NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

Introduction

The *NIOSH Pocket Guide to Chemical Hazards* is intended as a source of general industrial hygiene information for workers, employers, and occupational health professionals. The *Pocket Guide* presents key information and data in abbreviated tabular form for 677 chemicals or substance groupings (e.g., manganese compounds, tellurium compounds, inorganic tin compounds, etc.) that are found in the work environment. The industrial hygiene information found in the *Pocket Guide* should help users recognize and control occupational chemical hazards. The chemicals or substances contained in this revision include all substances for which the National Institute for Occupational Safety and Health (NIOSH) has recommended exposure limits (RELs) and those with permissible exposure limits (PELs) as found in the Occupational Safety and Health Administration (OSHA) General Industry Air Contaminants Standard (29 CFR 1910.1000).

Background

In 1974, NIOSH (which is responsible for recommending health and safety standards) joined OSHA (whose jurisdictions include promulgation and enforcement activities) in developing a series of occupational health standards for substances with existing PELs. This joint effort was labeled the Standards Completion Program and involved the cooperative efforts of several contractors and personnel from various divisions within NIOSH and OSHA. The Standards Completion Program developed 380 substance-specific draft standards with supporting documentation that contained technical information and recommendations needed for the promulgation of new occupational health regulations. The *Pocket Guide* was developed to make the technical information in those draft standards more conveniently available to workers, employers, and occupational health professionals. The *Pocket Guide* is updated periodically to reflect new data regarding the toxicity of various substances and any changes in exposure standards or recommendations.

Data Collection and Application

The data were collected from a variety of sources, including NIOSH policy documents such as criteria documents and Current Intelligence Bulletins (CIBs), and recognized references in the fields of industrial hygiene, occupational medicine, toxicology, and analytical chemistry.

NIOSH RECOMMENDATIONS

Acting under the authority of the Occupational Safety and Health Act of 1970 (29 USC Chapter 15) and the Federal Mine Safety and Health Act of 1977 (30 USC Chapter 22), NIOSH develops and periodically revises recommended exposure limits (RELs) for hazardous substances or conditions in the workplace. NIOSH also recommends appropriate preventive measures to reduce or eliminate the adverse health and safety effects of these hazards. To formulate these recommendations, NIOSH evaluates all known and available medical, biological, engineering, chemical, trade, and other information relevant to the hazard. These recommendations are then published and transmitted to OSHA and the Mine Safety and Health Administration (MSHA) for use in promulgating legal standards.

NIOSH recommendations are published in a variety of documents. Criteria documents recommend workplace exposure limits and appropriate preventive measures to reduce or eliminate adverse health effects and accidental injuries.

Current Intelligence Bulletins (CIBs) are issued to disseminate new scientific information about occupational hazards. A CIB may draw attention to a formerly

unrecognized hazard, report new data on a known hazard, or present information on hazard control.

Alerts, Special Hazard Reviews, Occupational Hazard Assessments, and Technical Guidelines support and complement the other standards development activities of the Institute. Their purpose is to assess the safety and health problems associated with a given agent or hazard (e.g., the potential for injury or for carcinogenic, mutagenic, or teratogenic effects) and to recommend appropriate control and surveillance methods. Although these documents are not intended to supplant the more comprehensive criteria documents, they are prepared to assist OSHA and MSHA in the formulation of regulations.

In addition to these publications, NIOSH periodically presents testimony before various Congressional committees and at OSHA and MSHA rulemaking hearings.

A complete list of occupational safety and health issues for which NIOSH has formal policies (e.g., recommendations for occupational exposure to chemical and physical hazards, engineering controls, work practices, safety considerations, etc.) can be found in *NIOSH Recommendations for Occupational Safety and Health: Compendium of Policy Documents and Statements* [DHHS (NIOSH) Publication No. 92-100].

HOW TO USE THIS POCKET GUIDE

The Pocket Guide has been designed to provide chemical-specific data to supplement general industrial hygiene knowledge. To maximize the amount of data provided in this limited space, abbreviations and codes have been used extensively. These abbreviations and codes, which have been designed to permit rapid comprehension by the regular user, are discussed for each column in the following subsections.

Chemical Name and Structure/Formula, AS and RTECS Numbers, and DOT ID and Guide Numbers

Chemical Name and Structure/Formula - The chemical name found in the OSHA General Industry Air Contaminants Standard (29 CFR 1910.1000) is listed first. The chemical formula is also provided under the chemical name.

CAS and RTECS Numbers - The Chemical Abstracts Service (CAS) number, in the format xxx-xx-x, is unique for each chemical and allows efficient searching on computerized data bases. The *NIOSH Registry of Toxic Effects of Chemical Substances* (RTECS) number, in the format ABxxxxxxx, may be useful for obtaining additional toxicologic information on a specific substance.

DOT ID and GUIDE Number - The U.S. Department of Transportation (DOT) identification number and the corresponding guide number. Their format is xxxx xxx. The Identification number (xxxx) indicates that the chemical is regulated by DOT. The Guide number (xxx) refers to actions to be taken to stabilize an emergency situation; this information can be found in the *1996 North American Emergency Response Guidebook* (Office of Hazardous Materials Training and Initiatives [DHM-50], Research and Special Programs Administration, U.S. Department of Transportation, Washington, D.C. 20590-0001; for sale by the U.S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, D.C. 20402-9328). A page index for all DOT ID numbers listed is included at the back of the *Pocket Guide* to help the user locate a specific substance; please note however, that many DOT numbers are NOT unique for specific substances.

Synonyms, Trade Names, and Conversion Factors

Common synonyms and trade names are listed alphabetically for each chemical. Factors for the conversion of ppm (parts of vapor or gas per million parts of contaminated air by volume) to mg/m^3 (milligrams of vapor or gas per cubic meter of contaminated air) at 25 °C and 1 atmosphere are listed for chemicals with exposure limits expressed in ppm.

Exposure Limits

The NIOSH recommended exposure limits (RELs) are listed first in this column. Unless noted otherwise, RELs are time-weighted average (TWA) concentrations for up to a 10-hour workday during a 40-hour workweek. A short-term exposure limit (STEL) is designated by "ST" preceding the value; unless noted otherwise, the STEL is a 15-minute TWA exposure that should not be exceeded at any time during a workday. A ceiling REL is designated by "C" preceding the value; unless noted otherwise, the ceiling value should not be exceeded at any time. Any substance that NIOSH considers to be a potential occupational carcinogen is designated by the notation "Ca" see (Appendix A, which contains a brief discussion of potential occupational carcinogens).

The OSHA permissible exposure limits (PELs), as found in Tables Z-1, Z-2, and Z-3 of the OSHA General Industry Air Contaminants Standard (29 CFR 1910.1000), that were effective on July 1, 1993* and which are currently enforced by OSHA are listed next. [*Note: In July 1992, the 11th Circuit Court of Appeals in its decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992) vacated more protective PELs set by OSHA in 1989 for 212 substances, moving them back to PELs established in 1971. The appeals court also vacated new PELs for 164 substances that were not previously regulated. The substances for which OSHA PELs were vacated on June 30, 1993 are indicated by the symbol "†" following OSHA PEL in this column. A number of RELs are based on NIOSH concurrence with the data presented and the airborne exposure limits proposed in this rulemaking.] Unless noted otherwise, PELs are TWA concentrations that must not be exceeded during any 8-hour workshift of a 40-hour workweek. A STEL is designated by "ST" preceding the value and is measured over a 15-minute period unless noted otherwise. OSHA ceiling concentrations (designated by "C" preceding the value) must not be exceeded during any part of the workday; if instantaneous monitoring is not feasible, the ceiling must be assessed as a 15-minute TWA exposure. In addition, there are a number of substances from Table Z-2 (e.g., beryllium, ethylene dibromide, etc.) that have PEL ceiling values that must not be exceeded except for specified excursions. For example, a "5-minute maximum peak in any 2 hours" means that a 5-minute exposure above the ceiling value, but never above the maximum peak, is allowed in any 2 hours during an 8-hour workday. Appendix B contains a brief discussion of substances regulated as carcinogens by OSHA.

Concentrations are given in ppm, mg/m^3, mppcf (millions of particles per cubic foot of air as determined from counting an impinger sample), or fibers/cm^3 (fibers per cubic centimeter). The "[skin]" designation indicates the potential for dermal absorption; skin exposure should be prevented as necessary through the use of good work practices and gloves, coveralls, goggles, and other appropriate equipment. The "(total)" designation indicates that the REL or PEL listed is for "total particulate" versus the "(resp)" designation which refers to the "respirable fraction" of the airborne particulate. Appendix C contains more detailed discussions of the specific exposure limits for certain low-molecular-weight aldehydes, asbestos, various dyes (benzidine-, o-tolidine-, and o-dianisidine-based), carbon black, the various chromium compounds (chromic acid and chromates, chromium(II) and chromium(III) compounds, and chromium metal), coal tar pitch volatiles, coke oven emissions, cotton dust, lead, NIAX Catalyst ESN, trichloroethylene, and tungsten carbide (cemented). Appendix D contains a brief discussion of substances included in the *Pocket Guide* with no established RELs at this time and Appendix F contains miscellaneous notes regarding the OSHA PELs. Appendix G lists the OSHA PELs that were vacated on June 30, 1993.]

IDLH

For the June 1994 Edition of the *Pocket Guide*, immediately dangerous to life or health concentrations (IDLHs) were reviewed and, in many cases, were revised and made more protective. As a consequence of the IDLH changes, many of the respirator recommendations for these substances were also revised. The criteria utilized to determine the adequacy of existing IDLH values were a combination of those used during the Standards Completion Program and a newer methodology developed by NIOSH. These "interim" criteria form a tiered approach with acute human toxicity data being used preferentially, followed next by acute animal inhalation toxicity data, and then finally by acute animal oral toxicity data to determine an updated IDLH value. When relevant acute toxicity data were insufficient or unavailable, the use of chronic toxicity data or an analogy to a chemically similar substance was considered. The criteria and information sources for both the original and revised IDLH values are given in *Documentation for Immediately Dangerous to Life and Health Concentrations (IDLHs)* (NTIS Publication No. PB-94-195047). NIOSH is currently assessing the various uses of

IDLHs and whether the original criteria used to derive the IDLH values are valid or if other information or criteria should be utilized. Based on this assessment, NIOSH will develop a new strategy for revising the IDLH values currently listed, as well as for developing new IDLH values for the more than 300 substances listed in the *Pocket Guide* without IDLHs.

The definition of IDLH that was derived during the Standards Completion Program was based on the Mine Safety and Health Administration (MSHA) definition stipulated in 30 CFR 11.3(t). The purpose for establishing an IDLH value in the Standards Completion Program was to ensure that a worker could escape without injury or irreversible health effects from an IDLH exposure in the event of the failure of respiratory protection equipment. The IDLH was considered a maximum concentration above which only a highly reliable breathing apparatus providing maximum worker protection was permitted. In determining IDLH values, the ability of a worker to escape without loss of life or irreversible health effects was considered along with severe eye or respiratory irritation and other deleterious effects (e.g., disorientation or incoordination) that could prevent escape. As a safety margin, the Standards Completion Program IDLH values were based on the effects that might occur as a consequence of a 30-minute exposure. However, the 30-minute period was NOT meant to imply that workers should stay in the work environment any longer than necessary, in fact, EVERY EFFORT SHOULD BE MADE TO EXIT IMMEDIATELY!

The current NIOSH definition for an IDLH exposure condition, as stipulated in the *NIOSH Respirator Decision Logic* (DHHS [NIOSH] Publication No. 87-108, NTIS Publication No. PB-91-151183), is a condition "that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment." The purpose of establishing an IDLH exposure concentration is to "ensure that the worker can escape from a given contaminated environment in the event of failure of the respiratory protection equipment." The *NIOSH Respirator Decision Logic* uses these IDLH values as one of several respirator selection criteria. Under the *NIOSH Respirator Decision Logic*, the most protective respirators (e.g., a self-contained breathing apparatus equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode) would be selected for firefighting, exposure to carcinogens, entry into oxygen-deficient atmospheres, in emergency situations, during entry into an atmosphere that contains a substance at a concentration greater than 2,000 times the NIOSH REL or OSHA PEL, and for entry into IDLH atmospheres.

IDLH values are listed for over 380 substances. The notation "Ca" appears in this column for all substances that NIOSH considers to be potential occupational carcinogens. However, IDLH values that were originally determined in the Standards Completion Program or were recently revised are shown in brackets following the "Ca" designations. "10%LEL" indicates that the IDLH was based on 10% of the lower explosive limit for safety considerations even though the relevant toxicological data indicated that irreversible health effects or impairment of escape existed only at higher concentrations. "N.D." indicates that an IDLH has not as yet been determined.

Physical Description

This entry provides a brief description of the appearance and odor of each substance. Notations are made as to whether a substance can be shipped as a liquefied compressed gas or whether it has major use as a pesticide.

Chemical and Physical Properties

The following abbreviations are used for the chemical and physical properties given for each substance. "NA" indicates that a property is not applicable, and a question mark (?) indicates that it is unknown.

MW	Molecular weight
BP	Boiling point at 1 atmosphere, °F
Sol	Solubility in water at 68 °F (unless a different temperature is noted), % by weight (i.e., g/100 ml)
Fl.P	Flash point (i.e., the temperature at which the liquid phase gives off enough vapor to flash when exposed to an external

	ignition source), closed cup (unless annotated "(oc)" for open cup), °F
IP	Ionization potential, eV (electron volts) [Ionization potentials are given as a guideline for the selection of photoionization detector lamps used in some direct-reading instruments.]
VP	Vapor pressure at 68 °F (unless a different temperature is noted), mm Hg; "approx" indicates approximately
MLT	Melting point for solids, °F
FRZ	Freezing point for liquids and gases, °F
UEL	Upper explosive (flammable) limit in air, % by volume (at room temperature unless otherwise noted)
LEL	Lower explosive (flammable) limit in air, % by volume (at room temperature unless otherwise noted)
MEC	Minimum explosive concentration, g/m^3 (when available)
Sp.Gr	Specific gravity at 68 °F (unless a different temperature is noted) referenced to water at 39.2 °F (4 °C)
RGasD	Relative density of gases referenced to air = 1 (indicates how many times a gas is heavier than air at the same temperature)

When possible, the flammability/combustibility of a substance was determined and listed after the specific gravity. The following OSHA criteria (29 CFR 1910.106) were used to classify flammable or combustible liquids:

Class IA flammable liquid	Fl.P. below 73 °F and BP below 100 °F.
Class IB flammable liquid	Fl.P. below 73 °F and BP at or above 100 °F.
Class IC flammable liquid	Fl.P. at or above 73 °F and below 100 °F.
Class II combustible liquid	Fl.P. at or above 100 °F and below 140 °F.
Class IIIA combustible liquid	Fl.P. at or above 140 °F and below 200 °F.
Class IIIB combustible liquid	Fl.P. at or above 200 °F.

Incompatibilities and Reactivities

This entry lists important hazardous incompatibilities or reactivities of each substance.

Measurement Methods

This entry provides a source (NIOSH or OSHA) and the method number for which a measurement method can be used to determine the exposure. Unless otherwise noted, the NIOSH methods are from the 4th edition of the *NIOSH Manual of Analytical Methods* (DHHS [NIOSH] Publication No. 94-113). If a different edition of the *NIOSH Manual of Analytical Methods* is cited, the appropriate edition and, where applicable, the volume number would be noted [e.g., II-4 (2nd edition, volume 4)]. The OSHA methods are from the OSHA web site, http://www.osha-slc.gov/dts/sltc/methods/ . "None available" means that no method is available from the NIOSH or OSHA source.

Personal Protection and Sanitation

This column presents a summary of recommended practices for each toxic substance. These recommendations supplement general work practices (e.g., no eating, drinking, or smoking where chemicals are used). Table 3 explains the codes used. Each category is described as follows:

SKIN:	Recommends the need for personal protective clothing.
EYES:	Recommends the need for eye protection.

WASH SKIN:	Recommends when workers should wash the spilled chemical from the body in addition to normal washing (e.g., before eating).
REMOVE:	Advises workers when to remove clothing that has accidentally become wet or significantly contaminated.
CHANGE:	Recommends whether the routine changing of clothing is needed.
PROVIDE:	Recommends the need for eyewash fountains and/or quick drench facilities.

First Aid

This entry lists emergency procedures for eye and skin contact, inhalation, and ingestion of the toxic substance.

Respirator Recommendations

This entry provides a condensed table of allowable respirator use for those substances for which IDLH values have been determined. NIOSH is currently reevaluating the IDLH values, and as new or revised IDLH values are developed, respirator selection recommendations will be incorporated into subsequent editions of the *Pocket Guide*. In the interim no respirator recommendations will be made for substances without IDLH values (these will be noted by "To be added later").

NIOSH has developed a new set of regulations in 42 CFR 84 (also referred to as "Part 84") for testing and certifying nonpowered, air-purifying, particulate-filter respirators. The new Part 84 respirators have passed a more demanding certification test than the old respirators (e.g.; dust; dust and mist; dust, mist, and fume; spray paint; pesticide; etc.) certified under 30 CFR 11 (also referred to as "Part 11"). Under Part 84, NIOSH is allowing manufacturers to continue selling and shipping Part 11 particulate filters as NIOSH-certified until July 10, 1998. It is important to see the *NIOSH Guide to the Selection and Use of Particulate Respirators* (DHHS [NIOSH] publication 96-101) for substitution of Part 84 respirators for Part 11 respirators.

The first line in the entry indicates whether the "NIOSH" or the "OSHA" exposure limit is used on which to base the respirator recommendations. The more protective limit between the NIOSH REL or the OSHA PEL is always used. "NIOSH/OSHA" indicates that the limits are equivalent.

Each subsequent line lists a maximum use concentration (MUC) followed by the classes of respirators, with their assigned protection factors (APFs), that are acceptable for use up to the MUC. Individual respirator classes are separated by diagonal lines (/). More protective respirators may be worn. Emergency or planned entry into unknown concentrations or entry into IDLH conditions are followed by the classes of respirators acceptable for these conditions. "Escape" indicates that the respirators are to be used only for escape purposes. For each MUC or condition this entry lists only those respirators with the required APF and other use restrictions based on the *NIOSH Respirator Decision Logic*.

In certain cases, the recommended respirators are annotated with the following symbols as additonal information:

- * Substance reported to cause eye irritation or damage; may require eye protection
- £ Substance causes eye irritation or damage; eye protection needed
- ^ If not present as a fume
- ¿ Only nonoxidizable sorbents allowed (not charcoal)
- † End of service life indicator (ESLI) required

All respirators selected must be approved by NIOSH and MSHA under the provisions of 30 CFR 11 or by NIOSH under 42 CFR 84. The current listing of NIOSH/MSHA certified respirators can be found in the *NIOSH Certified Equipment*

List (DHHS [NIOSH] Publication No. 94-104). A list of Part 84 respirators can be found on the NIOSH Home Page (http://www.cdc.gov/niosh/) or obtained by calling 1-800-35-NIOSH.

A complete respiratory protection program must be implemented and must fulfill all requirements of 29 CFR 1910.134. A respiratory protection program must include a written standard operating procedure covering regular training, fit-testing, fit-checking, periodic environmental monitoring, maintenance, medical monitoring, inspection, cleaning, storage and periodic program evaluation. Selection of a specific respirator within a given class of recommended respirators depends on the particular situation; this choice should be made only by a knowledgeable person. *REMEMBER:* Air-purifying respirators will not protect users against oxygen-deficient atmospheres, and they are not to be used in IDLH conditions. The only respirators recommended for fire fighting are self-contained breathing apparatuses that have full facepieces and are operated in a pressure-demand or other positive-pressure modes. Additional information on the selection and use of respirators can be found in the *NIOSH Respirator Decision Logic* and the *NIOSH Guide to Industrial Respiratory Protection* (DHHS [NIOSH] Publication No. 87-116).

Route of Health Hazard

This entry lists the toxicologically important routes of entry for each substance and whether contact with the skin or eyes is potentially hazardous.

Symptoms

This entry lists the potential symptoms of exposure.

Target Organs

This entry lists the organs that are affected by exposure to each substance.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

Online
NIOSH Pocket Guide
to Chemical Hazards

INDEX of Chemical Names

A B C D E F G H I K L M

N O P Q R S T U V W X Y Z

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0001	Acetaldehyde	75-07-0	AB1925000
0002	Acetic acid	64-19-7	AF1225000
0003	Acetic anhydride	108-24-7	AK1925000
0004	Acetone	67-64-1	AL3150000
0005	Acetone cyanohydrin	75-86-5	OD9275000
0006	Acetonitrile	75-05-8	AL7700000
0007	2-Acetylaminofluorene	53-96-3	AB9450000
0008	Acetylene	74-86-2	AO9600000
0009	Acetylene tetrabromide	79-27-6	KI8225000
0010	Acetylsalicyclic acid	50-78-2	VO0700000
0011	Acrolein	107-02-8	AS1050000
0012	Acrylamide	79-06-1	AS3325000
0013	Acrylic acid	79-10-7	AS4375000
0014	Acrylonitrile	107-13-1	AT5250000
0015	Adiponitrile	111-69-3	AV2625000
0016	Aldrin	309-00-2	IO2100000
0017	Allyl alcohol	107-18-6	BA5075000
0018	Allyl chloride	107-05-1	UC7350000
0019	Allyl glycidyl ether	106-92-3	RR0875000
0020	Allyl propyl disulfide	2179-59-1	JO0350000
0021	alpha-Alumina	1344-28-1	BD1200000
0022	Aluminum	7429-90-5	BD0330000
0023	Aluminum (pyro powders and welding fumes		
0024	Aluminum (soluble salts and alkyls, as A		
0025	4-Aminodiphenyl	92-67-1	DU8925000
0026	2-Aminopyridine	504-29-0	US1575000
0027	Amitrole	61-82-5	XZ3850000
0028	Ammonia	7664-41-7	BO0875000
0029	Ammonium chloride fume	12125-02-9	BP4550000
0030	Ammonium sulfamate	7773-06-0	WO6125000
0031	n-Amyl acetate	628-63-7	AJ1925000
0032	sec-Amyl acetate	626-38-0	AJ2100000
0033	Aniline (and homologs)	62-53-3	BW6650000
0034	o-Anisidine	90-04-0	BZ5410000
0035	p-Anisidine	104-94-9	BZ5450000
0036	Antimony	7440-36-0	CC4025000
0037	ANTU	86-88-4	YT9275000
0038	Arsenic (inorganic compounds, as As)	7440-38-2	CG0525000
0039	Arsenic, organic compounds (as As)		
0040	Arsine	7784-42-1	CG6475000
0041	Asbestos	1332-21-4	CI6475000
0042	Asphalt fumes	8052-42-4	CI9900000
0043	Atrazine	1912-24-9	XY5600000
0044	Azinphos-methyl	86-50-0	TE1925000

GUIDE CHEMICAL NAME CAS NO RTECS NO

0045	Barium chloride (as Ba)	10361-37-2	CQ8750000
0046	Barium nitrate (as Ba)	10022-31-8	CQ9625000
0047	Barium sulfate	7727-43-7	CR0600000
0048	Benomyl	17804-35-2	DD6475000
0049	Benzene	71-43-2	CY1400000
0050	Benzenethiol	108-98-5	DC0525000
0051	Benzidine	92-87-5	DC9625000
0052	Benzoyl peroxide	94-36-0	DM8575000
0053	Benzyl chloride	100-44-7	XS8925000
0054	Beryllium & beryllium compounds (as Be)	7440-41-7	DS1750000
0055	Bismuth telluride, doped with Selenium s		
0056	Bismuth telluride, undoped	1304-82-1	EB3110000
0057	Borates, tetra, sodium salts (Anhydrous)	1330-43-4	ED4588000
0058	Borates, tetra, sodium salts (Decahydrat	1303-96-4	VZ2275000
0059	Borates, tetra, sodium salts (Pentahydra	12179-04-3	
0060	Boron oxide	1303-86-2	ED7900000
0061	Boron tribromide	10294-33-4	ED7400000
0062	Boron trifluoride	7637-07-2	ED2275000
0063	Bromacil	314-40-9	YQ9100000
0064	Bromine	7726-95-6	EF9100000
0065	Bromine pentafluoride	7789-30-2	EF9350000
0066	Bromoform	75-25-2	PB5600000
0067	1,3-Butadiene	106-99-0	EI9275000
0068	n-Butane	106-97-8	EJ4200000
0069	2-Butanone	78-93-3	EL6475000
0070	2-Butoxyethanol	111-76-2	KJ8575000
0071	2-Butoxyethanol acetate	112-07-2	KJ8925000
0072	n-Butyl acetate	123-86-4	AF7350000
0073	sec-Butyl acetate	105-46-4	AF7380000
0074	tert-Butyl acetate	540-88-5	AF7400000
0075	Butyl acrylate	141-32-2	UD3150000
0076	n-Butyl alcohol	71-36-3	EO1400000
0077	sec-Butyl alcohol	78-92-2	EO1750000
0078	tert-Butyl alcohol	75-65-0	EO1925000
0079	n-Butylamine	109-73-9	EO2975000
0080	tert-Butyl chromate	1189-85-1	GB2900000
0081	n-Butyl glycidyl ether	2426-08-6	TX4200000
0082	n-Butyl lactate	138-22-7	OD4025000
0083	n-Butyl mercaptan	109-79-5	EK6300000
0084	o-sec-Butylphenol	89-72-5	SJ8920000
0085	p-tert-Butyltoluene	98-51-1	XS8400000
0086	n-Butyronitrile	109-74-0	ET8750000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0087	Cadmium dust (as Cd)	7440-43-9	EU9800000
0088	Cadmium fume (as Cd)	1306-19-0	EV1930000
0089	Calcium arsenate (as As)	7778-44-1	CG0830000
0090	Calcium carbonate	1317-65-3	EV9580000
0091	Calcium cyanamide	156-62-7	GS6000000
0092	Calcium hydroxide	1305-62-0	EW2800000
0093	Calcium oxide	1305-78-8	EW3100000
0094	Calcium silicate	1344-95-2	VV9150000
0095	Calcium sulfate	7778-18-9	WS6920000
0096	Camphor (synthetic)	76-22-2	EX1225000
0097	Caprolactam	105-60-2	CM3675000
0098	Captafol	2425-06-1	GS4900000
0099	Captan	133-06-2	GW5075000
0100	Carbaryl	63-25-2	FC5950000
0101	Carbofuran	1563-66-2	FB9450000
0102	Carbon black	1333-86-4	FF5800000
0103	Carbon dioxide	124-38-9	FF6400000
0104	Carbon disulfide	75-15-0	FF6650000
0105	Carbon monoxide	630-08-0	FG3500000
0106	Carbon tetrabromide	558-13-4	FG4725000
0107	Carbon tetrachloride	56-23-5	FG4900000
0108	Carbonyl fluoride	353-50-4	FG6125000
0109	Catechol	120-80-9	UX1050000

0110	Cellulose	9004-34-6	FJ5691460
0111	Cesium hydroxide	21351-79-1	FK9800000
0112	Chlordane	57-74-9	PB9800000
0113	Chlorinated camphene	8001-35-2	XW5250000
0114	Chlorinated diphenyl oxide		
0115	Chlorine	7782-50-5	FO2100000
0116	Chlorine dioxide	10049-04-4	FO3000000
0117	Chlorine trifluoride	7790-91-2	FO2800000
0118	Chloroacetaldehyde	107-20-0	AB2450000
0119	alpha-Chloroacetophenone	532-27-4	AM6300000
0120	Chloroacetyl chloride	79-04-9	AO6475000
0121	Chlorobenzene	108-90-7	CZ0175000
0122	o-Chlorobenzylidene malononitrile	2698-41-1	OO3675000
0123	Chlorobromomethane	74-97-5	PA5250000
0124	Chlorodifluoromethane	75-45-6	PA6390000
0125	Chlorodiphenyl (42% chlorine)	53469-21-9	TQ1356000
0126	Chlorodiphenyl (54% chlorine)	11097-69-1	TQ1360000
0127	Chloroform	67-66-3	FS9100000
0128	bis-Chloromethyl ether	542-88-1	KN1575000
0129	Chloromethyl methyl ether	107-30-2	KN6650000
0130	1-Chloro-1-nitropropane	600-25-9	TX5075000
0131	Chloropentafluoroethane	76-15-3	KH7877500
0132	Chloropicrin	76-06-2	PB6300000
0133	beta-Chloroprene	126-99-8	EI9625000
0134	o-Chlorostyrene	2039-87-4	WL4160000
0135	o-Chlorotoluene	95-49-8	XS9000000
0136	2-Chloro-6-trichloromethyl pyridine	1929-82-4	US7525000
0137	Chlorpyrifos	2921-88-2	TF6300000
0138	Chromic acid and chromates	1333-82-0	GB6650000
0139	Chromium(II) compounds (as Cr)		
0140	Chromium(III) compounds (as Cr)		
0141	Chromium metal	7440-47-3	GB4200000
0142	Chromyl chloride	14977-61-8	GB5775000
0143	Clopidol	2971-90-6	UU7711500
0144	Coal dust		GF8281000
0145	Coal tar pitch volatiles	65996-93-2	GF8655000
0146	Cobalt metal dust and fume (as Co)	7440-48-4	GF8750000
0147	Cobalt carbonyl (as Co)	10210-68-1	GG0300000
0148	Cobalt hydrocarbonyl (as Co)	16842-03-8	GG0900000
0149	Coke oven emissions		GH0346000
0150	Copper (dusts and mists, as Cu)	7440-50-8	GL5325000
0151	Copper fume (as Cu)	1317-38-0	GL7900000
0152	Cotton dust (raw)		GN2275000
0153	Crag® herbicide	136-78-7	KK4900000
0154	o-Cresol	95-48-7	GO6300000
0155	m-Cresol	108-39-4	GO6125000
0156	p-Cresol	106-44-5	GO6475000
0157	Crotonaldehyde	4170-30-3	GP9499000
0158	Crufomate	299-86-5	TB3850000
0159	Cumene	98-82-8	GR8575000
0160	Cyanamide	420-04-2	GS5950000
0161	Cyanogen	460-19-5	GT1925000
0162	Cyanogen chloride	506-77-4	GT2275000
0163	Cyclohexane	110-82-7	GU6300000
0164	Cyclohexanethiol	1569-69-3	GV7525000
0165	Cyclohexanol	108-93-0	GV7875000
0166	Cyclohexanone	108-94-1	GW1050000
0167	Cyclohexene	110-83-8	GW2500000
0168	Cyclohexylamine	108-91-8	GX0700000
0169	Cyclonite	121-82-4	XY9450000
0170	Cyclopentadiene	542-92-7	GY1000000
0171	Cyclopentane	287-92-3	GY2390000
0172	Cyhexatin	13121-70-5	WH8750000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0173	2,4-D	94-75-7	AG6825000
0174	DDT	50-29-3	KJ3325000
0175	Decaborane	17702-41-9	HD1400000
0176	1-Decanethiol	143-10-2	

0177	Demeton	8065-48-3	TF3150000
0178	Diacetone alcohol	123-42-2	SA9100000
0179	2,4-Diaminoanisole (and its salts)	615-05-4	BZ8580500
0180	o-Dianisidine	119-90-4	DD0875000
0181	Diazinon®	333-41-5	TF3325000
0182	Diazomethane	334-88-3	PA7000000
0183	Diborane	19287-45-7	HQ9275000
0184	1,2-Dibromo-3-chloropropane	96-12-8	TX8750000
0185	2-N-Dibutylaminoethanol	102-81-8	KK3850000
0186	Dibutyl phosphate	107-66-4	TB9605000
0187	Dibutyl phthalate	84-74-2	TI0875000
0188	Dichloroacetylene	7572-29-4	AP1080000
0189	o-Dichlorobenzene	95-50-1	CZ4500000
0190	p-Dichlorobenzene	106-46-7	CZ4550000
0191	3,3'-Dichlorobenzidine (and its salts)	91-94-1	DD0525000
0192	Dichlorodifluoromethane	75-71-8	PA8200000
0193	1,3-Dichloro-5,5-dimethylhydantoin	118-52-5	MU0700000
0194	1,1-Dichloroethane	75-34-3	KI0175000
0195	1,2-Dichloroethylene	540-59-0	KV9360000
0196	Dichloroethyl ether	111-44-4	KN0875000
0197	Dichloromonofluoromethane	75-43-4	PA8400000
0198	1,1-Dichloro-1-nitroethane	594-72-9	KI1050000
0199	1,3-Dichloropropene	542-75-6	UC8310000
0200	2,2-Dichloropropionic acid	75-99-0	UF0690000
0201	Dichlorotetrafluoroethane	76-14-2	KI1101000
0202	Dichlorvos	62-73-7	TC0350000
0203	Dicrotophos	141-66-2	TC3850000
0204	Dicyclopentadiene	77-73-6	PC1050000
0205	Dicyclopentadienyl iron	102-54-5	LK0700000
0206	Dieldrin	60-57-1	IO1750000
0207	Diesel exhaust		
0208	Diethanolamine	111-42-2	KL2975000
0209	Diethylamine	109-89-7	HZ8750000
0210	2-Diethylaminoethanol	100-37-8	KK5075000
0211	Diethylenetriamine	111-40-0	IE1225000
0212	Diethyl ketone	96-22-0	SA8050000
0213	Diethyl phthalate	84-66-2	TI1050000
0214	Difluorodibromomethane	75-61-6	PA7525000
0215	Diglycidyl ether	2238-07-5	KN2350000
0216	Diisobutyl ketone	108-83-8	MJ5775000
0217	Diisopropylamine	108-18-9	IM4025000
0218	Dimethyl acetamide	127-19-5	AB7700000
0219	Dimethylamine	124-40-3	IP8750000
0220	4-Dimethylaminoazobenzene	60-11-7	BX7350000
0221	bis(2-(Dimethylamino)ethyl)ether	3033-62-3	KR9460000
0222	Dimethylaminopropionitrile	1738-25-6	UG1575000
0223	N,N-Dimethylaniline	121-69-7	BX4725000
0224	Dimethyl carbamoyl chloride	79-44-7	FD4200000
0225	Dimethyl-1,2-dibromo-2,2-dichlorethyl ph	300-76-5	TB9450000
0226	Dimethylformamide	68-12-2	LQ2100000
0227	1,1-Dimethylhydrazine	57-14-7	MV2450000
0228	Dimethylphthalate	131-11-3	TI1575000
0229	Dimethyl sulfate	77-78-1	WS8225000
0230	Dinitolmide	148-01-6	XS4200000
0231	o-Dinitrobenzene	528-29-0	CZ7450000
0232	m-Dinitrobenzene	99-65-0	CZ7350000
0233	p-Dinitrobenzene	100-25-4	CZ7525000
0234	Dinitro-o-cresol	534-52-1	GO9625000
0235	Dinitrotoluene	25321-14-6	XT1300000
0236	Di-sec octyl phthalate	117-81-7	TI0350000
0237	Dioxane	123-91-1	JG8225000
0238	Dioxathion	78-34-2	TE3350000
0239	Diphenyl	92-52-4	DU8050000
0240	Diphenylamine	122-39-4	JJ7800000
0241	Dipropylene glycol methyl ether	34590-94-8	JM1575000
0242	Dipropyl ketone	123-19-3	MJ5600000
0243	Diquat (Diquat dibromide)	85-00-7	JM5690000
0244	Disulfiram	97-77-8	JO1225000
0245	Disulfoton	298-04-4	TD9275000
0246	2,6-Di-tert-butyl-p-cresol	128-37-0	GO7875000
0247	Diuron	330-54-1	YS8925000

0248	Divinyl benzene	1321-74-0	CZ9370000
0249	1-Dodecanethiol	112-55-0	JR3155000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0250	Emery	1302-74-5	GN0231000
0251	Endosulfan	115-29-7	RB9275000
0252	Endrin	72-20-8	IO1575000
0253	Enflurane	13838-16-9	KN6800000
0254	Epichlorohydrin	106-89-8	TX4900000
0255	EPN	2104-64-5	TB1925000
0256	Ethanolamine	141-43-5	KJ5775000
0257	Ethion	563-12-2	TE4550000
0258	2-Ethoxyethanol	110-80-5	KK8050000
0259	2-Ethoxyethyl acetate	111-15-9	KK8225000
0260	Ethyl acetate	141-78-6	AH5425000
0261	Ethyl acrylate	140-88-5	AT0700000
0262	Ethyl alcohol	64-17-5	KQ6300000
0263	Ethylamine	75-04-7	KH2100000
0264	Ethyl benzene	100-41-4	DA0700000
0265	Ethyl bromide	74-96-4	KH6475000
0266	Ethyl butyl ketone	106-35-4	MJ5250000
0267	Ethyl chloride	75-00-3	KH7525000
0268	Ethylene chlorohydrin	107-07-3	KK0875000
0269	Ethylenediamine	107-15-3	KH8575000
0270	Ethylene dibromide	106-93-4	KH9275000
0271	Ethylene dichloride	107-06-2	KI0525000
0272	Ethylene glycol	107-21-1	KW2975000
0273	Ethylene glycol dinitrate	628-96-6	KW5600000
0274	Ethyleneimine	151-56-4	KX5075000
0275	Ethylene oxide	75-21-8	KX2450000
0276	Ethylene thiourea	96-45-7	NI9625000
0277	Ethyl ether	60-29-7	KI5775000
0278	Ethyl formate	109-94-4	LQ8400000
0279	Ethylidene norbornene	16219-75-3	RB9450000
0280	Ethyl mercaptan	75-08-1	K19625000
0281	N-Ethylmorpholine	100-74-3	QE4025000
0282	Ethyl silicate	78-10-4	VV9450000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0283	Fenamiphos	22224-92-6	TB3675000
0284	Fensulfothion	115-90-2	TF3850000
0285	Fenthion	55-38-9	TF9625000
0286	Ferbam	14484-64-1	NO8750000
0287	Ferrovanadium dust	12604-58-9	LK2900000
0288	Fibrous glass dust		LK3651000
0289	Fluorine	7782-41-4	LM6475000
0290	Fluorotrichloromethane	75-69-4	PB6125000
0291	Fluoroxene	406-90-6	KO4250000
0292	Fonofos	944-22-9	TA5950000
0293	Formaldehyde	50-00-0	LP8925000
0294	Formalin (as formaldehyde)		
0295	Formamide	75-12-7	LQ0525000
0296	Formic acid	64-18-6	LQ4900000
0297	Furfural	98-01-1	LT7000000
0298	Furfuryl alcohol	98-00-0	LU9100000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0299	Gasoline	8006-61-9	LX3300000
0300	Germanium tetrahydride	7782-65-2	LY4900000
0301	Glutaraldehyde	111-30-8	MA2450000
0302	Glycerin (mist)	56-81-5	MA8050000
0303	Glycidol	556-52-5	UB4375000
0304	Glycolonitrile	107-16-4	AM0350000
0305	Grain dust (oat, wheat, barley)		MD7900000
0306	Graphite (natural)	7782-42-5	MD9659600

0307	Graphite (synthetic)	7440-44-0	FF5250100
0308	Gypsum	13397-24-5	MG2360000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0309	Hafnium	7440-58-6	MG4600000
0310	Halothane	151-67-7	KH6550000
0311	Heptachlor	76-44-8	PC0700000
0312	n-Heptane	142-82-5	MI7700000
0313	1-Heptanethiol	1639-09-4	MJ1400000
0314	Hexachlorobutadiene	87-68-3	EJ0700000
0315	Hexachlorocyclopentadiene	77-47-4	GY1225000
0316	Hexachloroethane	67-72-1	KI4025000
0317	Hexachloronaphthalene	1335-87-1	QJ7350000
0318	1-Hexadecanethiol	2917-26-2	
0319	Hexafluoroacetone	684-16-2	UC2450000
0320	Hexamethylene diisocyanate	822-06-0	MO1740000
0321	Hexamethyl phosphoramide	680-31-9	TD0875000
0322	n-Hexane	110-54-3	MN9275000
0323	Hexane isomers (excluding n-Hexane)		
0324	n-Hexanethiol	111-31-9	MO4550000
0325	2-Hexanone	591-78-6	MP1400000
0326	Hexone	108-10-1	SA9275000
0327	sec-Hexyl acetate	108-84-9	SA7525000
0328	Hexylene glycol	107-41-5	SA0810000
0329	Hydrazine	302-01-2	MU7175000
0330	Hydrogenated terphenyls	61788-32-7	WZ6535000
0331	Hydrogen bromide	10035-10-6	MW3850000
0332	Hydrogen chloride	7647-01-0	MW4025000
0333	Hydrogen cyanide	74-90-8	MW6825000
0334	Hydrogen fluoride (as F)	7664-39-3	MW7875000
0335	Hydrogen peroxide	7722-84-1	MX0900000
0336	Hydrogen selenide	7783-07-5	MX1050000
0337	Hydrogen sulfide	7783-06-4	MX1225000
0338	Hydroquinone	123-31-9	MX3500000
0339	2-Hydroxypropyl acrylate	999-61-1	AT1925000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0340	Indene	95-13-6	NK8225000
0341	Indium	7440-74-6	NL1050000
0342	Iodine	7553-56-2	NN1575000
0343	Iodoform	75-47-8	PB7000000
0344	Iron oxide dust and fume (as Fe)	1309-37-1	NO7400000
0345	Iron pentacarbonyl (as Fe)	13463-40-6	NO4900000
0346	Iron salts (soluble, as Fe)		
0347	Isoamyl acetate	123-92-2	NS9800000
0348	Isoamyl alcohol (primary)	123-51-3	EL5425000
0349	Isoamyl alcohol (secondary)	6032-29-7	
0350	Isobutane	75-28-5	TZ4300000
0351	Isobutyl acetate	110-19-0	AI4025000
0352	Isobutyl alcohol	78-83-1	NP9625000
0353	Isobutyronitrile	78-82-0	TZ4900000
0354	Isooctyl alcohol	26952-21-6	NS7700000
0355	Isophorone	78-59-1	GW7700000
0356	Isophorone diisocyanate	4098-71-9	NQ9370000
0357	2-Isopropoxyethanol	109-59-1	KL5075000
0358	Isopropyl acetate	108-21-4	AI4930000
0359	Isopropyl alcohol	67-63-0	NT8050000
0360	Isopropylamine	75-31-0	NT8400000
0361	N-Isopropylaniline	768-52-5	BY4190000
0362	Isopropyl ether	108-20-3	TZ5425000
0363	Isopropyl glycidyl ether	4016-14-2	TZ3500000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0364	Kaolin	1332-58-7	GF1670500
0365	Kepone	143-50-0	PC8575000

0366	Kerosene	8008-20-6	OA5500000
0367	Ketene	463-51-4	OA7700000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0368	Lead	7439-92-1	OF7525000
0369	Limestone	1317-65-3	EV9580000
0370	Lindane	58-89-9	GV4900000
0371	Lithium hydride	7580-67-8	OJ6300000
0372	L.P.G.	68476-85-7	SE7545000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0373	Magnesite	546-93-0	OM2470000
0374	Magnesium oxide fume	1309-48-4	OM3850000
0375	Malathion	121-75-5	WM8400000
0376	Maleic anhydride	108-31-6	ON3675000
0377	Malonaldehyde	542-78-9	TX6475000
0378	Malononitrile	109-77-3	OO3150000
0379	Manganese compounds and fume (as Mn)	7439-96-5	OO9275000
0380	Manganese cyclopentadienyl tricarbonyl	12079-65-1	OO9720000
0381	Manganese tetroxide (as Mn)	1317-35-7	OP0895000
0382	Marble	1317-65-3	EV9580000
0383	Mercury compounds [except (organo) alkyl	7439-97-6	OV4550000
0384	Mercury (organo) alkyl compounds (as Hg)		
0385	Mesityl oxide	141-79-7	SB4200000
0386	Methacrylic acid	79-41-4	OZ2975000
0387	Methomyl	16752-77-5	AK2975000
0388	Methoxychlor	72-43-5	KJ3675000
0389	Methoxyflurane	76-38-0	KN7820000
0390	4-Methoxyphenol	150-76-5	SL7700000
0391	Methyl acetate	79-20-9	AI9100000
0392	Methyl acetylene	74-99-7	UK4250000
0393	Methyl acetylene-propadiene mixture	59355-75-8	UK4920000
0394	Methyl acrylate	96-33-3	AT2800000
0395	Methylacrylonitrile	126-98-7	UD1400000
0396	Methylal	109-87-5	PA8750000
0397	Methyl alcohol	67-56-1	PC1400000
0398	Methylamine	74-89-5	PF6300000
0399	Methyl (n-amyl) ketone	110-43-0	MJ5075000
0400	Methyl bromide	74-83-9	PA4900000
0401	Methyl Cellosolve®	109-86-4	KL5775000
0402	Methyl Cellosolve® acetate	110-49-6	KL5950000
0403	Methyl chloride	74-87-3	PA6300000
0404	Methyl chloroform	71-55-6	KJ2975000
0405	Methyl-2-cyanoacrylate	137-05-3	AS7000000
0406	Methylcyclohexane	108-87-2	GV6125000
0407	Methylcyclohexanol	25639-42-3	GW0175000
0408	o-Methylcyclohexanone	583-60-8	GW1750000
0409	Methyl cyclopentadienyl manganese tricar	12108-13-3	OP1450000
0410	Methyl demeton	8022-00-2	TG1760000
0411	4,4'-Methylenebis(2-chloroaniline)	101-14-4	CY1050000
0412	Methylene bis(4-cyclohexylisocyanate)	5124-30-1	NQ9250000
0413	Methylene bisphenyl isocyanate	101-68-8	NQ9350000
0414	Methylene chloride	75-09-2	PA8050000
0415	4,4'-Methylenedianiline	101-77-9	BY5425000
0416	Methyl ethyl ketone peroxide	1338-23-4	EL9450000
0417	Methyl formate	107-31-3	LQ8925000
0418	5-Methyl-3-heptanone	541-85-5	MJ7350000
0419	Methyl hydrazine	60-34-4	MV5600000
0420	Methyl iodide	74-88-4	PA9450000
0421	Methyl isoamyl ketone	110-12-3	MP3850000
0422	Methyl isobutyl carbinol	108-11-2	SA7350000
0423	Methyl isocyanate	624-83-9	NQ9450000
0424	Methyl isopropyl ketone	563-80-4	EL9100000
0425	Methyl mercaptan	74-93-1	PB4375000
0426	Methyl methacrylate	80-62-6	OZ5075000
0427	Methyl parathion	298-00-0	TG0175000
0428	Methyl silicate	681-84-5	VV9800000

0429	alpha-Methyl styrene	98-83-9	WL5075300
0430	Metribuzin	21087-64-9	XZ2990000
0431	Mica (containing less than 1% quartz)	12001-26-2	VV8760000
0432	Mineral wool fiber		PY8070000
0433	Molybdenum	7439-98-7	QA4680000
0434	Molybdenum (soluble compounds, as Mo)		
0435	Monocrotophos	6923-22-4	TC4375000
0436	Monomethyl aniline	100-61-8	BY4550000
0437	Morpholine	110-91-8	QD6475000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0438	Naphtha (coal tar)	8030-30-6	DE3030000
0439	Naphthalene	91-20-3	QJ0525000
0440	Naphthalene diisocyanate	3173-72-6	NQ9600000
0441	alpha-Naphthylamine	134-32-7	QM1400000
0442	beta-Naphthylamine	91-59-8	QM2100000
0443	Niax® Catalyst ESN	62765-93-9	QR3900000
0444	Nickel carbonyl	13463-39-3	QR6300000
0445	Nickel metal and other compounds (as Ni)	7440-02-0	QR5950000
0446	Nicotine	54-11-5	QS5250000
0447	Nitric acid	7697-37-2	QU5775000
0448	Nitric oxide	10102-43-9	QX0525000
0449	p-Nitroaniline	100-01-6	BY7000000
0450	Nitrobenzene	98-95-3	DA6475000
0451	4-Nitrobiphenyl	92-93-3	DV5600000
0452	p-Nitrochlorobenzene	100-00-5	CZ1050000
0453	Nitroethane	79-24-3	K15600000
0454	Nitrogen dioxide	10102-44-0	QW9800000
0455	Nitrogen trifluoride	7783-54-2	QX1925000
0456	Nitroglycerine	55-63-0	QX2100000
0457	Nitromethane	75-52-5	PA9800000
0458	2-Nitronaphthalene	581-89-5	QJ9760000
0459	1-Nitropropane	108-03-2	TZ5075000
0460	2-Nitropropane	79-46-9	TZ5250000
0461	N-Nitrosodimethylamine	62-75-9	IQ0525000
0462	o-Nitrotoluene	88-72-2	XT3150000
0463	m-Nitrotoluene	99-08-1	XT2975000
0464	p-Nitrotoluene	99-99-0	XT3325000
0465	Nitrous oxide	10024-97-2	QX1350000
0466	Nonane	111-84-2	RA6115000
0467	1-Nonanethiol	1455-21-6	

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0468	Octachloronaphthalene	2234-13-1	QK0250000
0469	1-Octadecanethiol	2885-00-9	
0470	Octane	111-65-9	RG8400000
0471	1-Octanethiol	111-88-6	
0472	Oil mist (mineral)	8012-95-1	PY8030000
0473	Osmium tetroxide	20816-12-0	RN1140000
0474	Oxalic acid	144-62-7	RO2450000
0475	Oxygen difluoride	7783-41-7	RS2100000
0476	Ozone	10028-15-6	RS8225000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0477	Paraffin wax fume	8002-74-2	RV0350000
0478	Paraquat (Paraquat dichloride)	1910-42-5	DW2275000
0479	Parathion	56-38-2	TF4550000
0480	Particulates not otherwise regulated		
0481	Pentaborane	19624-22-7	RY8925000
0482	Pentachloroethane	76-01-7	KI6300000
0483	Pentachloronaphthalene	1321-64-8	QK0300000
0484	Pentachlorophenol	87-86-5	SM6300000
0485	Pentaerythritol	115-77-5	RZ2490000
0486	n-Pentane	109-66-0	RZ9450000
0487	1-Pentanethiol	110-66-7	SA3150000

0488	2-Pentanone	107-87-9	SA7875000
0489	Perchloromethyl mercaptan	594-42-3	PB0370000
0490	Perchloryl fluoride	7616-94-6	SD1925000
0491	Perlite	93763-70-3	SO5254000
0492	Petroleum distillates (naphtha)	8002-05-9	SE7449000
0493	Phenol	108-95-2	SJ3325000
0494	Phenothiazine	92-84-2	SN5075000
0495	p-Phenylene diamine	106-50-3	SS8050000
0496	Phenyl ether (vapor)	101-84-8	KN8970000
0497	Phenyl ether-biphenyl mixture (vapor)	8004-13-5	DV1500000
0498	Phenyl glycidyl ether	122-60-1	TZ3675000
0499	Phenylhydrazine	100-63-0	MW8925000
0500	N-Phenyl-beta-naphthylamine	135-88-6	QM4550000
0501	Phenylphosphine	638-21-1	SZ2100000
0502	Phorate	298-02-2	TD9450000
0503	Phosdrin	7786-34-7	GQ5250000
0504	Phosgene	75-44-5	SY5600000
0505	Phosphine	7803-51-2	SY7525000
0506	Phosphoric acid	7664-38-2	TB6300000
0507	Phosphorus (yellow)	7723-14-0	TH3500000
0508	Phosphorus oxychloride	10025-87-3	TH4897000
0509	Phosphorus pentachloride	10026-13-8	TB6125000
0510	Phosphorus pentasulfide	1314-80-3	TH4375000
0511	Phosphorus trichloride	7719-12-2	TH3675000
0512	Phthalic anhydride	85-44-9	TI3150000
0513	m-Phthalodinitrile	626-17-5	CZ1900000
0514	Picloram	1918-02-1	TJ7525000
0515	Picric acid	88-89-1	TJ7875000
0516	Pindone	83-26-1	NK6300000
0517	Piperazine dihydrochloride	142-64-3	TL4025000
0518	Plaster of Paris	26499-65-0	TP0700000
0519	Platinum	7440-06-4	TP2160000
0520	Platinum (soluble salts, as Pt)		
0521	Portland cement	65997-15-1	VV8770000
0522	Potassium cyanide (as CN)	151-50-8	TS8750000
0523	Potassium hydroxide	1310-58-3	TT2100000
0524	Propane	74-98-6	TX2275000
0525	Propane sultone	1120-71-4	RP5425000
0526	1-Propanethiol	107-03-9	TZ7300000
0527	Propargyl alcohol	107-19-7	UK5075000
0528	beta-Propiolactone	57-57-8	RQ7350000
0529	Propionic acid	79-09-4	UE5950000
0530	Propionitrile	107-12-0	UF9625000
0531	Propoxur	114-26-1	FC3150000
0532	n-Propyl acetate	109-60-4	AJ3675000
0533	n-Propyl alcohol	71-23-8	UH8225000
0534	Propylene dichloride	78-87-5	TX9625000
0535	Propylene glycol dinitrate	6423-43-4	TY6300000
0536	Propylene glycol monomethyl ether	107-98-2	UB7700000
0537	Propylene imine	75-55-8	CM8050000
0538	Propylene oxide	75-56-9	TZ2975000
0539	n-Propyl nitrate	627-13-4	UK0350000
0540	Pyrethrum	8003-34-7	UR4200000
0541	Pyridine	110-86-1	UR8400000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0542	Quinone	106-51-4	DK2625000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0543	Resorcinol	108-46-3	VG9625000
0544	Rhodium (metal fume and insoluble compou	7440-16-6	VI9069000
0545	Rhodium (soluble compounds, as Rh)		
0546	Ronnel	299-84-3	TG0525000
0547	Rosin core solder, pyrolysis products		
0548	Rotenone	83-79-4	DJ2800000
0549	Rouge	1309-37-1	NO7400000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0550	Selenium	7782-49-2	VS7700000
0551	Selenium hexafluoride	7783-79-1	VS9450000
0552	Silica, amorphous	7631-86-9	VV7310000
0553	Silica, crystalline (as respirable dust)	14808-60-7	VV7330000
0554	Silicon	7440-21-3	VW0400000
0555	Silicon carbide	409-21-2	VW0450000
0556	Silicon tetrahydride	7803-62-5	VV1400000
0557	Silver (metal dust and soluble compounds	7440-22-4	VW3500000
0558	Soapstone (containing less than 1% quart		VV8780000
0559	Sodium aluminum fluoride (as F)	15096-52-3	WA9625000
0560	Sodium azide	26628-22-8	VY8050000
0561	Sodium bisulfite	7631-90-5	VZ2000000
0562	Sodium cyanide (as CN)	143-33-9	VZ7530000
0563	Sodium fluoride (as F)	7681-49-4	WB0350000
0564	Sodium fluoroacetate	62-74-8	AH9100000
0565	Sodium hydroxide	1310-73-2	WB4900000
0566	Sodium metabisulfite	7681-57-4	UX8225000
0567	Starch	9005-25-8	GM5090000
0568	Stibine	7803-52-3	WJ0700000
0569	Stoddard solvent	8052-41-3	WJ8925000
0570	Strychnine	57-24-9	WL2275000
0571	Styrene	100-42-5	WL3675000
0572	Subtilisins	1395-21-7	CO9450000
0573	Succinonitrile	110-61-2	WN3850000
0574	Sucrose	57-50-1	WN6500000
0575	Sulfur dioxide	7446-09-5	WS4550000
0576	Sulfur hexafluoride	2551-62-4	WS4900000
0577	Sulfuric acid	7664-93-9	WS5600000
0578	Sulfur monochloride	10025-67-9	WS4300000
0579	Sulfur pentafluoride	5714-22-7	WS4480000
0580	Sulfur tetrafluoride	7783-60-0	WT4800000
0581	Sulfuryl fluoride	2699-79-8	WT5075000
0582	Sulprofos	35400-43-2	TE4165000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0583	2,4,5-T	93-76-5	AJ8400000
0584	Talc (containing no asbestos and less th	14807-96-6	WW2710000
0585	Tantalum (metal and oxide dust, as Ta)	7440-25-7	WW5505000
0586	TEDP	3689-24-5	XN4375000
0587	Tellurium	13494-80-9	WY2625000
0588	Tellurium hexafluoride	7783-80-4	WY2800000
0589	Temephos	3383-96-8	TF6890000
0590	TEPP	107-49-3	UX6825000
0591	o-Terphenyl	84-15-1	WZ6472000
0592	m-Terphenyl	92-06-8	WZ6470000
0593	p-Terphenyl	92-94-4	WZ6475000
0594	2,3,7,8-Tetrachloro-dibenzo-p-dioxin	1746-01-6	HP3500000
0595	1,1,1,2-Tetrachloro-2,2-difluoroethane	76-11-9	KI1425000
0596	1,1,2,2-Tetrachloro-1,2-difluoroethane	76-12-0	KI1420000
0597	1,1,1,2-Tetrachloroethane	630-20-6	KI8450000
0598	1,1,2,2-Tetrachloroethane	79-34-5	KI8575000
0599	Tetrachloroethylene	127-18-4	KX3850000
0600	Tetrachloronaphthalene	1335-88-2	QK3700000
0601	Tetraethyl lead (as Pb)	78-00-2	TP4550000
0602	Tetrahydrofuran	109-99-9	LU5950000
0603	Tetramethyl lead (as Pb)	75-74-1	TP4725000
0604	Tetramethyl succinonitrile	3333-52-6	WN4025000
0605	Tetranitromethane	509-14-8	PB4025000
0606	Tetrasodium pyrophosphate	7722-88-5	UX7350000
0607	Tetryl	479-45-8	BY6300000
0608	Thallium (soluble compounds, as Tl)		
0609	4,4'-Thiobis(6-tert-butyl-m-cresol)	96-69-5	GP3150000
0610	Thioglycolic acid	68-11-1	AI5950000
0611	Thionyl chloride	7719-09-7	XM5150000
0612	Thiram	137-26-8	JO1400000
0613	Tin	7440-31-5	XP7320000

0614	Tin (organic compounds, as Sn)		
0615	Tin(II) oxide (as Sn)	21651-19-4	
0616	Tin(IV) oxide (as Sn)	18282-10-5	XQ4000000
0617	Titanium dioxide	13463-67-7	XR2275000
0618	o-Tolidine	119-93-7	DD1225000
0619	Toluene	108-88-3	XS5250000
0620	Toluenediamine	25376-45-8	XS9445000
0621	Toluene-2,4-diisocyanate	584-84-9	CZ6300000
0622	o-Toluidine	95-53-4	XU2975000
0623	m-Toluidine	108-44-1	XU2800000
0624	p-Toluidine	106-49-0	XU3150000
0625	Tributyl phosphate	126-73-8	TC7700000
0626	Trichloroacetic acid	76-03-9	AJ7875000
0627	1,2,4-Trichlorobenzene	120-82-1	DC2100000
0628	1,1,2-Trichloroethane	79-00-5	KJ3150000
0629	Trichloroethylene	79-01-6	KX4550000
0630	Trichloronaphthalene	1321-65-9	QK4025000
0631	1,2,3-Trichloropropane	96-18-4	TZ9275000
0632	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	KJ4000000
0633	Triethylamine	121-44-8	YE0175000
0634	Trifluorobromomethane	75-63-8	PA5425000
0635	Trimellitic anhydride	552-30-7	DC2050000
0636	Trimethylamine	75-50-3	PA0350000
0637	1,2,3-Trimethylbenzene	526-73-8	DC330000
0638	1,2,4-Trimethylbenzene	95-63-6	DC3325000
0639	1,3,5-Trimethylbenzene	108-67-8	OX6825000
0640	Trimethyl phosphite	121-45-9	TH1400000
0641	2,4,6-Trinitrotoluene	118-96-7	XU0175000
0642	Triorthocresyl phosphate	78-30-8	TD0350000
0643	Triphenylamine	603-34-9	YK2680000
0644	Triphenyl phosphate	115-86-6	TC8400000
0645	Tungsten	7440-33-7	YO7175000
0646	Tungsten (soluble compounds, as W)		
0647	Tungsten carbide (cemented)	11107-01-0	Y07350000
0648	Turpentine	8006-64-2	YO8400000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0649	1-Undecanethiol	5332-52-5	
0650	Uranium (insoluble compounds, as U)	7440-61-1	YR3490000
0651	Uranium (soluble compounds, as U)		

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0652	n-Valeraldehyde	110-62-3	YV3600000
0653	Vanadium dust	1314-62-1	YW2450000
0654	Vanadium fume	1314-62-1	YW2460000
0655	Vegetable oil mist	68956-68-3	YX1850000
0656	Vinyl acetate	108-05-4	AK0875000
0657	Vinyl bromide	593-60-2	KU8400000
0658	Vinyl chloride	75-01-4	KU9625000
0659	Vinyl cyclohexene dioxide	106-87-6	RN8640000
0660	Vinyl fluoride	75-02-5	YZ7351000
0661	Vinylidene chloride	75-35-4	KV9275000
0662	Vinylidene fluoride	75-38-7	KW0560000
0663	Vinyl toluene	25013-15-4	WL5075000
0664	VM & P Naphtha	8032-32-4	OI6180000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0665	Warfarin	81-81-2	GN4550000
0666	Welding fumes		ZC2550000
0667	Wood dust		ZC9850000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0668	o-Xylene	95-47-6	ZE2450000

0669	m-Xylene	108-38-3	ZE2275000
0670	p-Xylene	106-42-3	ZE2625000
0671	m-Xylene-alpha,alpha'-diamine	1477-55-0	PF8970000
0672	Xylidine	1300-73-8	ZE8575000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0673	Yttrium	7440-65-5	ZG2980000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0674	Zinc chloride fume	7646-85-7	ZH1400000
0675	Zinc oxide	1314-13-2	ZH4810000
0676	Zinc stearate	557-05-1	ZH5200000
0677	Zirconium compounds (as Zr)	7440-67-7	ZH7070000

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

This page last updated: June 23, 1999

INDEX of Chemical Names and Synonyms

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0017	AA	107-18-6	BA5075000
0007	AAF	53-96-3	AB9450000
0007	2-AAF	53-96-3	AB9450000
0019	AGE	106-92-3	RR0875000
0030	AMS	7773-06-0	WO6125000
0429	AMS	98-83-9	WL5075300
0014	AN	107-13-1	AT5250000
0037*	ANTU	86-88-4	YT9275000
0514	ATCP	1918-02-1	TJ7525000
0589	Abate®	3383-96-8	TF6890000
0010	Acetal	50-78-2	VO0700000
0001*	Acetaldehyde	75-07-0	AB1925000
0007	2-Acetaminofluorene	53-96-3	AB9450000
0002*	Acetic acid	64-19-7	AF1225000
0002	Acetic acid (aqueous)	64-19-7	AF1225000
0003	Acetic acid anhydride	108-24-7	AK1925000
0001	Acetic aldehyde	75-07-0	AB1925000
0003*	Acetic anhydride	108-24-7	AK1925000
0260	Acetic ester	141-78-6	AH5425000
0260	Acetic ether	141-78-6	AH5425000
0003	Acetic oxide	108-24-7	AK1925000
0004*	Acetone	67-64-1	AL3150000
0005*	Acetone cyanohydrin	75-86-5	OD9275000
0006*	Acetonitrile	75-05-8	AL7700000
0665	3-(alpha-Acetonyl)-benzyl-4-hydroxycouma	81-81-2	GN4550000
0010	2-Acetoxybenzoic acid	50-78-2	VO0700000
0010	o-Acetoxybenzoic acid	50-78-2	VO0700000
0656	1-Acetoxyethylene	108-05-4	AK0875000
0610	Acetyl mercaptan	68-11-1	AI5950000
0003	Acetyl oxide	108-24-7	AK1925000
0424	2-Acetyl propane	563-80-4	EL9100000
0007*	2-Acetylaminofluorene	53-96-3	AB9450000
0008*	Acetylene	74-86-2	AO9600000
0102	Acetylene black	1333-86-4	FF5800000
0195	Acetylene dichloride	540-59-0	KV9360000
0195	cis-Acetylene dichloride	540-59-0	KV9360000
0195	trans-Acetylene dichloride	540-59-0	KV9360000
0009*	Acetylene tetrabromide	79-27-6	KI8225000
0598	Acetylene tetrachloride	79-34-5	KI8575000
0010*	Acetylsalicyclic acid	50-78-2	VO0700000
0011	Acraldehyde	107-02-8	AS1050000
0013	Acroleic acid	79-10-7	AS4375000
0011*	Acrolein	107-02-8	AS1050000
0011	Acrylaldehyde	107-02-8	AS1050000
0012*	Acrylamide	79-06-1	AS3325000
0012	Acrylamide monomer	79-06-1	AS3325000

0013*	Acrylic acid	79-10-7	AS4375000
0011	Acrylic aldehyde	107-02-8	AS1050000
0012	Acrylic amide	79-06-1	AS3325000
0014*	Acrylonitrile	107-13-1	AT5250000
0014	Acrylonitrile monomer	107-13-1	AT5250000
0041	Actinolite	1332-21-4	CI6475000
0041	Actinolite asbestos	1332-21-4	CI6475000
0307	Activated carbon	7440-44-0	FF5250100
0015*	Adiponitrile	111-69-3	AV2625000
0262	Alcohol	64-17-5	KQ6300000
0016*	Aldrin	309-00-2	IO2100000
0492	Aliphatic petroleum naphtha	8002-05-9	SE7449000
0017*	Allyl alcohol	107-18-6	BA5075000
0011	Allyl aldehyde	107-02-8	AS1050000
0018*	Allyl chloride	107-05-1	UC7350000
0019*	Allyl glycidyl ether	106-92-3	RR0875000
0020*	Allyl propyl disulfide	2179-59-1	JO0350000
0631	Allyl trichloride	96-18-4	TZ9275000
0392	Allylene	74-99-7	UK4250000
0017	Allylic alcohol	107-18-6	BA5075000
0019	1-Allyloxy-2,3-epoxypropane	106-92-3	RR0875000
0021	Alumina	1344-28-1	BD1200000
0021*	alpha-Alumina	1344-28-1	BD1200000
0022	Aluminium	7429-90-5	BD0330000
0022*	Aluminum	7429-90-5	BD0330000
0023*	Aluminum (pyro powders and welding fumes		
0024*	Aluminum (soluble salts and alkyls, as A		
0022	Aluminum metal	7429-90-5	BD0330000
0250	Aluminum oxide	1302-74-5	GN0231000
0021	Aluminum oxide	1344-28-1	BD1200000
0022	Aluminum powder	7429-90-5	BD0330000
0250	Aluminum trioxide	1302-74-5	GN0231000
0021	Aluminum trioxide	1344-28-1	BD1200000
0160	Amidocyanogen	420-04-2	GS5950000
0027	3-Amino-1,2,4-triazole	61-82-5	XZ3850000
0027	2-Amino-1,3,4-triazole	61-82-5	XZ3850000
0623	3-Amino-1-methylbenzene	108-44-1	XU2800000
0514	4-Amino-3,5,6-trichloro-2-picolinic acid	1918-02-1	TJ7525000
0514	4-Amino-3,5,6-trichloropicolinic acid	1918-02-1	TJ7525000
0430	4-Amino-6-(1,1-dimethylethyl)-3-(methylt	21087-64-9	XZ2990000
0495	4-Aminoaniline	106-50-3	SS8050000
0035	para-Aminoanisole	104-94-9	BZ5450000
0034	ortho-Aminoanisole	90-04-0	BZ5410000
0033	Aminobenzene	62-53-3	BW6650000
0025	p-Aminobiphenyl	92-67-1	DU8925000
0025	4-Aminobiphenyl	92-67-1	DU8925000
0079	1-Aminobutane	109-73-9	EO2975000
0097	Aminocaproic lactam	105-60-2	CM3675000
0168	Aminocyclohexane	108-91-8	GX0700000
0672	Aminodimethylbenzene	1300-73-8	ZE8575000
0025	p-Aminodiphenyl	92-67-1	DU8925000
0025*	4-Aminodiphenyl	92-67-1	DU8925000
0263	Aminoethane	75-04-7	KH2100000
0256	2-Aminoethanol	141-43-5	KJ5775000
0256	beta-Aminoethyl alcohol	141-43-5	KJ5775000
0211	bis(2-Aminoethyl)amine	111-40-0	IE1225000
0274	Aminoethylene	151-56-4	KX5075000
0168	Aminohexahydrobenzene	108-91-8	GX0700000
0398	Aminomethane	74-89-5	PF6300000
0671	1,3-bis(Aminomethyl)benzene	1477-55-0	PF8970000
0441	1-Aminonaphthalene	134-32-7	QM1400000
0442	2-Aminonaphthalene	91-59-8	QM2100000
0449	para-Aminonitrobenzene	100-01-6	BY7000000
0623	1-Aminophenylmethane	108-44-1	XU2800000
0360	2-Aminopropane	75-31-0	NT8400000
0026*	2-Aminopyridine	504-29-0	US1575000
0026	alpha-Aminopyridine	504-29-0	US1575000
0624	4-Aminotoluene	106-49-0	XU3150000
0623	m-Aminotoluene	108-44-1	XU2800000
0622	o-Aminotoluene	95-53-4	XU2975000
0622	2-Aminotoluene	95-53-4	XU2975000

0027	Aminotriazole	61-82-5	XZ3850000
0027	3-Aminotriazole	61-82-5	XZ3850000
0672	Aminoxylene	1300-73-8	ZE8575000
0027*	Amitrole	61-82-5	XZ3850000
0030	Ammate herbicide	7773-06-0	WO6125000
0028*	Ammonia	7664-41-7	BO0875000
0030	Ammonium amidosulfonate	7773-06-0	WO6125000
0029	Ammonium chloride	12125-02-9	BP4550000
0029*	Ammonium chloride fume	12125-02-9	BP4550000
0029	Ammonium muriate fume	12125-02-9	BP4550000
0030*	Ammonium sulfamate	7773-06-0	WO6125000
0041	Amosite (cummingtonite-grunerite)	1332-21-4	CI6475000
0031*	n-Amyl acetate	628-63-7	AJ1925000
0032*	sec-Amyl acetate	626-38-0	AJ2100000
0031	Amyl acetic ester	628-63-7	AJ1925000
0031	Amyl acetic ether	628-63-7	AJ1925000
0652	Amyl aldehyde	110-62-3	YV3600000
0418	Amyl ethyl ketone	541-85-5	MJ7350000
0487	Amyl hydrosulfide	110-66-7	SA3150000
0487	Amyl mercaptan	110-66-7	SA3150000
0399	Amyl methyl ketone	110-43-0	MJ5075000
0399	n-Amyl methyl ketone	110-43-0	MJ5075000
0487	Amyl sulfhydrate	110-66-7	SA3150000
0028	Anhydrous ammonia	7664-41-7	BO0875000
0057	Anhydrous borax	1330-43-4	ED4588000
0095	Anhydrous calcium sulfate	7778-18-9	WS6920000
0095	Anhydrous gypsum	7778-18-9	WS6920000
0331	Anhydrous hydrogen bromide	10035-10-6	MW3850000
0332	Anhydrous hydrogen chloride	7647-01-0	MW4025000
0334	Anhydrous hydrogen fluoride	7664-39-3	MW7875000
0095	Anhydrous sulfate of lime	7778-18-9	WS6920000
0033*	Aniline (and homologs)	62-53-3	BW6650000
0033	Aniline oil	62-53-3	BW6650000
0240	Anilinobenzene	122-39-4	JJ7800000
0500	2-Anilinonaphthalene	135-88-6	QM4550000
0035	4-Anisidine	104-94-9	BZ5450000
0035*	p-Anisidine	104-94-9	BZ5450000
0034*	o-Anisidine	90-04-0	BZ5410000
0034	2-Anisidine	90-04-0	BZ5410000
0165	Anol	108-93-0	GV7875000
0166	Anone	108-94-1	GW1050000
0244	Antabuse®	97-77-8	JO1225000
0041	Anthophyllite	1332-21-4	CI6475000
0041	Anthophyllite asbestos	1332-21-4	CI6475000
0144	Anthracite coal dust		GF8281000
0036*	Antimony	7440-36-0	CC4025000
0568	Antimony hydride	7803-52-3	WJ0700000
0036	Antimony metal	7440-36-0	CC4025000
0036	Antimony powder	7440-36-0	CC4025000
0568	Antimony trihydride	7803-52-3	WJ0700000
0531	Aprocarb®	114-26-1	FC3150000
0028	Aqua ammonia	7664-41-7	BO0875000
0447	Aqua fortis	7697-37-2	QU5775000
0013	Aqueous acrylic acid (technical grade is	79-10-7	AS4375000
0028	Aqueous ammonia	7664-41-7	BO0875000
0331	Aqueous hydrogen bromide (i.e.	10035-10-6	MW3850000
0332	Aqueous hydrogen chloride (i.e.	7647-01-0	MW4025000
0334	Aqueous hydrogen fluoride (i.e.	7664-39-3	MW7875000
0557	Argentum	7440-22-4	VW3500000
0125	Aroclor® 1242	53469-21-9	TQ1356000
0126	Aroclor® 1254	11097-69-1	TQ1360000
0038*	Arsenic (inorganic compounds, as As)	7440-38-2	CG0525000
0040	Arsenic hydride	7784-42-1	CG6475000
0040	Arsenic trihydride	7784-42-1	CG6475000
0039*	Arsenic, organic compounds (as As)		
0040	Arseniuretted hydrogen	7784-42-1	CG6475000
0040	Arsenous hydride	7784-42-1	CG6475000
0040*	Arsine	7784-42-1	CG6475000
0047	Artificial barite	7727-43-7	CR0600000
0041*	Asbestos	1332-21-4	CI6475000
0042*	Asphalt fumes	8052-42-4	CI9900000

0042	Asphalt: Asphaltum	8052-42-4	CI9900000
0010	Aspirin	50-78-2	VO0700000
0638	Assymetrical trimethylbenzene	95-63-6	DC3325000
0194	Asymmetrical dichloroethane	75-34-3	KI0175000
0043*	Atrazine	1912-24-9	XY5600000
0587	Aurum paradoxum	13494-80-9	WY2625000
0541	Azabenzene	110-86-1	UR8400000
0560	Azide	26628-22-8	VY8050000
0182	Azimethylene	334-88-3	PA7000000
0541	Azine	110-86-1	UR8400000
0044*	Azinphos-methyl	86-50-0	TE1925000
0274	Azirane	151-56-4	KX5075000
0274	Aziridine	151-56-4	KX5075000
0560	Azium	26628-22-8	VY8050000
0182	Azomethylene	334-88-3	PA7000000
0427	Azophos®	298-00-0	TG0175000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0128	BCME	542-88-1	KN1575000
0081	BGE	2426-08-6	TX4200000
0370	BHC	58-89-9	GV4900000
0246	BHT	128-37-0	GO7875000
0528	BPL	57-57-8	RQ7350000
0415	para	101-77-9	BY5425000
0572	Bacillus subtilis	1395-21-7	CO9450000
0572	Bacillus subtilis BPN	1395-21-7	CO9450000
0572	Bacillus subtilis Carlsburg	1395-21-7	CO9450000
0347	Banana oil	123-92-2	NS9800000
0047	Barite	7727-43-7	CR0600000
0045*	Barium chloride (as Ba)	10361-37-2	CQ8750000
0045	Barium dichloride	10361-37-2	CQ8750000
0046	Barium dinitrate	10022-31-8	CQ9625000
0046*	Barium nitrate (as Ba)	10022-31-8	CQ9625000
0046	Barium salt of nitric acid	10022-31-8	CQ9625000
0047	Barium salt of sulfuric acid	7727-43-7	CR0600000
0047*	Barium sulfate	7727-43-7	CR0600000
0046	Barium(II) nitrate (1:2)	10022-31-8	CQ9625000
0047	Barytes (natural)	7727-43-7	CR0600000
0181	Basudin®	333-41-5	TF3325000
0577	Battery acid	7664-93-9	WS5600000
0285	Baytex	55-38-9	TF9625000
0574	Beet sugar	57-50-1	WN6500000
0048*	Benomyl	17804-35-2	DD6475000
0033	Benzenamine	62-53-3	BW6650000
0049*	Benzene	71-43-2	CY1400000
0121	Benzene chloride	108-90-7	CZ0175000
0163	Benzene hexahydride	110-82-7	GU6300000
0167	Benzene tetrahydride	110-83-8	GW2500000
0495	1,4-Benzenediamine	106-50-3	SS8050000
0513	1,3-Benzenedicarbonitrile	626-17-5	CZ1900000
0512	1,2-Benzenedicarboxylic anhydride	85-44-9	TI3150000
0671	1,3-Benzenedimethanamine	1477-55-0	PF8970000
0543	m-Benzenediol	108-46-3	VG9625000
0109	o-Benzenediol	120-80-9	UX1050000
0338	p-Benzenediol	123-31-9	MX3500000
0543	1,3-Benzenediol	108-46-3	VG9625000
0109	1,2-Benzenediol	120-80-9	UX1050000
0338	1,4-Benzenediol	123-31-9	MX3500000
0050*	Benzenethiol	108-98-5	DC0525000
0635	1,2,4-Benzenetricarboxylic anhydride	552-30-7	DC2050000
0051*	Benzidine	92-87-5	DC9625000
0051	Benzidine-based dyes	92-87-5	DC9625000
0251	Benzoepin	115-29-7	RB9275000
0049	Benzol	71-43-2	CY1400000
0052	Benzoperoxide	94-36-0	DM8575000
0542	p-Benzoquinone	106-51-4	DK2625000
0542	1,4-Benzoquinone	106-51-4	DK2625000
0052*	Benzoyl peroxide	94-36-0	DM8575000
0053*	Benzyl chloride	100-44-7	XS8925000

0054*	Beryllium & beryllium compounds (as Be)	7440-41-7	DS1750000
0051	4,4'-Bianiline	92-87-5	DC9625000
0204	Bicyclopentadiene	77-73-6	PC1050000
0203	Bidrin®	141-66-2	TC3850000
0067	Biethylene	106-99-0	EI9275000
0431	Biotite	12001-26-2	VV8760000
0239	Biphenyl	92-52-4	DU8050000
0051	1,1'-Biphenyl-4,4'-diamine	92-87-5	DC9625000
0051	4,4'-Biphenyldiamine	92-87-5	DC9625000
0056	Bismuth sesquitelluride	1304-82-1	EB3110000
0056	Bismuth telluride	1304-82-1	EB3110000
0055*	Bismuth telluride, doped with Selenium s		
0056*	Bismuth telluride, undoped	1304-82-1	EB3110000
0056	Bismuth tritelluride	1304-82-1	EB3110000
0042	Bitumen (European term)	8052-42-4	CI9900000
0144	Bituminous coal dust		GF8281000
0067	Bivinyl	106-99-0	EI9275000
0151	Black copper oxide fume	1317-38-0	GL7900000
0306	Black lead	7782-42-5	MD9659600
0586	Bladafum®	3689-24-5	XN4375000
0582	Bolstar®	35400-43-2	TE4165000
0057*	Borates, tetra, sodium salts (Anhydrous)	1330-43-4	ED4588000
0058*	Borates, tetra, sodium salts (Decahydrat	1303-96-4	VZ2275000
0059*	Borates, tetra, sodium salts (Pentahydra	12179-04-3	
0058	Borax	1303-96-4	VZ2275000
0058	Borax decahydrate	1303-96-4	VZ2275000
0057	Borax dehydrated	1330-43-4	ED4588000
0059	Borax pentahydrate	12179-04-3	
0060	Boric anhydride	1303-86-2	ED7900000
0060	Boric oxide	1303-86-2	ED7900000
0183	Boroethane	19287-45-7	HQ9275000
0061	Boron bromide	10294-33-4	ED7400000
0062	Boron fluoride	7637-07-2	ED2275000
0183	Boron hydride	19287-45-7	HQ9275000
0060*	Boron oxide	1303-86-2	ED7900000
0061*	Boron tribromide	10294-33-4	ED7400000
0062*	Boron trifluoride	7637-07-2	ED2275000
0060	Boron trioxide	1303-86-2	ED7900000
0372	Bottled gas	68476-85-7	SE7545000
0524	Bottled gas	74-98-6	TX2275000
0063*	Bromacil	314-40-9	YQ9100000
0064*	Bromine	7726-95-6	EF9100000
0065	Bromine fluoride	7789-30-2	EF9350000
0065*	Bromine pentafluoride	7789-30-2	EF9350000
0310	1-Bromo-1-chloro-2,2,2-trifluoroethane	151-67-7	KH6550000
0310	2-Bromo-2-chloro-1,1,1-trifluoroethane	151-67-7	KH6550000
0063	5-Bromo-3-sec-butyl-6-methyluracil	314-40-9	YQ9100000
0063	5-Bromo-6-methyl-3-(1-methylpropyl)uraci	314-40-9	YQ9100000
0123	Bromochloromethane	74-97-5	PA5250000
0265	Bromoethane	74-96-4	KH6475000
0657	Bromoethene	593-60-2	KU8400000
0657	Bromoethylene	593-60-2	KU8400000
0066*	Bromoform	75-25-2	PB5600000
0400	Bromomethane	74-83-9	PA4900000
0634	Bromotrifluoromethane	75-63-8	PA5425000
0093	Burned lime	1305-78-8	EW3100000
0093	Burnt lime	1305-78-8	EW3100000
0067	Butadiene	106-99-0	EI9275000
0067*	1,3-Butadiene	106-99-0	EI9275000
0068*	n-Butane	106-97-8	EJ4200000
0068	normal-Butane	106-97-8	EJ4200000
0573	Butanedinitrile	110-61-2	WN3850000
0086	Butanenitrile	109-74-0	ET8750000
0083	Butanethiol	109-79-5	EK6300000
0083	1-Butanethiol	109-79-5	EK6300000
0083	n-Butanethiol	109-79-5	EK6300000
0076	1-Butanol	71-36-3	EO1400000
0076	n-Butanol	71-36-3	EO1400000
0077	2-Butanol	78-92-2	EO1750000
0069*	2-Butanone	78-93-3	EL6475000
0416	2-Butanone peroxide	1338-23-4	EL9450000

0157	2-Butenal	4170-30-3	GP9499000
0376	cis-Butenedioic anhydride	108-31-6	ON3675000
0070*	2-Butoxyethanol	111-76-2	KJ8575000
0071*	2-Butoxyethanol acetate	112-07-2	KJ8925000
0071	2-Butoxyethyl acetate	112-07-2	KJ8925000
0220	Butter yellow	60-11-7	BX7350000
0075	Butyl 2-propenoate	141-32-2	UD3150000
0070	Butyl Cellosolve®	111-76-2	KJ8575000
0071	Butyl Cellosolve® acetate	112-07-2	KJ8925000
0072	Butyl acetate	123-86-4	AF7350000
0072*	n-Butyl acetate	123-86-4	AF7350000
0073*	sec-Butyl acetate	105-46-4	AF7380000
0074*	tert-Butyl acetate	540-88-5	AF7400000
0075*	Butyl acrylate	141-32-2	UD3150000
0075	n-Butyl acrylate	141-32-2	UD3150000
0076	Butyl alcohol	71-36-3	EO1400000
0076*	n-Butyl alcohol	71-36-3	EO1400000
0077*	sec-Butyl alcohol	78-92-2	EO1750000
0078*	tert-Butyl alcohol	75-65-0	EO1925000
0080*	tert-Butyl chromate	1189-85-1	GB2900000
0082	Butyl ester of 2-hydroxypropanoic acid	138-22-7	OD4025000
0072	n-Butyl ester of acetic acid	123-86-4	AF7350000
0073	sec-Butyl ester of acetic acid	105-46-4	AF7380000
0074	tert-Butyl ester of acetic acid	540-88-5	AF7400000
0075	Butyl ester of acrylic acid	141-32-2	UD3150000
0080	di-tert-Butyl ester of chromic acid	1189-85-1	GB2900000
0082	Butyl ester of lactic acid	138-22-7	OD4025000
0072	Butyl ethanoate	123-86-4	AF7350000
0266	Butyl ethyl ketone	106-35-4	MJ5250000
0081*	n-Butyl glycidyl ether	2426-08-6	TX4200000
0071	Butyl glycol acetate	112-07-2	KJ8925000
0068	Butyl hydride	106-97-8	EJ4200000
0082	Butyl lactate	138-22-7	OD4025000
0082*	n-Butyl lactate	138-22-7	OD4025000
0083*	n-Butyl mercaptan	109-79-5	EK6300000
0325	Butyl methyl ketone	591-78-6	MP1400000
0070	Butyl oxitol	111-76-2	KJ8575000
0625	Butyl phosphate	126-73-8	TC7700000
0516	tert-Butyl valone	83-26-1	NK6300000
0158	4-t-Butyl-2-chlorophenylmethyl methylpho	299-86-5	TB3850000
0079	Butylamine	109-73-9	EO2975000
0079*	n-Butylamine	109-73-9	EO2975000
0246	Butylated hydroxytoluene	128-37-0	GO7875000
0077	Butylene hydrate	78-92-2	EO1750000
0084*	o-sec-Butylphenol	89-72-5	SJ8920000
0084	2-sec-Butylphenol	89-72-5	SJ8920000
0085	4-tert-Butyltoluene	98-51-1	XS8400000
0085*	p-tert-Butyltoluene	98-51-1	XS8400000
0242	Butyrone	123-19-3	MJ5600000
0086	Butyronitrile	109-74-0	ET8750000
0086*	n-Butyronitrile	109-74-0	ET8750000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0123	CB	74-97-5	PA5250000
0123	CBM	74-97-5	PA5250000
0632	CFC-113	76-13-1	KJ4000000
0409	CI-2	12108-13-3	OP1450000
0128	bis-CME	542-88-1	KN1575000
0129	CMME	107-30-2	KN6650000
0122	CS	2698-41-1	OO3675000
0087*	Cadmium dust (as Cd)	7440-43-9 (	EU9800000
0088*	Cadmium fume (as Cd)	1306-19-0	EV1930000
0088	Cadmium monoxide	1306-19-0	EV1930000
0089*	Calcium arsenate (as As)	7778-44-1	CG0830000
0091	Calcium carbimide	156-62-7	GS6000000
0090*	Calcium carbonate	1317-65-3	EV9580000
0369	Calcium carbonate	1317-65-3	EV9580000
0382	Calcium carbonate	1317-65-3	EV9580000
0091*	Calcium cyanamide	156-62-7	GS6000000

0092	Calcium hydrate	1305-62-0	EW2800000
0094	Calcium hydrosilicate	1344-95-2	VV9150000
0092*	Calcium hydroxide	1305-62-0	EW2800000
0094	Calcium metasilicate	1344-95-2	VV9150000
0094	Calcium monosilicate	1344-95-2	VV9150000
0093*	Calcium oxide	1305-78-8	EW3100000
0089	Calcium salt (2:3) of arsenic acid	7778-44-1	CG0830000
0090	Calcium salt of carbonic acid	1317-65-3	EV9580000
0094	Calcium salt of silicic acid	1344-95-2	VV9150000
0095	Calcium salt of sulfuric acid	7778-18-9	WS6920000
0094*	Calcium silicate	1344-95-2	VV9150000
0095*	Calcium sulfate	7778-18-9	WS6920000
0518	Calcium sulfate hemihydrate	26499-65-0	TP0700000
0308	Calcium(II) sulfate dihydrate	13397-24-5	MG2360000
0096	2-Camphonone	76-22-2	EX1225000
0096*	Camphor (synthetic)	76-22-2	EX1225000
0574	Cane sugar	57-50-1	WN6500000
0097*	Caprolactam	105-60-2	CM3675000
0097	epsilon-Caprolactam	105-60-2	CM3675000
0098*	Captafol	2425-06-1	GS4900000
0099*	Captan	133-06-2	GW5075000
0099	Captane	133-06-2	GW5075000
0098	Captofol	2425-06-1	GS4900000
0295	Carbamaldehyde	75-12-7	LQ0525000
0100*	Carbaryl	63-25-2	FC5950000
0203	Carbicron®	141-66-2	TC3850000
0160	Carbimide	420-04-2	GS5950000
0397	Carbinol	67-56-1	PC1400000
0160	Carbodiimide	420-04-2	GS5950000
0101*	Carbofuran	1563-66-2	FB9450000
0493	Carbolic acid	108-95-2	SJ3325000
0367	Carbomethene	463-51-4	OA7700000
0503	2-Carbomethoxy-1-methylvinyl dimethyl ph	7786-34-7	GQ5250000
0104	Carbon bisulfide	75-15-0	FF6650000
0102*	Carbon black	1333-86-4	FF5800000
0106	Carbon bromide	558-13-4	FG4725000
0107	Carbon chloride	56-23-5	FG4900000
0108	Carbon difluoride oxide	353-50-4	FG6125000
0103*	Carbon dioxide	124-38-9	FF6400000
0104*	Carbon disulfide	75-15-0	FF6650000
0108	Carbon fluoride oxide	353-50-4	FG6125000
0316	Carbon hexachloride	67-72-1	KI4025000
0105*	Carbon monoxide	630-08-0	FG3500000
0161	Carbon nitride	460-19-5	GT1925000
0105	Carbon oxide	630-08-0	FG3500000
0504	Carbon oxychloride	75-44-5	SY5600000
0108	Carbon oxyfluoride	353-50-4	FG6125000
0555	Carbon silicide	409-21-2	VW0450000
0107	Carbon tet	56-23-5	FG4900000
0106*	Carbon tetrabromide	558-13-4	FG4725000
0107*	Carbon tetrachloride	56-23-5	FG4900000
0373	Carbonate magnesium	546-93-0	OM2470000
0103	Carbonic acid gas	124-38-9	FF6400000
0504	Carbonyl chloride	75-44-5	SY5600000
0504	Carbonyl dichloride	75-44-5	SY5600000
0108	Carbonyl difluoride	353-50-4	FG6125000
0108*	Carbonyl fluoride	353-50-4	FG6125000
0147	di-mu-Carbonylhexacarbonyldicobalt	10210-68-1	GG0300000
0555	Carborundum®	409-21-2	VW0450000
0529	Carboxyethane	79-09-4	UE5950000
0635	4-Carboxyphthalic anhydride	552-30-7	DC2050000
0109*	Catechol	120-80-9	UX1050000
0092	Caustic lime	1305-62-0	EW2800000
0523	Caustic potash	1310-58-3	TT2100000
0565	Caustic soda	1310-73-2	WB4900000
0258	Cellosolve®	110-80-5	KK8050000
0259	Cellosolve® acetate	111-15-9	KK8225000
0110*	Cellulose	9004-34-6	FJ5691460
0309	Celtium	7440-58-6	MG4600000
0521	Cement	65997-15-1	VV8770000
0647	Cemented WC	11107-01-0	Y07350000

0647	Cemented tungsten carbide	11107-01-0	Y07350000
0111	Cesium hydrate	21351-79-1	FK9800000
0111*	Cesium hydroxide	21351-79-1	FK9800000
0111	Cesium hydroxide dimer	21351-79-1	FK9800000
0318	Cetyl mercaptan	2917-26-2	
0102	Channel black	1333-86-4	FF5800000
0364	China clay	1332-58-7	GF1670500
0162	Chlorcyan	506-77-4	GT2275000
0112	Chlordan	57-74-9	PB9800000
0112*	Chlordane	57-74-9	PB9800000
0112	Chlordano	57-74-9	PB9800000
0365	Chlordecone	143-50-0	PC8575000
0113*	Chlorinated camphene	8001-35-2	XW5250000
0114*	Chlorinated diphenyl oxide		
0115*	Chlorine	7782-50-5	FO2100000
0162	Chlorine cyanide	506-77-4	GT2275000
0116*	Chlorine dioxide	10049-04-4	FO3000000
0117	Chlorine fluoride	7790-91-2	FO2800000
0490	Chlorine fluoride oxide	7616-94-6	SD1925000
0116	Chlorine oxide	10049-04-4	FO3000000
0490	Chlorine oxyfluoride	7616-94-6	SD1925000
0116	Chlorine peroxide	10049-04-4	FO3000000
0117*	Chlorine trifluoride	7790-91-2	FO2800000
0253	2-Chloro-1,1,2-trifluoroethyl difluorome	13838-16-9	KN6800000
0133	2-Chloro-1,3-butadiene	126-99-8	EI9625000
0253	2-Chloro-1-(difluoromethoxy)-1,1,2-trifl	13838-16-9	KN6800000
0135	2-Chloro-1-methylbenzene	95-49-8	XS9000000
0130*	1-Chloro-1-nitropropane	600-25-9	TX5075000
0184	1-Chloro-2,3-dibromopropane	96-12-8	TX8750000
0254	1-Chloro-2,3-epoxypropane	106-89-8	TX4900000
0134	1-Chloro-2-ethenylbenzene	2039-87-4	WL4160000
0135	1-Chloro-2-methylbenzene	95-49-8	XS9000000
0018	1-Chloro-2-propene	107-05-1	UC7350000
0043	2-Chloro-4-ethylamino-6-isopropylamino-s	1912-24-9	XY5600000
0452	1-Chloro-4-nitrobenzene	100-00-5	CZ1050000
0136	2-Chloro-6-(trichloro-methyl)pyridine	1929-82-4	US7525000
0136*	2-Chloro-6-trichloromethyl pyridine	1929-82-4	US7525000
0043	6-Chloro-N-ethyl-N'- (1-methylethyl)-1,3	1912-24-9	XY5600000
0118*	Chloroacetaldehyde	107-20-0	AB2450000
0118	2-Chloroacetaldehyde	107-20-0	AB2450000
0118	Chloroacetaldehyde (40% aqueous solution	107-20-0	AB2450000
0120	Chloroacetic acid chloride	79-04-9	AO6475000
0120	Chloroacetic chloride	79-04-9	AO6475000
0119	2-Chloroacetophenone	532-27-4	AM6300000
0119*	alpha-Chloroacetophenone	532-27-4	AM6300000
0120*	Chloroacetyl chloride	79-04-9	AO6475000
0199	3-Chloroallyl chloride	542-75-6	UC8310000
0122	2-Chlorobenzalmalonitrile	2698-41-1	OO3675000
0121*	Chlorobenzene	108-90-7	CZ0175000
0121	Chlorobenzol	108-90-7	CZ0175000
0122*	o-Chlorobenzylidene malononitrile	2698-41-1	OO3675000
0123*	Chlorobromomethane	74-97-5	PA5250000
0133	Chlorobutadiene	126-99-8	EI9625000
0113	Chlorocamphene	8001-35-2	XW5250000
0142	Chlorochromic anhydride	14977-61-8	GB5775000
0162	Chlorocyanide	506-77-4	GT2275000
0162	Chlorocyanogen	506-77-4	GT2275000
0124*	Chlorodifluoromethane	75-45-6	PA6390000
0129	Chlorodimethyl ether	107-30-2	KN6650000
0125*	Chlorodiphenyl (42% chlorine)	53469-21-9	TQ1356000
0126*	Chlorodiphenyl (54% chlorine)	11097-69-1	TQ1360000
0118	2-Chloroethanal	107-20-0	AB2450000
0267	Chloroethane	75-00-3	KH7525000
0268	2-Chloroethanol	107-07-3	KK0875000
0658	Chloroethene	75-01-4	KU9625000
0268	2-Chloroethyl alcohol	107-07-3	KK0875000
0196	bis(2-Chloroethyl)ether	111-44-4	KN0875000
0658	Chloroethylene	75-01-4	KU9625000
0632	Chlorofluorocarbon-113	76-13-1	KJ4000000
0127*	Chloroform	67-66-3	FS9100000
0224	Chloroformic acid dimethylamide	79-44-7	FD4200000

0504	Chloroformyl chloride	75-44-5	SY5600000
0403	Chloromethane	74-87-3	PA6300000
0129	Chloromethoxymethane	107-30-2	KN6650000
0128	Chloromethyl ether	542-88-1	KN1575000
0128*	bis-Chloromethyl ether	542-88-1	KN1575000
0129*	Chloromethyl methyl ether	107-30-2	KN6650000
0119	Chloromethyl phenyl ketone	532-27-4	AM6300000
0053	Chloromethylbenzene	100-44-7	XS8925000
0452	4-Chloronitrobenzene	100-00-5	CZ1050000
0452	p-Chloronitrobenzene	100-00-5	CZ1050000
0131*	Chloropentafluoroethane	76-15-3	KH7877500
0132*	Chloropicrin	76-06-2	PB6300000
0133	Chloroprene	126-99-8	EI9625000
0133*	beta-Chloroprene	126-99-8	EI9625000
0018	3-Chloropropene	107-05-1	UC7350000
0018	3-Chloropropylene	107-05-1	UC7350000
0254	2-Chloropropylene oxide	106-89-8	TX4900000
0254	gamma-Chloropropylene oxide	106-89-8	TX4900000
0134*	o-Chlorostyrene	2039-87-4	WL4160000
0134	2-Chlorostyrene	2039-87-4	WL4160000
0134	ortho-Chlorostyrene	2039-87-4	WL4160000
0404	Chlorothene	71-55-6	KJ2975000
0135*	o-Chlorotoluene	95-49-8	XS9000000
0135	2-Chlorotoluene	95-49-8	XS9000000
0053	alpha-Chlorotoluene	100-44-7	XS8925000
0117	Chlorotrifluoride	7790-91-2	FO2800000
0137*	Chlorpyrifos	2921-88-2	TF6300000
0137	Chlorpyrifos-ethyl	2921-88-2	TF6300000
0141	Chrome	7440-47-3	GB4200000
0138	Chromic acid (CrO3): Chromic anhydride	1333-82-0	GB6650000
0138*	Chromic acid and chromates	1333-82-0	GB6650000
0138	Chromic oxide	1333-82-0	GB6650000
0142	Chromic oxychloride	14977-61-8	GB5775000
0141	Chromium	7440-47-3	GB4200000
0142	Chromium chloride oxide	14977-61-8	GB5775000
0142	Chromium dichloride dioxide	14977-61-8	GB5775000
0142	Chromium dioxide dichloride	14977-61-8	GB5775000
0142	Chromium dioxychloride	14977-61-8	GB5775000
0141*	Chromium metal	7440-47-3	GB4200000
0142	Chromium oxychloride	14977-61-8	GB5775000
0139*	Chromium(II) compounds (as Cr)		
0140*	Chromium(III) compounds (as Cr)		
0138	Chromium(VI) oxide (1:3)	1333-82-0	GB6650000
0142*	Chromyl chloride	14977-61-8	GB5775000
0041	Chrysotile	1332-21-4	CI6475000
0540	Cinerin I or II	8003-34-7	UR4200000
0364	Clay	1332-58-7	GF1670500
0143*	Clopidol	2971-90-6	UU7711500
0144*	Coal dust		GF8281000
0145*	Coal tar pitch volatiles	65996-93-2	GF8655000
0147*	Cobalt carbonyl (as Co)	10210-68-1	GG0300000
0148*	Cobalt hydrocarbonyl (as Co)	16842-03-8	GG0900000
0146	Cobalt metal dust	7440-48-4	GF8750000
0146*	Cobalt metal dust and fume (as Co)	7440-48-4	GF8750000
0146	Cobalt metal fume	7440-48-4	GF8750000
0147	Cobalt octacarbonyl	10210-68-1	GG0300000
0147	Cobalt tetracarbonyl dimer	10210-68-1	GG0300000
0149*	Coke oven emissions		GH0346000
0262	Cologne spirit	64-17-5	KQ6300000
0397	Columbian spirits	67-56-1	PC1400000
0409	Combustion Improver-2	12108-13-3	OP1450000
0372	Compressed petroleum gas	68476-85-7	SE7545000
0574	Confectioner's sugar	57-50-1	WN6500000
0150*	Copper (dusts and mists, as Cu)	7440-50-8	GL5325000
0151*	Copper fume (as Cu)	1317-38-0	GL7900000
0150	Copper metal dusts	7440-50-8	GL5325000
0150	Copper metal fumes	7440-50-8	GL5325000
0151	Copper monoxide fume	1317-38-0	GL7900000
0151	Copper(II) oxide fume	1317-38-0	GL7900000
0567	Corn starch	9005-25-8	GM5090000
0250	Corundum	1302-74-5	GN0231000

0152*	Cotton dust (raw)		GN2275000
0143	Coyden®	2971-90-6	UU7711500
0153*	Crag® herbicide	136-78-7	KK4900000
0153	Crag® herbicide No. 1	136-78-7	KK4900000
0156*	p-Cresol	106-44-5	GO6475000
0156	4-Cresol	106-44-5	GO6475000
0155	3-Cresol	108-39-4	GO6125000
0155*	m-Cresol	108-39-4	GO6125000
0154	2-Cresol	95-48-7	GO6300000
0154*	o-Cresol	95-48-7	GO6300000
0156	para-Cresol	106-44-5	GO6475000
0155	meta-Cresol	108-39-4	GO6125000
0154	ortho-Cresol	95-48-7	GO6300000
0156	p-Cresylic acid	106-44-5	GO6475000
0155	m-Cresylic acid	108-39-4	GO6125000
0154	o-Cresylic acid	95-48-7	GO6300000
0553	Cristobalite	14808-60-7	VV7330000
0041	Crocidolite (Riebeckite)	1332-21-4	CI6475000
0157*	Crotonaldehyde	4170-30-3	GP9499000
0438	Crude solvent coal tar naphtha	8030-30-6	DE3030000
0158*	Crufomate	299-86-5	TB3850000
0559	Cryocide	15096-52-3	WA9625000
0559	Cryodust	15096-52-3	WA9625000
0559	Cryolite	15096-52-3	WA9625000
0089	Cucumber dust	7778-44-1	CG0830000
0159*	Cumene	98-82-8	GR8575000
0638	psi-Cumene	95-63-6	DC3325000
0159	Cumol	98-82-8	GR8575000
0091	Cyanamide	156-62-7	GS6000000
0160*	Cyanamide	420-04-2	GS5950000
0395	2-Cyano-1-propene	126-98-7	UD1400000
0005	2-Cyano-2-propanol	75-86-5	OD9275000
0378	Cyanoacetonitrile	109-77-3	OO3150000
0530	Cyanoethane	107-12-0	UF9625000
0014	Cyanoethylene	107-13-1	AT5250000
0161*	Cyanogen	460-19-5	GT1925000
0162*	Cyanogen chloride	506-77-4	GT2275000
0160	Cyanogen nitride	420-04-2	GS5950000
0005	Cyanohydrin-2-propanone	75-86-5	OD9275000
0006	Cyanomethane	75-05-8	AL7700000
0304	Cyanomethanol	107-16-4	AM0350000
0086	1-Cyanopropane	109-74-0	ET8750000
0395	2-Cyanopropene-1	126-98-7	UD1400000
0542	1,4-Cyclohexadiene dioxide	106-51-4	DK2625000
0163*	Cyclohexane	110-82-7	GU6300000
0164*	Cyclohexanethiol	1569-69-3	GV7525000
0165*	Cyclohexanol	108-93-0	GV7875000
0166*	Cyclohexanone	108-94-1	GW1050000
0167*	Cyclohexene	110-83-8	GW2500000
0165	Cyclohexyl alcohol	108-93-0	GV7875000
0166	Cyclohexyl ketone	108-94-1	GW1050000
0168*	Cyclohexylamine	108-91-8	GX0700000
0164	Cyclohexylmercaptan	1569-69-3	GV7525000
0406	Cyclohexylmethane	108-87-2	GV6125000
0164	Cyclohexylthiol	1569-69-3	GV7525000
0169*	Cyclonite	121-82-4	XY9450000
0170*	Cyclopentadiene	542-92-7	GY1000000
0170	1,3-Cyclopentadiene	542-92-7	GY1000000
0380	Cyclopentadienyl tricarbonyl manganese	12079-65-1	OO9720000
0205	bis(Cyclopentadienyl)iron	102-54-5	LK0700000
0380	Cyclopentadienylmanganese tricarbonyl	12079-65-1	OO9720000
0171*	Cyclopentane	287-92-3	GY2390000
0169	Cyclotrimethylenetrinitramine	121-82-4	XY9450000
0172*	Cyhexatin	13121-70-5	WH8750000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0173*	2,4-D	94-75-7	AG6825000
0220	DAB	60-11-7	BX7350000
0411	DACPM	101-14-4	CY1050000

0184	DBCP	96-12-8	TX8750000
0187	DBP	84-74-2	TI0875000
0188	DCA	7572-29-4	AP1080000
0190	p-DCB	106-46-7	CZ4550000
0189	o-DCB	95-50-1	CZ4500000
0661	1,1-DCE	75-35-4	KV9275000
0199	DCP	542-75-6	UC8310000
0204	DCPD	77-73-6	PC1050000
0193	DDH	118-52-5	MU0700000
0174*	DDT	50-29-3	KJ3325000
0174	p,p'-DDT	50-29-3	KJ3325000
0202	DDVP	62-73-7	TC0350000
0208	DEA	111-42-2	KL2975000
0236	DEHP	117-81-7	TI0350000
0212	DEK	96-22-0	SA8050000
0213	DEP	84-66-2	TI1050000
0211	DETA	111-40-0	IE1225000
0215	DGE	2238-07-5	KN2350000
0216	DIBK	108-83-8	MJ5775000
0217	DIPA	108-18-9	IM4025000
0218	DMAC	127-19-5	AB7700000
0224	DMCC	79-44-7	FD4200000
0412	DMDI	5124-30-1	NQ9250000
0388	DMDT	72-43-5	KJ3675000
0226	DMF	68-12-2	LQ2100000
0227	DMH	57-14-7	MV2450000
0461	DMNA	62-75-9	IQ0525000
0228	DMP	131-11-3	TI1575000
0234	DNC	534-52-1	GO9625000
0234	DNOC	534-52-1	GO9625000
0235	DNT	25321-14-6	XT1300000
0236	DOP	117-81-7	TI0350000
0240	DPA	122-39-4	JJ7800000
0242	DPK	123-19-3	MJ5600000
0248	DVB	1321-74-0	CZ9370000
0193	Dactin	118-52-5	MU0700000
0200	Dalapon	75-99-0	UF0690000
0284	Dasanit®	115-90-2	TF3850000
0175*	Decaborane	17702-41-9	HD1400000
0175	Decaboron tetradecahydride	17702-41-9	HD1400000
0365	Decachlorooctahydro-1,3,4-metheno-2H-cyc	143-50-0	PC8575000
0365	Decachlorooctahydro-kepone-2-one	143-50-0	PC8575000
0365	Decachlorotetrahydro-4,7-methanoindeneon	143-50-0	PC8575000
0176*	1-Decanethiol	143-10-2	
0176	Decylmercaptan	143-10-2	
0176	n-Decylmercaptan	143-10-2	
0238	Delnav®	78-34-2	TE3350000
0177*	Demeton	8065-48-3	TF3150000
0410	Demeton methyl	8022-00-2	TG1760000
0215	Di(2,3-epoxypropyl) ether	2238-07-5	KN2350000
0236	Di(2-ethylhexyl)phthalate	117-81-7	TI0350000
0208	Di(2-hydroxyethyl)amine	111-42-2	KL2975000
0185	2-Di-N-butylaminoethanol	102-81-8	KK3850000
0185	2-Di-N-butylaminoethyl alcohol	102-81-8	KK3850000
0245	Di-Syston®	298-04-4	TD9275000
0186	Di-n-butyl hydrogen phosphate	107-66-4	TB9605000
0187	Di-n-butyl phthalate	84-74-2	TI0875000
0236*	Di-sec octyl phthalate	117-81-7	TI0350000
0246*	2,6-Di-tert-butyl-p-cresol	128-37-0	GO7875000
0178	Diacetone	123-42-2	SA9100000
0178*	Diacetone alcohol	123-42-2	SA9100000
0215	Diallyl ether dioxide	2238-07-5	KN2350000
0329	Diamine	302-01-2	MU7175000
0191	4,4'-Diamino-3,3'-dichlorobiphenyl	91-94-1	DD0525000
0618	4,4'-Diamino-3,3'-dimethylbiphenyl	119-93-7	DD1225000
0179	1,3-Diamino-4-methoxybenzene	615-05-4	BZ8580500
0179*	2,4-Diaminoanisole (and its salts)	615-05-4	BZ8580500
0495	p-Diaminobenzene	106-50-3	SS8050000
0495	1,4-Diaminobenzene	106-50-3	SS8050000
0051	4,4'-Diaminobiphenyl	92-87-5	DC9625000
0211	2,2'-Diaminodiethylamine	111-40-0	IE1225000

0051	p-Diaminodiphenyl	92-87-5	DC9625000
0415	para'-Diaminodiphenyl-methane	101-77-9	BY5425000
0415	4,4'-Diaminodiphenylmethane	101-77-9	BY5425000
0618	Diaminoditolyl	119-93-7	DD1225000
0269	1,2-Diaminoethane	107-15-3	KH8575000
0620	Diaminotoluene	25376-45-8<	XS9445000
0415	Dianilinomethane	101-77-9	BY5425000
0180	Dianisidine	119-90-4	DD0875000
0180*	o-Dianisidine	119-90-4	DD0875000
0180	3,3'-Dianisidine	119-90-4	DD0875000
0552	Diatomaceous earth	7631-86-9	VV7310000
0552	Diatomaceous silica	7631-86-9	VV7310000
0552	Diatomite	7631-86-9	VV7310000
0181	Diazide®	333-41-5	TF3325000
0181*	Diazinon®	333-41-5	TF3325000
0182	Diazirine	334-88-3	PA7000000
0182*	Diazomethane	334-88-3	PA7000000
0676	Dibasic zinc stearate	557-05-1	ZH5200000
0494	Dibenzothiazine	92-84-2	SN5075000
0052	Dibenzoyl peroxide	94-36-0	DM8575000
0183*	Diborane	19287-45-7	HQ9275000
0183	Diboron hexahydride	19287-45-7	HQ9275000
0225	1,2-Dibromo-2,2-dichloroethyl dimethyl p	300-76-5	TB9450000
0184*	1,2-Dibromo-3-chloropropane	96-12-8	TX8750000
0184	Dibromochloropropane	96-12-8	TX8750000
0214	Dibromodifluoromethane	75-61-6	PA7525000
0270	1,2-Dibromoethane	106-93-4	KH9275000
0225	Dibrom®	300-76-5	TB9450000
0187	Dibutyl 1,2-benzene-dicarboxylate	84-74-2	TI0875000
0186	Dibutyl acid o-phosphate	107-66-4	TB9605000
0186*	Dibutyl phosphate	107-66-4	TB9605000
0186	Dibutyl phosphoric acid	107-66-4	TB9605000
0187*	Dibutyl phthalate	84-74-2	TI0875000
0185	Dibutylaminoethanol	102-81-8	KK3850000
0185	2-Dibutylaminoethanol	102-81-8	KK3850000
0246	Dibutylated hydroxytoluene	128-37-0	GO7875000
0389	2,2-Dichloro-1,1-difluoro-1-methoxyethan	76-38-0	KN7820000
0389	2,2-Dichloro-1,1-difluoroethyl methyl et	76-38-0	KN7820000
0534	Dichloro-1,2-propane	78-87-5	TX9625000
0198*	1,1-Dichloro-1-nitroethane	594-72-9	KI1050000
0199	1,3-Dichloro-1-propene	542-75-6	UC8310000
0143	3,5-Dichloro-2,6-dimethyl-4-pyridinol	2971-90-6	UU7711500
0191	3,3'-Dichloro-4,4'-biphenyldiamine	91-94-1	DD0525000
0191	3,3'-Dichloro-4,4'-diaminobiphenyl	91-94-1	DD0525000
0411	3,3'-Dichloro-4,4'-diaminodiphenylmethan	101-14-4	CY1050000
0193*	1,3-Dichloro-5,5-dimethylhydantoin	118-52-5	MU0700000
0188*	Dichloroacetylene	7572-29-4	AP1080000
0190*	p-Dichlorobenzene	106-46-7	CZ4550000
0189*	o-Dichlorobenzene	95-50-1	CZ4500000
0190	1,4-Dichlorobenzene	106-46-7	CZ4550000
0189	1,2-Dichlorobenzene	95-50-1	CZ4500000
0190	para-Dichlorobenzene	106-46-7	CZ4550000
0189	ortho-Dichlorobenzene	95-50-1	CZ4500000
0191	o,o'-Dichlorobenzidine	91-94-1	DD0525000
0191*	3,3'-Dichlorobenzidine (and its salts)	91-94-1	DD0525000
0191	Dichlorobenzidine base	91-94-1	DD0525000
0189	o-Dichlorobenzol	95-50-1	CZ4500000
0191	3,3'-Dichlorobiphenyl-4,4'-diamine	91-94-1	DD0525000
0190	Dichlorocide	106-46-7	CZ4550000
0196	2,2'-Dichlorodiethyl ether	111-44-4	KN0875000
0192*	Dichlorodifluoromethane	75-71-8	PA8200000
0128	Dichlorodimethyl ether	542-88-1	KN1575000
0142	Dichlorodioxochromium	14977-61-8	GB5775000
0174	Dichlorodiphenyltrichloroethane	50-29-3	KJ3325000
0271	1,2-Dichloroethane	107-06-2	KI0525000
0194*	1,1-Dichloroethane	75-34-3	KI0175000
0661	1,1-Dichloroethene	75-35-4	KV9275000
0196*	Dichloroethyl ether	111-44-4	KN0875000
0196	2,2'-Dichloroethyl ether	111-44-4	KN0875000
0195*	1,2-Dichloroethylene	540-59-0	KV9360000
0195	sym-Dichloroethylene	540-59-0	KV9360000

0661	1,1-Dichloroethylene	75-35-4	KV9275000
0188	Dichloroethyne	7572-29-4	AP1080000
0197	Dichlorofluoromethane	75-43-4	PA8400000
0414	Dichloromethane	75-09-2	PA8050000
0128	Dichloromethyl ether	542-88-1	KN1575000
0197*	Dichloromonofluoromethane	75-43-4	PA8400000
0198	Dichloronitroethane	594-72-9	KI1050000
0153	2-(2,4-Dichlorophenoxy)ethyl sodium sulf	136-78-7	KK4900000
0173	Dichlorophenoxyacetic acid	94-75-7	AG6825000
0173	2,4-Dichlorophenoxyacetic acid	94-75-7	AG6825000
0247	3-(3,4-Dichlorophenyl)-1,1-dimethylurea	330-54-1	YS8925000
0534	1,2-Dichloropropane	78-87-5	TX9625000
0200	2,2-Dichloropropanoic acid	75-99-0	UF0690000
0199*	1,3-Dichloropropene	542-75-6	UC8310000
0200*	2,2-Dichloropropionic acid	75-99-0	UF0690000
0200	alpha,alpha-Dichloropropionic acid	75-99-0	UF0690000
0199	1,3-Dichloropropylene	542-75-6	UC8310000
0201*	Dichlorotetrafluoroethane	76-14-2	KI1101000
0201	1,2-Dichlorotetrafluoroethane	76-14-2	KI1101000
0202	2,2-Dichlorovinyl dimethyl phosphate	62-73-7	TC0350000
0202*	Dichlorvos	62-73-7	TC0350000
0147	Dicobalt Octacarbonyl	10210-68-1	GG0300000
0147	Dicobalt carbonyl	10210-68-1	GG0300000
0203*	Dicrotophos	141-66-2	TC3850000
0161	Dicyan	460-19-5	GT1925000
0513	m-Dicyanobenzene	626-17-5	CZ1900000
0513	1,3-Dicyanobenzene	626-17-5	CZ1900000
0015	1,4-Dicyanobutane	111-69-3	AV2625000
0573	1,2-Dicyanoethane	110-61-2	WN3850000
0161	Dicyanogen	460-19-5	GT1925000
0378	Dicyanomethane	109-77-3	OO3150000
0412	Dicyclohexylmethane 4,4'-diisocyanate	5124-30-1	NQ9250000
0204*	Dicyclopentadiene	77-73-6	PC1050000
0204	1,3-Dicyclopentadiene dimer	77-73-6	PC1050000
0205*	Dicyclopentadienyl iron	102-54-5	LK0700000
0206*	Dieldrin	60-57-1	IO1750000
0207*	Diesel exhaust		
0209	Diethamine	109-89-7	HZ8750000
0208*	Diethanolamine	111-42-2	KL2975000
0068	Diethyl	106-97-8	EJ4200000
0375	Diethyl (dimethoxyphosphinothioylthio) s	121-75-5	WM8400000
0248	Diethyl benzene	1321-74-0	CZ9370000
0213	Diethyl ester of phthalic acid	84-66-2	TI1050000
0277	Diethyl ether	60-29-7	KI5775000
0212*	Diethyl ketone	96-22-0	SA8050000
0277	Diethyl oxide	60-29-7	KI5775000
0479	Diethyl parathion	56-38-2	TF4550000
0213*	Diethyl phthalate	84-66-2	TI1050000
0210	Diethyl-(2-hydroxyethyl)amine	100-37-8	KK5075000
0209*	Diethylamine	109-89-7	HZ8750000
0210	Diethylaminoethanol	100-37-8	KK5075000
0210*	2-Diethylaminoethanol	100-37-8	KK5075000
0210	2-Diethylaminoethyl alcohol	100-37-8	KK5075000
0237	Diethylene dioxide	123-91-1	JG8225000
0237	Diethylene ether	123-91-1	JG8225000
0437	Diethylene imidoxide	110-91-8	QD6475000
0602	Diethylene oxide	109-99-9	LU5950000
0437	Diethylene oximide	110-91-8	QD6475000
0211*	Diethylenetriamine	111-40-0	IE1225000
0323	Diethylmethylmethane		
0244	bis(Diethylthiocarbamoyl) disulfide	97-77-8	JO1225000
0475	Difluorine monoxide	7783-41-7	RS2100000
0595	2,2-Difluoro-1,1,1,2-tetrachloroethane	76-11-9	KI1425000
0596	1,2-Difluoro-1,1,2,2-tetrachloroethane	76-12-0	KI1420000
0662	Difluoro-1,1-ethylene	75-38-7	KW0560000
0124	Difluorochloromethane	75-45-6	PA6390000
0214*	Difluorodibromomethane	75-61-6	PA7525000
0192	Difluorodichloromethane	75-71-8	PA8200000
0662	1,1-Difluoroethene	75-38-7	KW0560000
0662	1,1-Difluoroethylene	75-38-7	KW0560000
0098	Difolatan®	2425-06-1	GS4900000

0215*	Diglycidyl ether	2238-07-5	KN2350000
0101	2,3-Dihydro-2,2-dimethyl-7-benzofuranyl	1563-66-2	FB9450000
0328	2,4-Dihydroxy-2-methylpentane	107-41-5	SA0810000
0338	Dihydroxybenzene	123-31-9	MX3500000
0543	m-Dihydroxybenzene	108-46-3	VG9625000
0109	o-Dihydroxybenzene	120-80-9	UX1050000
0543	1,3-Dihydroxybenzene	108-46-3	VG9625000
0109	1,2-Dihydroxybenzene	120-80-9	UX1050000
0338	1,4-Dihydroxybenzene	123-31-9	MX3500000
0208	2,2'-Dihydroxydiethyamine	111-42-2	KL2975000
0272	1,2-Dihydroxyethane	107-21-1	KW2975000
0216*	Diisobutyl ketone	108-83-8	MJ5775000
0320	1,6-Diisocyanatohexane	822-06-0	MO1740000
0440	1,5-Diisocyanatonaphthalene	3173-72-6	NQ9600000
0323	Diisopropyl		
0216	sym-Diisopropyl acetone	108-83-8	MJ5775000
0362	Diisopropyl ether	108-20-3	TZ5425000
0362	Diisopropyl oxide	108-20-3	TZ5425000
0217*	Diisopropylamine	108-18-9	IM4025000
0227	Dimazine	57-14-7	MV2450000
0180	3,3'-Dimethoxybenzidine	119-90-4	DD0875000
0388	p,p'-Dimethoxydiphenylftrichloroethane	72-43-5	KJ3675000
0396	Dimethoxymethane	109-87-5	PA8750000
0218*	Dimethyl acetamide	127-19-5	AB7700000
0224*	Dimethyl carbamoyl chloride	79-44-7	FD4200000
0359	Dimethyl carbinol	67-63-0	NT8050000
0203	2-Dimethyl cis-2-dimethylcarbamoyl-1-met	141-66-2	TC3850000
0228	Dimethyl ester of 1,2-benzenedicarboxyli	131-11-3	TI1575000
0229	Dimethyl ester of sulfuric acid	77-78-1	WS8225000
0226	Dimethyl formamide	68-12-2	LQ2100000
0004	Dimethyl ketone	67-64-1	AL3150000
0524	Dimethyl methane	74-98-6	TX2275000
0229*	Dimethyl sulfate	77-78-1	WS8225000
0225*	Dimethyl-1,2-dibromo-2,2-dichlorethyl ph	300-76-5	TB9450000
0478	1,1'-Dimethyl-4,4'-bipyridinium dichlori	1910-42-5	DW2275000
0618	3,3'-Dimethyl-4,4'-diphenyldiamine	119-93-7	DD1225000
0216	2,6-Dimethyl-4-heptanone	108-83-8	MJ5775000
0212	Dimethylacetone	96-22-0	SA8050000
0219*	Dimethylamine	124-40-3	IP8750000
0219	Dimethylamine (anhydrous)	124-40-3	IP8750000
0221*	bis(2-(Dimethylamino)ethyl)ether	3033-62-3	KR9460000
0222	3-(Dimethylamino)propionitrile	1738-25-6	UG1575000
0220	p-Dimethylaminoazobenzene	60-11-7	BX7350000
0220*	4-Dimethylaminoazobenzene	60-11-7	BX7350000
0672	Dimethylaminobenzene	1300-73-8	ZE8575000
0222*	Dimethylaminopropionitrile	1738-25-6	UG1575000
0672	Dimethylaniline	1300-73-8	ZE8575000
0672	2,4-Dimethylaniline)	1300-73-8	ZE8575000
0670	1,4-Dimethylbenzene	106-42-3	ZE2625000
0669	1,3-Dimethylbenzene	108-38-3	ZE2275000
0668	1,2-Dimethylbenzene	95-47-6	ZE2450000
0618	3,3'-Dimethylbenzidine	119-93-7	DD1225000
0323	2,2-Dimethylbutane		
0323	2,3-Dimethylbutane		
0327	1,3-Dimethylbutyl acetate	108-84-9	SA7525000
0224	Dimethylcarbamic chloride	79-44-7	FD4200000
0129	Dimethylchloroether	107-30-2	KN6650000
0286	tris(Dimethyldithiocarbamato)iron	14484-64-1	NO8750000
0275	Dimethylene oxide	75-21-8	KX2450000
0274	Dimethyleneimine	151-56-4	KX5075000
0274	Dimethylenimine	151-56-4	KX5075000
0226*	Dimethylformamide	68-12-2	LQ2100000
0227*	1,1-Dimethylhydrazine	57-14-7	MV2450000
0460	Dimethylnitromethane	79-46-9	TZ5250000
0461	Dimethylnitrosamine	62-75-9	IQ0525000
0228*	Dimethylphthalate	131-11-3	TI1575000
0229	Dimethylsulfate	77-78-1	WS8225000
0612	bis(Dimethylthiocarbamoyl) disulfide	137-26-8	JO1400000
0573	Dinile	110-61-2	WN3850000
0230*	Dinitolmide	148-01-6	XS4200000
0234	3,5-Dinitro-2-hydroxytoluene	534-52-1	GO9625000

0234	4,6-Dinitro-2-methyl phenol	534-52-1	GO9625000
0234*	Dinitro-o-cresol	534-52-1	GO9625000
0234	4,6-Dinitro-o-cresol	534-52-1	GO9625000
0230	3,5-Dinitro-o-toluamide	148-01-6	XS4200000
0233*	p-Dinitrobenzene	100-25-4	CZ7525000
0231*	o-Dinitrobenzene	528-29-0	CZ7450000
0232*	m-Dinitrobenzene	99-65-0	CZ7350000
0233	1,4-Dinitrobenzene	100-25-4	CZ7525000
0231	1,2-Dinitrobenzene	528-29-0	CZ7450000
0232	1,3-Dinitrobenzene	99-65-0	CZ7350000
0233	para-Dinitrobenzene	100-25-4	CZ7525000
0232	meta-Dinitrobenzene	99-65-0	CZ7350000
0231	ortho-Dinitrobenzene	528-29-0	CZ7450000
0465	Dinitrogen monoxide	10024-97-2	QX1350000
0454	Dinitrogen tetroxide (N2O4)	10102-44-0	QW9800000
0235*	Dinitrotoluene	25321-14-6	XT1300000
0235	Dinitrotoluol	25321-14-6	XT1300000
0208	Diolamine	111-42-2	KL2975000
0237	Dioxan	123-91-1	JG8225000
0237*	Dioxane	123-91-1	JG8225000
0237	p-Dioxane	123-91-1	JG8225000
0237	1,4-Dioxane	123-91-1	JG8225000
0238	Dioxane phosphate	78-34-2	TE3350000
0238	p-Dioxane-2,3-diyl ethyl phosphorodithio	78-34-2	TE3350000
0238	2,3-p-Dioxanethiol S,S-bis(O,O-diethyl p	78-34-2	TE3350000
0238*	Dioxathion	78-34-2	TE3350000
0594	Dioxin	1746-01-6	HP3500000
0594	Dioxine	1746-01-6	HP3500000
0516	1,3-Dioxo-2-pivaloy-lindane	83-26-1	NK6300000
0239*	Diphenyl	92-52-4	DU8050000
0496	Diphenyl ether	101-84-8	KN8970000
0496	Diphenyl oxide	101-84-8	KN8970000
0497	Diphenyl oxide-diphenyl mixture	8004-13-5	DV1500000
0240*	Diphenylamine	122-39-4	JJ7800000
0591	o-Diphenylbenzene	84-15-1	WZ6472000
0592	m-Diphenylbenzene	92-06-8	WZ6470000
0593	p-Diphenylbenzene	92-94-4	WZ6475000
0591	1,2-Diphenylbenzene	84-15-1	WZ6472000
0592	1,3-Diphenylbenzene	92-06-8	WZ6470000
0593	1,4-Diphenylbenzene	92-94-4	WZ6475000
0413	4,4'-Diphenylmethane diisocyanate	101-68-8	NQ9350000
0415	4,4'-Diphenylmethanediamine	101-77-9	BY5425000
0242*	Dipropyl ketone	123-19-3	MJ5600000
0241*	Dipropylene glycol methyl ether	34590-94-8	JM1575000
0241	Dipropylene glycol monomethyl ether	34590-94-8	JM1575000
0243*	Diquat (Diquat dibromide)	85-00-7	JM5690000
0243	Diquat dibromide	85-00-7	JM5690000
0247	Direx®	330-54-1	YS8925000
0566	Disodium pyrosulfite	7681-57-4	UX8225000
0057	Disodium salt of boric acid	1330-43-4	ED4588000
0057	Disodium tetrabromate	1330-43-4	ED4588000
0244*	Disulfiram	97-77-8	JO1225000
0245*	Disulfoton	298-04-4	TD9275000
0579	Disulfur decafluoride	5714-22-7	WS4480000
0020	4,5-Dithia-1-octene	2179-59-1	JO0350000
0586	Dithion®	3689-24-5	XN4375000
0247*	Diuron	330-54-1	YS8925000
0653	Divanadium pentoxide dust	1314-62-1	YW2450000
0654	Divanadium pentoxide fume	1314-62-1	YW2460000
0067	Divinyl	106-99-0	EI9275000
0248*	Divinyl benzene	1321-74-0	CZ9370000
0249*	1-Dodecanethiol	112-55-0	JR3155000
0249	Dodecyl mercaptan	112-55-0	JR3155000
0249	1-Dodecyl mercaptan	112-55-0	JR3155000
0249	n-Dodecyl mercaptan	112-55-0	JR3155000
0055	Doped bismuth sesquitelluride		
0055	Doped bismuth telluride		
0055	Doped bismuth tritelluride		
0055	Doped tellurobismuthite		
0241	Dowanol® 50B	34590-94-8	JM1575000
0070	Dowanol® EB	111-76-2	KJ8575000

0158	Dowco® 132	299-86-5	TB3850000
0536	Dowtherm® 209	107-98-2	UB7700000
0497	Dowtherm® A	8004-13-5	DV1500000
0518	Dried calcium sulfate	26499-65-0	TP0700000
0569	Dry cleaning safety solvent	8052-41-3	WJ8925000
0103	Dry ice	124-38-9	FF6400000
0137	Dursban®	2921-88-2	TF6300000
0292	Dyfonate®	944-22-9	TA5950000
0292	Dyphonate	944-22-9	TA5950000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0070	EGBE	111-76-2	KJ8575000
0071	EGBEA	112-07-2	KJ8925000
0273	EGDN	628-96-6	KW5600000
0258	EGEE	110-80-5	KK8050000
0259	EGEEA	111-15-9	KK8225000
0401	EGME	109-86-4	KL5775000
0402	EGMEA	110-49-6	KL5950000
0279	ENB	16219-75-3	RB9450000
0255*	EPN	2104-64-5	TB1925000
0276	ETU	96-45-7	NI9625000
0070	Ektasolve EB®	111-76-2	KJ8575000
0071	Ektasolve EB® acetate	112-07-2	KJ8925000
0022	Elemental aluminum	7429-90-5	BD0330000
0309	Elemental hafnium	7440-58-6	MG4600000
0507	Elemental phosphorus	7723-14-0	TH3500000
0550	Elemental selenium	7782-49-2	VS7700000
0554	Elemental silicon	7440-21-3	VW0400000
0250*	Emery	1302-74-5	GN0231000
0251*	Endosulfan	115-29-7	RB9275000
0251	Endosulphan	115-29-7	RB9275000
0252*	Endrin	72-20-8	IO1575000
0253*	Enflurane	13838-16-9	KN6800000
0447	Engravers acid	7697-37-2	QU5775000
0285	Entex	55-38-9	TF9625000
0254*	Epichlorohydrin	106-89-8	TX4900000
0275	1,2-Epoxy ethane	75-21-8	KX2450000
0538	1,2-Epoxy propane	75-56-9	TZ2975000
0303	2,3-Epoxy-1-propanol	556-52-5	UB4375000
0081	1,2-Epoxy-3-butoxypropane	2426-08-6	TX4200000
0363	1,2-Epoxy-3-isopropoxypropane	4016-14-2	TZ3500000
0498	1,2-Epoxy-3-phenoxy propane	122-60-1	TZ3675000
0602	1,4-Epoxybutane	109-99-9	LU5950000
0659	1-Epoxyethyl-3,4-epoxy-cyclohexane	106-87-6	RN8640000
0303	Epoxypropyl alcohol	556-52-5	UB4375000
0215	2-Epoxypropyl ether	2238-07-5	KN2350000
0215	bis(2,3-Epoxypropyl) ether	2238-07-5	KN2350000
0067	Erythrene	106-99-0	EI9275000
0450	Essence of mirbane	98-95-3	DA6475000
0262	EtOH	64-17-5	KQ6300000
0001	Ethanal	75-07-0	AB1925000
0316	Ethane hexachloride	67-72-1	KI4025000
0482	Ethane pentachloride	76-01-7	KI6300000
0628	Ethane trichloride	79-00-5	KJ3150000
0529	Ethanecarboxylic acid	79-09-4	UE5950000
0269	1,2-Ethanediamine	107-15-3	KH8575000
0161	Ethanedinitrile	460-19-5	GT1925000
0474	Ethanedioic acid	144-62-7	RO2450000
0272	1,2-Ethanediol	107-21-1	KW2975000
0273	1,2-Ethanediol dinitrate	628-96-6	KW5600000
0280	Ethanethiol	75-08-1	K19625000
0002	Ethanoic acid	64-19-7	AF1225000
0003	Ethanoic anhydride	108-24-7	AK1925000
0262	Ethanol	64-17-5	KQ6300000
0256*	Ethanolamine	141-43-5	KJ5775000
0367	Ethenone	463-51-4	OA7700000
0656	Ethenyl acetate	108-05-4	AK0875000
0571	Ethenyl benzene	100-42-5	WL3675000
0656	Ethenyl ethanoate	108-05-4	AK0875000

0663	Ethenylmethylbenzene	25013-15-4	WL5075000
0277	Ether	60-29-7	KI5775000
0008	Ethine	74-86-2	AO9600000
0257*	Ethion	563-12-2	TE4550000
0258*	2-Ethoxyethanol	110-80-5	KK8050000
0259*	2-Ethoxyethyl acetate	111-15-9	KK8225000
0253	Ethrane®	13838-16-9	KN6800000
0283	Ethyl 3-methyl-4-(methylthio)phenyl-(1-m	22224-92-6	TB3675000
0260*	Ethyl acetate	141-78-6	AH5425000
0488	Ethyl acetone	107-87-9	SA7875000
0261*	Ethyl acrylate	140-88-5	AT0700000
0261	Ethyl acrylate (inhibited)	140-88-5	AT0700000
0262*	Ethyl alcohol	64-17-5	KQ6300000
0001	Ethyl aldehyde	75-07-0	AB1925000
0418	Ethyl amyl ketone	541-85-5	MJ7350000
0264*	Ethyl benzene	100-41-4	DA0700000
0265*	Ethyl bromide	74-96-4	KH6475000
0266*	Ethyl butyl ketone	106-35-4	MJ5250000
0533	Ethyl carbinol	71-23-8	UH8225000
0267*	Ethyl chloride	75-00-3	KH7525000
0530	Ethyl cyanide	107-12-0	UF9625000
0260	Ethyl ester of acetic acid	141-78-6	AH5425000
0261	Ethyl ester of acrylic acid	140-88-5	AT0700000
0278	Ethyl ester of formic acid	109-94-4	LQ8400000
0260	Ethyl ethanoate	141-78-6	AH5425000
0277*	Ethyl ether	60-29-7	KI5775000
0278*	Ethyl formate	109-94-4	LQ8400000
0212	Ethyl ketone	96-22-0	SA8050000
0280*	Ethyl mercaptan	75-08-1	K19625000
0278	Ethyl methanoate	109-94-4	LQ8400000
0069	Ethyl methyl ketone	78-93-3	EL6475000
0416	Ethyl methyl ketone peroxide	1338-23-4	EL9450000
0006	Ethyl nitrile	75-05-8	AL7700000
0282	Ethyl orthosilicate	78-10-4	VV9450000
0277	Ethyl oxide	60-29-7	KI5775000
0255	Ethyl p-nitrophenyl benzenethionophospho	2104-64-5	TB1925000
0479	Ethyl parathion	56-38-2	TF4550000
0213	Ethyl phthalate	84-66-2	TI1050000
0261	Ethyl propenoate	140-88-5	AT0700000
0590	Ethyl pyrophosphate	107-49-3	UX6825000
0282*	Ethyl silicate	78-10-4	VV9450000
0282	Ethyl silicate (condensed)	78-10-4	VV9450000
0280	Ethyl sulfhydrate	75-08-1	K19625000
0263*	Ethylamine	75-04-7	KH2100000
0263	Ethylamine (anhydrous)	75-04-7	KH2100000
0264	Ethylbenzol	100-41-4	DA0700000
0270	Ethylene bromide	106-93-4	KH9275000
0268	Ethylene chlorhydrin	107-07-3	KK0875000
0271	Ethylene chloride	107-06-2	KI0525000
0268*	Ethylene chlorohydrin	107-07-3	KK0875000
0573	Ethylene cyanide	110-61-2	WN3850000
0270*	Ethylene dibromide	106-93-4	KH9275000
0271*	Ethylene dichloride	107-06-2	KI0525000
0573	Ethylene dicyanide	110-61-2	WN3850000
0273	Ethylene dinitrate	628-96-6	KW5600000
0272*	Ethylene glycol	107-21-1	KW2975000
0273*	Ethylene glycol dinitrate	628-96-6	KW5600000
0357	Ethylene glycol isopropyl ether	109-59-1	KL5075000
0070	Ethylene glycol monobutyl ether	111-76-2	KJ8575000
0071	Ethylene glycol monobutyl ether acetate	112-07-2	KJ8925000
0258	Ethylene glycol monoethyl ether	110-80-5	KK8050000
0259	Ethylene glycol monoethyl ether acetate	111-15-9	KK8225000
0401	Ethylene glycol monomethyl ether	109-86-4	KL5775000
0402	Ethylene glycol monomethyl ether acetate	110-49-6	KL5950000
0658	Ethylene monochloride	75-01-4	KU9625000
0273	Ethylene nitrate	628-96-6	KW5600000
0275*	Ethylene oxide	75-21-8	KX2450000
0276*	Ethylene thiourea	96-45-7	NI9625000
0629	Ethylene trichloride	79-01-6	KX4550000
0243	1,1'-Ethylene-2,2'-bipyridyllium dibromi	85-00-7	JM5690000
0276	1,3-Ethylene-2-thiourea	96-45-7	NI9625000

0013	Ethylenecarboxylic acid	79-10-7	AS4375000
0269*	Ethylenediamine	107-15-3	KH8575000
0269	Ethylenediamine (anhydrous)	107-15-3	KH8575000
0274*	Ethyleneimine	151-56-4	KX5075000
0274	Ethylenimine	151-56-4	KX5075000
0529	Ethylformic acid	79-09-4	UE5950000
0236	bis-(2-Ethylhexyl)phthalate	117-81-7	TI0350000
0194	Ethylidene chloride	75-34-3	KI0175000
0194	1,1-Ethylidene dichloride	75-34-3	KI0175000
0279*	Ethylidene norbornene	16219-75-3	RB9450000
0279	5-Ethylidene-2-norbornene	16219-75-3	RB9450000
0279	5-Ethylidenebicyclo(2.2.1)-hept-2-ene	16219-75-3	RB9450000
0274	Ethylimine	151-56-4	KX5075000
0281	4-Ethylmorpholine	100-74-3	QE4025000
0256	Ethylolamine	141-43-5	KJ5775000
0008	Ethyne	74-86-2	AO9600000
0491	Expanded perlite	93763-70-3	SO5254000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0007	FAA	53-96-3	AB9450000
0007	2-FAA	53-96-3	AB9450000
0346	FeSO4: Ferrous sulfate		
0283*	Fenamiphos	22224-92-6	TB3675000
0546	Fenchlorophos	299-84-3	TG0525000
0494	Fenothiazine	92-84-2	SN5075000
0284*	Fensulfothion	115-90-2	TF3850000
0285*	Fenthion	55-38-9	TF9625000
0501	Fenylfosfin	638-21-1	SZ2100000
0286*	Ferbam	14484-64-1	NO8750000
0348	Fermentation amyl alcohol	123-51-3	EL5425000
0286	Ferric dimethyl dithiocarbamate	14484-64-1	NO8750000
0344	Ferric oxide	1309-37-1	NO7400000
0205	Ferrocene	102-54-5	LK0700000
0287	Ferrovanadium	12604-58-9	LK2900000
0287*	Ferrovanadium dust	12604-58-9	LK2900000
0288	Fiber glas®		LK3651000
0288	Fiberglass		LK3651000
0288*	Fibrous glass dust		LK3651000
0563	Floridine	7681-49-4	WB0350000
0105	Flue gas	630-08-0	FG3500000
0007	2-Fluorenylacetamide	53-96-3	AB9450000
0289*	Fluorine	7782-41-4	LM6475000
0475	Fluorine monoxide	7783-41-7	RS2100000
0289	Fluorine-19	7782-41-4	LM6475000
0123	Fluorocarbon 1011	74-97-5	PA5250000
0192	Fluorocarbon 12	75-71-8	PA8200000
0634	Fluorocarbon 1301	75-63-8	PA5425000
0131	Fluorocarbon-115	76-15-3	KH7877500
0124	Fluorocarbon-22	75-45-6	PA6390000
0197	Fluorodichloromethane	75-43-4	PA8400000
0660	Fluoroethene	75-02-5	YZ7351000
0660	Fluoroethylene	75-02-5	YZ7351000
0108	Fluoroformyl fluoride	353-50-4	FG6125000
0108	Fluorophosgene	353-50-4	FG6125000
0290*	Fluorotrichloromethane	75-69-4	PB6125000
0291*	Fluoroxene	406-90-6	KO4250000
0292*	Fonofos	944-22-9	TA5950000
0292	Fonophos	944-22-9	TA5950000
0396	Formal	109-87-5	PA8750000
0293*	Formaldehyde	50-00-0	LP8925000
0304	Formaldehyde cyanohydrin	107-16-4	AM0350000
0396	Formaldehyde dimethylacetal	109-87-5	PA8750000
0294	Formaldehyde solution		
0294*	Formalin (as formaldehyde)		
0295*	Formamide	75-12-7	LQ0525000
0296*	Formic acid	64-18-6	LQ4900000
0296	Formic acid (85-95% in aqueous solution)	64-18-6	LQ4900000
0333	Formonitrile	74-90-8	MW6825000
0107	Freon® 10	56-23-5	FG4900000

0290	Freon® 11	75-69-4	PB6125000
0596	Freon® 112	76-12-0	KI1420000
0595	Freon® 112a	76-11-9	KI1425000
0632	Freon® 113	76-13-1	KJ4000000
0201	Freon® 114	76-14-2	KI1101000
0131	Freon® 115	76-15-3	KH7877500
0192	Freon® 12	75-71-8	PA8200000
0214	Freon® 12B2	75-61-6	PA7525000
0634	Freon® 13B1	75-63-8	PA5425000
0197	Freon® 21	75-43-4	PA8400000
0124	Freon® 22	75-45-6	PA6390000
0366	Fuel Oil No. 1	8008-20-6	OA5500000
0101	Furacarb®	1563-66-2	FB9450000
0101	Furadan®	1563-66-2	FB9450000
0297	Fural	98-01-1	LT7000000
0297	2-Furancarboxaldehyde	98-01-1	LT7000000
0376	2,5-Furanedione	108-31-6	ON3675000
0297*	Furfural	98-01-1	LT7000000
0297	Furfuraldehyde	98-01-1	LT7000000
0297	2-Furfuraldehyde	98-01-1	LT7000000
0298*	Furfuryl alcohol	98-00-0	LU9100000
0102	Furnace black	1333-86-4	FF5800000
0298	2-Furylmethanol	98-00-0	LU9100000
0057	Fused borax	1330-43-4	ED4588000
0348	Fusel oil	123-51-3	EL5425000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0145	acridine	65996-93-2	GF8655000
0145	chrysene	65996-93-2	GF8655000
0145	anthracene & benzo(a)pyrene).	65996-93-2	GF8655000
0145	pyrene	65996-93-2	GF8655000
0145	phenanthrene	65996-93-2	GF8655000
0299*	Gasoline	8006-61-9	LX3300000
0632	Genetron® 113	76-13-1	KJ4000000
0201	Genetron® 114	76-14-2	KI1101000
0131	Genetron® 115	76-15-3	KH7877500
0192	Genetron® 12	75-71-8	PA8200000
0197	Genetron® 21	75-43-4	PA8400000
0124	Genetron® 22	75-45-6	PA6390000
0300	Germane	7782-65-2	LY4900000
0300	Germanium hydride	7782-65-2	LY4900000
0300*	Germanium tetrahydride	7782-65-2	LY4900000
0300	Germanomethane	7782-65-2	LY4900000
0002	Glacial acetic acid (pure compound)	64-19-7	AF1225000
0013	Glacial acrylic acid (98% in aqueous sol	79-10-7	AS4375000
0288	Glass fibers		LK3651000
0288	Glass wool		LK3651000
0301*	Glutaraldehyde	111-30-8	MA2450000
0301	Glutaric dialdehyde	111-30-8	MA2450000
0302	Glycerin (anhydrous)	56-81-5	MA8050000
0302*	Glycerin (mist)	56-81-5	MA8050000
0302	Glycerol	56-81-5	MA8050000
0631	Glycerol trichlorohydrin	96-18-4	TZ9275000
0631	Glyceryl trichlorohydrin	96-18-4	TZ9275000
0456	Glyceryl trinitrate	55-63-0	QX2100000
0303	Glycide	556-52-5	UB4375000
0303*	Glycidol	556-52-5	UB4375000
0019	Glycidyl allyl ether	106-92-3	RR0875000
0498	Glycidyl phenyl ether	122-60-1	TZ3675000
0272	Glycol	107-21-1	KW2975000
0272	Glycol alcohol	107-21-1	KW2975000
0270	Glycol dibromide	106-93-4	KH9275000
0271	Glycol dichloride	107-06-2	KI0525000
0273	Glycol dinitrate	628-96-6	KW5600000
0259	Glycol monoethyl ether acetate	111-15-9	KK8225000
0401	Glycol monomethyl ether	109-86-4	KL5775000
0402	Glycol monomethyl ether acetate	110-49-6	KL5950000
0304	Glycolic nitrile	107-16-4	AM0350000
0304*	Glycolonitrile	107-16-4	AM0350000

0304	Glyconitrile	107-16-4	AM0350000
0302	Glycyl alcohol	56-81-5	MA8050000
0262	Grain alcohol	64-17-5	KQ6300000
0305*	Grain dust (oat, wheat, barley)		MD7900000
0574	Granulated sugar	57-50-1	WN6500000
0306*	Graphite (natural)	7782-42-5	MD9659600
0307*	Graphite (synthetic)	7440-44-0 (	FF5250100
0096	Gum camphor	76-22-2	EX1225000
0648	Gum turpentine	8006-64-2	YO8400000
0648	Gumspirits	8006-64-2	YO8400000
0044	Guthion®	86-50-0	TE1925000
0308*	Gypsum	13397-24-5	MG2360000
0518	Gypsum hemihydrate	26499-65-0	TP0700000
0308	Gypsum stone	13397-24-5	MG2360000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0314	HCBD	87-68-3	EJ0700000
0315	HCCPD	77-47-4	GY1225000
0370	HCH	58-89-9	GV4900000
0320	HDI	822-06-0	MO1740000
0206	HEOD	60-57-1	IO1750000
0334	HF-A	7664-39-3	MW7875000
0319	HFA	684-16-2	UC2450000
0016	HHDN	309-00-2	IO2100000
0412	HMDI	5124-30-1	NQ9250000
0320	HMDI	822-06-0	MO1740000
0321	HMPA	680-31-9	TD0875000
0339	HPA	999-61-1	AT1925000
0309*	Hafnium	7440-58-6	MG4600000
0309	Hafnium metal	7440-58-6	MG4600000
0193	Halane	118-52-5	MU0700000
0596	Halocarbon 112	76-12-0	KI1420000
0595	Halocarbon 112a	76-11-9	KI1425000
0632	Halocarbon 113	76-13-1	KJ4000000
0662	Halocarbon 1132A	75-38-7	KW0560000
0131	Halocarbon 115	76-15-3	KH7877500
0634	Halocarbon 13B1	75-63-8	PA5425000
0123	Halon® 1011	74-97-5	PA5250000
0107	Halon® 104	56-23-5	FG4900000
0197	Halon® 112	75-43-4	PA8400000
0214	Halon® 1202	75-61-6	PA7525000
0192	Halon® 122	75-71-8	PA8200000
0634	Halon® 1301	75-63-8	PA5425000
0201	Halon® 242	76-14-2	KI1101000
0310*	Halothane	151-67-7	KH6550000
0630	Halowax®	1321-65-9	QK4025000
0600	Halowax®	1335-88-2	QK3700000
0483	Halowax® 1013	1321-64-8	QK0300000
0317	Halowax® 1014	1335-87-1	QJ7350000
0468	Halowax® 1051	2234-13-1	QK0250000
0647	Hard metal	11107-01-0	Y07350000
0667	Hard wood dust		ZC9850000
0472	Heavy mineral oil mist	8012-95-1	PY8030000
0637	Hemellitol	526-73-8	DC330000
0518	Hemihydrate gypsum	26499-65-0	TP0700000
0311*	Heptachlor	76-44-8	PC0700000
0311	1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetr	76-44-8	PC0700000
0242	Heptan-4-one	123-19-3	MJ5600000
0312	Heptane	142-82-5	MI7700000
0312*	n-Heptane	142-82-5	MI7700000
0312	normal-Heptane	142-82-5	MI7700000
0313*	1-Heptanethiol	1639-09-4	MJ1400000
0266	3-Heptanone	106-35-4	MJ5250000
0399	2-Heptanone	110-43-0	MJ5075000
0242	4-Heptanone	123-19-3	MJ5600000
0313	Heptyl mercaptan	1639-09-4	MJ1400000
0313	n-Heptyl mercaptan	1639-09-4	MJ1400000
0314	Hexachloro-1,3-butadiene	87-68-3	EJ0700000
0315	Hexachloro-1,3-cyclopentadiene	77-47-4	GY1225000

0315	1,2,3,4,5,5-Hexachloro-1,3-cyclopentadie	77-47-4	GY1225000
0016	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-h	309-00-2	IO2100000
0251	6,7,8,9,10-Hexachloro-1,5,5a,6,9,9a-hexa	115-29-7	RB9275000
0206	1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4	60-57-1	IO1750000
0252	1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4	72-20-8	IO1575000
0314*	Hexachlorobutadiene	87-68-3	EJ0700000
0314	1,3-Hexachlorobutadiene	87-68-3	EJ0700000
0370	gamma-Hexachlorocyclohexane	58-89-9	GV4900000
0315*	Hexachlorocyclopentadiene	77-47-4	GY1225000
0370	gamma isomer of 1,2,3,4,5,6-Hexachlorocy	58-89-9	GV4900000
0316*	Hexachloroethane	67-72-1	KI4025000
0317*	Hexachloronaphthalene	1335-87-1	QJ7350000
0318	n-Hexadecanethiol	2917-26-2	
0318*	1-Hexadecanethiol	2917-26-2	
0318	Hexadecanethiol-1	2917-26-2	
0318	Hexadecyl mercaptan	2917-26-2	
0252	Hexadrin®	72-20-8	IO1575000
0319	Hexafluoro-2-propanone	684-16-2	UC2450000
0319	1,1,1,3,3,3-Hexafluoro-2-propanone	684-16-2	UC2450000
0319*	Hexafluoroacetone	684-16-2	UC2450000
0169	Hexahydro-1,3,5-trinitro-s-triazine	121-82-4	XY9450000
0097	Hexahydro-2H-azepin-2-one	105-60-2	CM3675000
0168	Hexahydroaniline	108-91-8	GX0700000
0168	Hexahydrobenzenamine	108-91-8	GX0700000
0163	Hexahydrobenzene	110-82-7	GU6300000
0407	Hexahydrocresol	25639-42-3	GW0175000
0407	Hexahydromethylphenol	25639-42-3	GW0175000
0165	Hexahydrophenol	108-93-0	GV7875000
0406	Hexahydrotoluene	108-87-2	GV6125000
0165	Hexalin	108-93-0	GV7875000
0321*	Hexamethyl phosphoramide	680-31-9	TD0875000
0163	Hexamethylene	110-82-7	GU6300000
0320*	Hexamethylene diisocyanate	822-06-0	MO1740000
0320	1,6-Hexamethylene diisocyanate	822-06-0	MO1740000
0320	Hexamethylene-1,6-diisocyanate	822-06-0	MO1740000
0321	Hexamethylphosphoric triamide	680-31-9	TD0875000
0321	Hexamethylphosphorotriamide	680-31-9	TD0875000
0163	Hexanaphthene	110-82-7	GU6300000
0322	Hexane	110-54-3	MN9275000
0322*	n-Hexane	110-54-3	MN9275000
0322	normal-Hexane	110-54-3	MN9275000
0323*	Hexane isomers (excluding n-Hexane)		
0015	Hexanedinitrile	111-69-3	AV2625000
0324*	n-Hexanethiol	111-31-9	MO4550000
0324	1-Hexanethiol	111-31-9	MO4550000
0325*	2-Hexanone	591-78-6	MP1400000
0326*	Hexone	108-10-1	SA9275000
0327*	sec-Hexyl acetate	108-84-9	SA7525000
0322	Hexyl hydride	110-54-3	MN9275000
0324	Hexyl mercaptan	111-31-9	MO4550000
0324	n-Hexyl mercaptan	111-31-9	MO4550000
0328*	Hexylene glycol	107-41-5	SA0810000
0324	n-Hexylthiol	111-31-9	MO4550000
0438	High solvent naphtha	8030-30-6	DE3030000
0335	High-strength hydrogen peroxide	7722-84-1	MX0900000
0165	Hydralin	108-93-0	GV7875000
0364	Hydrated aluminum silicate	1332-58-7	GF1670500
0308	Hydrated calcium sulfate	13397-24-5	MG2360000
0092	Hydrated lime	1305-62-0	EW2800000
0521	Hydraulic cement	65997-15-1	VV8770000
0329*	Hydrazine	302-01-2	MU7175000
0329	Hydrazine (anhydrous)	302-01-2	MU7175000
0329	Hydrazine base	302-01-2	MU7175000
0499	Hydrazinobenzene	100-63-0	MW8925000
0364	Hydrite	1332-58-7	GF1670500
0528	Hydroacrylic acid	57-57-8	RQ7350000
0331	Hydrobromic acid)	10035-10-6	MW3850000
0332	Hydrochloric acid	7647-01-0	MW4025000
0267	Hydrochloric ether	75-00-3	KH7525000
0148	Hydrocobalt tetracarbonyl	16842-03-8	GG0900000
0333	Hydrocyanic acid	74-90-8	MW6825000

0334	Hydrofluoric acid)	7664-39-3	MW7875000
0568	Hydrogen antimonide	7803-52-3	WJ0700000
0040	Hydrogen arsenide	7784-42-1	CG6475000
0331*	Hydrogen bromide	10035-10-6	MW3850000
0296	Hydrogen carboxylic acid	64-18-6	LQ4900000
0332*	Hydrogen chloride	7647-01-0	MW4025000
0160	Hydrogen cyanamide	420-04-2	GS5950000
0333*	Hydrogen cyanide	74-90-8	MW6825000
0335	Hydrogen dioxide	7722-84-1	MX0900000
0334*	Hydrogen fluoride (as F)	7664-39-3	MW7875000
0447	Hydrogen nitrate	7697-37-2	QU5775000
0335*	Hydrogen peroxide	7722-84-1	MX0900000
0335	Hydrogen peroxide (aqueous)	7722-84-1	MX0900000
0505	Hydrogen phosphide	7803-51-2	SY7525000
0336*	Hydrogen selenide	7783-07-5	MX1050000
0577	Hydrogen sulfate	7664-93-9	WS5600000
0337*	Hydrogen sulfide	7783-06-4	MX1225000
0412	Hydrogenated MDI	5124-30-1	NQ9250000
0330	Hydrogenated diphenylbenzenes	61788-32-7	WZ6535000
0330	Hydrogenated phenylbiphenyls	61788-32-7	WZ6535000
0330*	Hydrogenated terphenyls	61788-32-7	WZ6535000
0330	Hydrogenated triphenyls	61788-32-7	WZ6535000
0373	Hydromagnesite	546-93-0	OM2470000
0335	Hydroperoxide	7722-84-1	MX0900000
0338*	Hydroquinone	123-31-9	MX3500000
0390	Hydroquinone monomethyl ether	150-76-5	SL7700000
0337	Hydrosulfuric acid	7783-06-4	MX1225000
0584	Hydrous magnesium silicate	14807-96-6	WW2710000
0525	3-Hydroxy-1-propanesulphonic acid sulton	1120-71-4	RP5425000
0005	2-Hydroxy-2-methyl-propionitrile	75-86-5	OD9275000
0154	1-Hydroxy-2-methylbenzene	95-48-7	GO6300000
0665	4-Hydroxy-3-(3-oxo-1-phenyl butyl)-2H-1-	81-81-2	GN4550000
0155	1-Hydroxy-3-methylbenzene	108-39-4	GO6125000
0178	4-Hydroxy-4-methyl-2-pentanone	123-42-2	SA9100000
0156	1-Hydroxy-4-methylbenzene	106-44-5	GO6475000
0435	3-Hydroxy-N-methylcrotonamide dimethylph	6923-22-4	TC4375000
0528	3-Hydroxy-beta-lactone	57-57-8	RQ7350000
0528	3-Hydroxy-propionic acid	57-57-8	RQ7350000
0304	Hydroxyacetonitrile	107-16-4	AM0350000
0390	p-Hydroxyanisole	150-76-5	SL7700000
0493	Hydroxybenzene	108-95-2	SJ3325000
0076	1-Hydroxybutane	71-36-3	EO1400000
0077	2-Hydroxybutane	78-92-2	EO1750000
0110	Hydroxycellulose	9004-34-6	FJ5691460
0165	Hydroxycyclohexane	108-93-0	GV7875000
0357	beta-Hydroxyethyl isopropyl ether	109-59-1	KL5075000
0208	bis(2-Hydroxyethyl)amine	111-42-2	KL2975000
0256	2-Hydroxyethylamine	141-43-5	KJ5775000
0005	alpha-Hydroxyisobutyronitrile	75-86-5	OD9275000
0303	Hydroxymethyl ethylene oxide	556-52-5	UB4375000
0303	2-Hydroxymethyl oxiran	556-52-5	UB4375000
0485	2,2-bis(Hydroxymethyl)-1,3-propanediol	115-77-5	RZ2490000
0298	2-Hydroxymethylfuran	98-00-0	LU9100000
0543	m-Hydroxyphenol	108-46-3	VG9625000
0543	3-Hydroxyphenol	108-46-3	VG9625000
0109	2-Hydroxyphenol	120-80-9	UX1050000
0339*	2-Hydroxypropyl acrylate	999-61-1	AT1925000
0339	beta-Hydroxypropyl acrylate	999-61-1	AT1925000
0303	3-Hydroxypropylene oxide	556-52-5	UB4375000
0156	4-Hydroxytoluene	106-44-5	GO6475000
0155	3-Hydroxytoluene	108-39-4	GO6125000
0154	2-Hydroxytoluene	95-48-7	GO6300000
0210	2-Hydroxytriethylamine	100-37-8	KK5075000
0465	Hyponitrous acid anhydride	10024-97-2	QX1350000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0352	IBA	78-83-1	NP9625000
0363	IGE	4016-14-2	TZ3500000
0359	IPA	67-63-0	NT8050000

0356	IPDI	4098-71-9	NQ9370000
0276	2-Imidazolidine-2-thione	96-45-7	NI9625000
0208	2,2'-Iminodiethanol	111-42-2	KL2975000
0250	Impure corundum	1302-74-5	GN0231000
0340*	Indene	95-13-6	NK8225000
0341*	Indium	7440-74-6	NL1050000
0341	Indium metal	7440-74-6	NL1050000
0340	Indonaphthene	95-13-6	NK8225000
0480	"Inert" dusts		
0342*	Iodine	7553-56-2	NN1575000
0342	Iodine crystals	7553-56-2	NN1575000
0343*	Iodoform	75-47-8	PB7000000
0420	Iodomethane	74-88-4	PA9450000
0345	Iron carbonyl	13463-40-6	NO4900000
0205	Iron dicyclopentadienyl	102-54-5	LK0700000
0344*	Iron oxide dust and fume (as Fe)	1309-37-1	NO7400000
0549	Iron oxide red	1309-37-1	NO7400000
0345*	Iron pentacarbonyl (as Fe)	13463-40-6	NO4900000
0346*	Iron salts (soluble, as Fe)		
0355	Isoacetophorone	78-59-1	GW7700000
0347*	Isoamyl acetate	123-92-2	NS9800000
0348*	Isoamyl alcohol (primary)	123-51-3	EL5425000
0349*	Isoamyl alcohol (secondary)	6032-29-7	
0421	Isoamyl methyl ketone	110-12-3	MP3850000
0350*	Isobutane	75-28-5	TZ4300000
0352	Isobutanol	78-83-1	NP9625000
0385	Isobutenyl methyl ketone	141-79-7	SB4200000
0351*	Isobutyl acetate	110-19-0	AI4025000
0352*	Isobutyl alcohol	78-83-1	NP9625000
0348	Isobutyl carbinol	123-51-3	EL5425000
0351	Isobutyl ester of acetic acid	110-19-0	AI4025000
0326	Isobutyl methyl ketone	108-10-1	SA9275000
0422	Isobutylmethylcarbinol	108-11-2	SA7350000
0353*	Isobutyronitrile	78-82-0	TZ4900000
0412	bis(4-Isocyanatocyclohexyl)methane	5124-30-1	NQ9250000
0356	3-Isocyanatomethyl-3,5,5-trimethylcycloh	4098-71-9	NQ9370000
0592	Isodiphenylbenzene	92-06-8	WZ6470000
0323	Isohexane		
0354	Isooctanol	26952-21-6	NS7700000
0354*	Isooctyl alcohol	26952-21-6	NS7700000
0347	Isopentyl acetate	123-92-2	NS9800000
0348	Isopentyl alcohol	123-51-3	EL5425000
0421	Isopentyl methyl ketone	110-12-3	MP3850000
0355*	Isophorone	78-59-1	GW7700000
0356	Isophorone diamine diisocyanate	4098-71-9	NQ9370000
0356*	Isophorone diisocyanate	4098-71-9	NQ9370000
0513	Isophthalodinitrile	626-17-5	CZ1900000
0395	Isoprene cyanide	126-98-7	UD1400000
0359	Isopropanol	67-63-0	NT8050000
0429	Isopropenyl benzene	98-83-9	WL5075300
0395	Isopropenylnitrile	126-98-7	UD1400000
0362	2-Isopropoxy propane	108-20-3	TZ5425000
0357*	2-Isopropoxyethanol	109-59-1	KL5075000
0363	Isopropoxymethyl oxirane	4016-14-2	TZ3500000
0531	o-Isopropoxyphenyl-N-methylcarbamate	114-26-1	FC3150000
0357	Isopropyl Cellosolve®	109-59-1	KL5075000
0358*	Isopropyl acetate	108-21-4	AI4930000
0359*	Isopropyl alcohol	67-63-0	NT8050000
0159	Isopropyl benzene	98-82-8	GR8575000
0353	Isopropyl cyanide	78-82-0	TZ4900000
0358	Isopropyl ester of acetic acid	108-21-4	AI4930000
0362*	Isopropyl ether	108-20-3	TZ5425000
0363*	Isopropyl glycidyl ether	4016-14-2	TZ3500000
0357	Isopropyl glycol	109-59-1	KL5075000
0424	Isopropyl methyl ketone	563-80-4	EL9100000
0360*	Isopropylamine	75-31-0	NT8400000
0361	Isopropylaniline	768-52-5	BY4190000
0352	Isopropylcarbinol	78-83-1	NP9625000
0385	Isopropylideneacetone	141-79-7	SB4200000
0216	Isovalerone	108-83-8	MJ5775000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0540	Jasmolin I or II	8003-34-7	UR4200000
0070	Jeffersol EB	111-76-2	KJ8575000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0364*	Kaolin	1332-58-7	GF1670500
0247	Karmex®	330-54-1	YS8925000
0365*	Kepone	143-50-0	PC8575000
0366*	Kerosene	8008-20-6	OA5500000
0367*	Ketene	463-51-4	OA7700000
0367	Keto-ethylene	463-51-4	OA7700000
0004	Ketone propane	67-64-1	AL3150000
0130	Korax®	600-25-9	TX5075000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0372*	L.P.G.	68476-85-7	SE7545000
0372	LPG	68476-85-7	SE7545000
0528	beta-Lactone	57-57-8	RQ7350000
0102	Lamp black	1333-86-4	FF5800000
0387	Lannate®	16752-77-5	AK2975000
0130	Lanstan®	600-25-9	TX5075000
0465	Laughing gas	10024-97-2	QX1350000
0096	Laurel camphor	76-22-2	EX1225000
0249	Lauryl mercaptan	112-55-0	JR3155000
0249	n-Lauryl mercaptan	112-55-0	JR3155000
0368*	Lead	7439-92-1	OF7525000
0368	Lead metal	7439-92-1	OF7525000
0601	Lead tetraethyl	78-00-2	TP4550000
0603	Lead tetramethyl	75-74-1	TP4725000
0431	Lepidolite	12001-26-2	VV8760000
0144	Lignite coal dust		GF8281000
0664	Ligroin	8032-32-4	OI6180000
0093	Lime	1305-78-8	EW3100000
0091	Lime nitrogen	156-62-7	GS6000000
0369*	Limestone	1317-65-3	EV9580000
0370*	Lindane	58-89-9	GV4900000
0372	Liquefied hydrocarbon gas	68476-85-7	SE7545000
0372	Liquefied petroleum gas	68476-85-7	SE7545000
0371*	Lithium hydride	7580-67-8	OJ6300000
0371	Lithium monohydride	7580-67-8	OJ6300000
0523	Lye	1310-58-3	TT2100000
0565	Lye	1310-73-2	WB4900000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0436	MA	100-61-8	BY4550000
0393	MAPP gas	59355-75-8	UK4920000
0325	MBK	591-78-6	MP1400000
0411	MBOCA	101-14-4	CY1050000
0121	MCB	108-90-7	CZ0175000
0380	MCT	12079-65-1	OO9720000
0415	MDA	101-77-9	BY5425000
0413	MDI	101-68-8	NQ9350000
0069	MEK	78-93-3	EL6475000
0416	MEK peroxide	1338-23-4	EL9450000
0416	MEKP	1338-23-4	EL9450000
0421	MIAK	110-12-3	MP3850000
0422	MIBC	108-11-2	SA7350000
0326	MIBK	108-10-1	SA9275000
0423	MIC	624-83-9	NQ9450000
0424	MIPK	563-80-4	EL9100000
0419	MMH	60-34-4	MV5600000
0409	MMT	12108-13-3	OP1450000
0411	MOCA	101-14-4	CY1050000

0488	MPK	107-87-9	SA7875000
0671	MXDA	1477-55-0	PF8970000
0119	Mace®	532-27-4	AM6300000
0374	Magnesia fume	1309-48-4	OM3850000
0373*	Magnesite	546-93-0	OM2470000
0373	Magnesium carbonate	546-93-0	OM2470000
0374*	Magnesium oxide fume	1309-48-4	OM3850000
0373	Magnesium(II) carbonate	546-93-0	OM2470000
0375*	Malathion	121-75-5	WM8400000
0376	Maleic acid anhydride	108-31-6	ON3675000
0376*	Maleic anhydride	108-31-6	ON3675000
0377*	Malonaldehyde	542-78-9	TX6475000
0377	Malonic aldehyde	542-78-9	TX6475000
0378	Malonic dinitrile	109-77-3	OO3150000
0377	Malonodialdehyde	542-78-9	TX6475000
0378*	Malononitrile	109-77-3	OO3150000
0379*	Manganese compounds and fume (as Mn)	7439-96-5	OO9275000
0380*	Manganese cyclopentadienyl tricarbonyl	12079-65-1	OO9720000
0381	Manganese oxide	1317-35-7	OP0895000
0381*	Manganese tetroxide (as Mn)	1317-35-7	OP0895000
0409	Manganese tricarbonylmethylcyclopentadie	12108-13-3	OP1450000
0379	Manganese-55	7439-96-5	OO9275000
0381	Manganomanganic oxide	1317-35-7	OP0895000
0432	Manmade mineral fibers		PY8070000
0382*	Marble	1317-65-3	EV9580000
0431	Margarite	12001-26-2	VV8760000
0558	Massive talc		VV8780000
0405	Mecrylate	137-05-3	AS7000000
0390	Mequinol	150-76-5	SL7700000
0610	Mercaptoacetate	68-11-1	AI5950000
0610	Mercaptoacetic acid	68-11-1	AI5950000
0610	2-Mercaptoacetic acid	68-11-1	AI5950000
0050	Mercaptobenzene	108-98-5	DC0525000
0083	1-Mercaptobutane	109-79-5	EK6300000
0176	1-Mercaptodecane	143-10-2	
0249	1-Mercaptododecane	112-55-0	JR3155000
0280	Mercaptoethane	75-08-1	K19625000
0425	Mercaptomethane	74-93-1	PB4375000
0467	1-Mercaptononane	1455-21-6	
0469	1-Mercaptooctadecane	2885-00-9	
0471	1-Mercaptooctane	111-88-6	
0526	3-Mercaptopropane	107-03-9	TZ7300000
0384*	Mercury (organo) alkyl compounds (as Hg)		
0383*	Mercury compounds [except (organo) alkyl	7439-97-6	OV4550000
0383	Mercury metal: Colloidal mercury	7439-97-6	OV4550000
0385*	Mesityl oxide	141-79-7	SB4200000
0639	Mesitylene	108-67-8	OX6825000
0212	Metacetone	96-22-0	SA8050000
0529	Metacetonic acid	79-09-4	UE5950000
0383	Metallic mercury	7439-97-6	OV4550000
0613	Metallic tin	7440-31-5	XP7320000
0587	Metallum problematum	13494-80-9	WY2625000
0410	Metasystox®	8022-00-2	TG1760000
0426	Methacrylate monomer	80-62-6	OZ5075000
0386*	Methacrylic acid	79-41-4	OZ2975000
0386	alpha-Methacrylic acid	79-41-4	OZ2975000
0386	Methacrylic acid (glacial)	79-41-4	OZ2975000
0386	Methacrylic acid (inhibited)	79-41-4	OZ2975000
0395	Methacrylonitrile	126-98-7	UD1400000
0293	Methanal	50-00-0	LP8925000
0295	Methanamide	75-12-7	LQ0525000
0106	Methane tetrabromide	558-13-4	FG4725000
0485	Methane tetramethylol	115-77-5	RZ2490000
0127	Methane trichloride	67-66-3	FS9100000
0002	Methanecarboxylic acid	64-19-7	AF1225000
0425	Methanethiol	74-93-1	PB4375000
0296	Methanoic acid	64-18-6	LQ4900000
0397	Methanol	67-56-1	PC1400000
0389	Methoflurane	76-38-0	KN7820000
0387*	Methomyl	16752-77-5	AK2975000
0179	4-Methoxy-1,3-benzene-diamine	615-05-4	BZ8580500

0536	2-Methoxy-1-methylethanol	107-98-2	UB7700000
0536	1-Methoxy-2-hydroxypropane	107-98-2	UB7700000
0536	1-Methoxy-2-propanol	107-98-2	UB7700000
0388	Methoxy-DDT	72-43-5	KJ3675000

0179 4-Methoxy-m-phenylene-diamine

Synony 615-05-4 BZ8580500

0035	p-Methoxyaniline	104-94-9	BZ5450000
0034	o-Methoxyaniline	90-04-0	BZ5410000
0394	Methoxycarbonylethylene	96-33-3	AT2800000
0388*	Methoxychlor	72-43-5	KJ3675000
0401	2-Methoxyethanol	109-86-4	KL5775000
0402	2-Methoxyethyl acetate	110-49-6	KL5950000
0389	Methoxyfluorane	76-38-0	KN7820000
0389*	Methoxyflurane	76-38-0	KN7820000
0396	Methoxymethyl methyl ether	109-87-5	PA8750000
0390*	4-Methoxyphenol	150-76-5	SL7700000
0390	p-Methoxyphenol	150-76-5	SL7700000
0388	2,2-bis(p-Methoxyphenyl)-1,1,1-trichloro	72-43-5	KJ3675000
0048	Methyl 1-(butylcarbamoyl)-2-benzimidazol	17804-35-2	DD6475000
0326	4-Methyl 2-pentanone	108-10-1	SA9275000
0387	Methyl N-((methylamino)carbonyl)oxy)etha	16752-77-5	AK2975000
0391*	Methyl acetate	79-20-9	AI9100000
0529	Methyl acetic acid	79-09-4	UE5950000
0069	Methyl acetone	78-93-3	EL6475000
0392*	Methyl acetylene	74-99-7	UK4250000
0393	Methyl acetylene-allene mixture	59355-75-8	UK4920000
0393*	Methyl acetylene-propadiene mixture	59355-75-8	UK4920000
0393	Methyl acetylene-propadiene mixture (sta	59355-75-8	UK4920000
0157	beta-Methyl acrolein	4170-30-3	GP9499000
0394*	Methyl acrylate	96-33-3	AT2800000
0397*	Methyl alcohol	67-56-1	PC1400000
0293	Methyl aldehyde	50-00-0	LP8925000
0405	Methyl alpha-cyanoacrylate	137-05-3	AS7000000
0422	Methyl amyl alcohol	108-11-2	SA7350000
0399*	Methyl (n-amyl) ketone	110-43-0	MJ5075000
0044	Methyl azinphos	86-50-0	TE1925000
0619	Methyl benzene	108-88-3	XS5250000
0619	Methyl benzol	108-88-3	XS5250000
0400*	Methyl bromide	74-83-9	PA4900000
0424	3-Methyl butan-2-one	563-80-4	EL9100000
0325	Methyl butyl ketone	591-78-6	MP1400000
0401*	Methyl Cellosolve®	109-86-4	KL5775000
0402*	Methyl Cellosolve® acetate	110-49-6	KL5950000
0403*	Methyl chloride	74-87-3	PA6300000
0123	Methyl chlorobromide	74-97-5	PA5250000
0404*	Methyl chloroform	71-55-6	KJ2975000
0006	Methyl cyanide	75-05-8	AL7700000
0405	Methyl cyanoacrylate	137-05-3	AS7000000
0409*	Methyl cyclopentadienyl manganese tricar	12108-13-3	OP1450000
0410*	Methyl demeton	8022-00-2	TG1760000
0405	Methyl ester of 2-cyanoacrylic acid	137-05-3	AS7000000
0391	Methyl ester of acetic acid	79-20-9	AI9100000
0394	Methyl ester of acrylic acid	96-33-3	AT2800000
0417	Methyl ester of formic acid	107-31-3	LQ8925000
0423	Methyl ester of isocyanic acid	624-83-9	NQ9450000
0426	Methyl ester of methacrylic acid	80-62-6	OZ5075000
0391	Methyl ethanoate	79-20-9	AI9100000
0077	Methyl ethyl carbinol	78-92-2	EO1750000
0069	Methyl ethyl ketone	78-93-3	EL6475000
0416	Methyl ethyl ketone hydroperoxide	1338-23-4	EL9450000
0416*	Methyl ethyl ketone peroxide	1338-23-4	EL9450000
0538	Methyl ethylene oxide	75-56-9	TZ2975000
0417*	Methyl formate	107-31-3	LQ8925000
0419*	Methyl hydrazine	60-34-4	MV5600000
0420*	Methyl iodide	74-88-4	PA9450000
0421*	Methyl isoamyl ketone	110-12-3	MP3850000
0385	Methyl isobutenyl ketone	141-79-7	SB4200000
0422*	Methyl isobutyl carbinol	108-11-2	SA7350000
0326	Methyl isobutyl ketone	108-10-1	SA9275000
0423*	Methyl isocyanate	624-83-9	NQ9450000

0424*	Methyl isopropyl ketone	563-80-4	EL9100000
0425*	Methyl mercaptan	74-93-1	PB4375000
0410	Methyl mercaptophos	8022-00-2	TG1760000
0426*	Methyl methacrylate	80-62-6	OZ5075000
0417	Methyl methanoate	107-31-3	LQ8925000
0325	Methyl n-butyl ketone	591-78-6	MP1400000
0428	Methyl orthosilicate	681-84-5	VV9800000
0427*	Methyl parathion	298-00-0	TG0175000
0156	4-Methyl phenol	106-44-5	GO6475000
0155	3-Methyl phenol	108-39-4	GO6125000
0154	2-Methyl phenol	95-48-7	GO6300000
0640	Methyl phosphite	121-45-9	TH1400000
0394	Methyl propenoate	96-33-3	AT2800000
0488	Methyl propyl ketone	107-87-9	SA7875000
0428*	Methyl silicate	681-84-5	VV9800000
0429*	alpha-Methyl styrene	98-83-9	WL5075300
0229	Methyl sulfate	77-78-1	WS8225000
0425	Methyl sulfhydrate	74-93-1	PB4375000
0410	Methyl systox®	8022-00-2	TG1760000
0066	Methyl tribromide	75-25-2	PB5600000
0220	Methyl yellow	60-11-7	BX7350000
0348	3-Methyl-1-butanol	123-51-3	EL5425000
0347	3-Methyl-1-butanol acetate	123-92-2	NS9800000
0429	1-Methyl-1-phenylethylene	98-83-9	WL5075300
0352	2-Methyl-1-propanol	78-83-1	NP9625000
0641	1-Methyl-2,4,6-trinitrobenzene	118-96-7	XU0175000
0328	2-Methyl-2,4-pentanediol	107-41-5	SA0810000
0328	4-Methyl-2,4-pentanediol	107-41-5	SA0810000
0246	4-Methyl-2,6-di-tert-butyl phenol	128-37-0	GO7875000
0622	1-Methyl-2-aminobenzene	95-53-4	XU2975000
0349	3-Methyl-2-butanol	6032-29-7	<
0424	3-Methyl-2-butanone	563-80-4	EL9100000
0405*	Methyl-2-cyanoacrylate	137-05-3	AS7000000
0421	5-Methyl-2-hexanone	110-12-3	MP3850000
0426	Methyl-2-methyl-2-propenoate	80-62-6	OZ5075000
0422	4-Methyl-2-pentanol	108-11-2	SA7350000
0178	2-Methyl-2-pentanol-4-one	123-42-2	SA9100000
0078	2-Methyl-2-propanol	75-65-0	EO1925000
0446	3-(1-Methyl-2-pyrrolidyl)pyridine	54-11-5	QS5250000
0230	2-Methyl-3,5-dinitrobenzamide	148-01-6	XS4200000
0418*	5-Methyl-3-heptanone	541-85-5	MJ7350000
0385	4-Methyl-3-penten-2-one	141-79-7	SB4200000
0085	1-Methyl-4-tert-butylbenzene	98-51-1	XS8400000
0418	3-Methyl-5-heptanone	541-85-5	MJ7350000
0421	2-Methyl-5-hexanone	110-12-3	MP3850000
0386	2-Methylacrylic acid	79-41-4	OZ2975000
0395*	Methylacrylonitrile	126-98-7	UD1400000
0395	alpha-Methylacrylonitrile	126-98-7	UD1400000
0396*	Methylal	109-87-5	PA8750000
0398*	Methylamine	74-89-5	PF6300000
0398	Methylamine (anhydrous)	74-89-5	PF6300000
0398	Methylamine (aqueous)	74-89-5	PF6300000
0436	(Methylamino)benzene	100-61-8	BY4550000
0624	4-Methylaniline	106-49-0	XU3150000
0623	3-Methylaniline	108-44-1	XU2800000
0622	o-Methylaniline	95-53-4	XU2975000
0622	2-Methylaniline	95-53-4	XU2975000
0537	2-Methylaziridine	75-55-8	CM8050000
0624	4-Methylbenzenamine	106-49-0	XU3150000
0623	3-Methylbenzenamine	108-44-1	XU2800000
0032	1-Methylbutyl acetate	626-38-0	AJ2100000
0347	3-Methylbutyl ester of acetic acid	123-92-2	NS9800000
0347	3-Methylbutyl ethanoate	123-92-2	NS9800000
0129	Methylchloromethyl ether	107-30-2	KN6650000
0406*	Methylcyclohexane	108-87-2	GV6125000
0407*	Methylcyclohexanol	25639-42-3	GW0175000
0408	2-Methylcyclohexanone	583-60-8	GW1750000
0408*	o-Methylcyclohexanone	583-60-8	GW1750000
0409	2-Methylcyclopentadienyl manganese trica	12108-13-3	OP1450000
0235	Methyldinitrobenzene	25321-14-6	XT1300000
0412*	Methylene bis(4-cyclohexylisocyanate)	5124-30-1	NQ9250000

0413	Methylene bis(4-phenyl isocyanate)	101-68-8	NQ9350000
0413*	Methylene bisphenyl isocyanate	101-68-8	NQ9350000
0414*	Methylene chloride	75-09-2	PA8050000
0413	Methylene di-p-phenylene ester of isocya	101-68-8	NQ9350000
0414	Methylene dichloride	75-09-2	PA8050000
0396	Methylene dimethyl ether	109-87-5	PA8750000
0293	Methylene oxide	50-00-0	LP8925000
0411*	4,4'-Methylenebis(2-chloroaniline)	101-14-4	CY1050000
0411	4,4'-Methylenebis(2-chlorobenzenamine)	101-14-4	CY1050000
0411	4,4'-Methylenebis(o-chloro aniline)	101-14-4	CY1050000
0415*	4,4'-Methylenedianiline	101-77-9	BY5425000
0358	1-Methylethyl ester of acetic acid	108-21-4	AI4930000
0537	2-Methylethyleneimine	75-55-8	CM8050000
0068	Methylethylmethane	106-97-8	EJ4200000
0327	Methylisoamyl acetate	108-84-9	SA7525000
0005	2-Methyllactonitrile	75-86-5	OD9275000
0462	o-Methylnitrobenzene	88-72-2	XT3150000
0462	2-Methylnitrobenzene	88-72-2	XT3150000
0463	3-Methylnitrobenzene	99-08-1	XT2975000
0463	m-Methylnitrobenzene	99-08-1	XT2975000
0464	4-Methylnitrobenzene	99-99-0	XT3325000
0464	p-Methylnitrobenzene	99-99-0	XT3325000
0538	Methyloxirane	75-56-9	TZ2975000
0323	3-Methylpentane		
0323	2-Methylpentane		
0328	2-Methylpentane-2,4-diol	107-41-5	SA0810000
0436	Methylphenylamine	100-61-8	BY4550000
0620	Methylphenylene diamine	25376-45-8	XS9445000
0350	2-Methylpropane	75-28-5	TZ4300000
0353	2-Methylpropanenitrile	78-82-0	TZ4900000
0395	2-Methylpropenenitrile	126-98-7	UD1400000
0386	2-Methylpropenoic acid	79-41-4	OZ2975000
0353	2-Methylpropionitrile	78-82-0	TZ4900000
0073	1-Methylpropyl acetate	105-46-4	AF7380000
0351	2-Methylpropyl acetate	110-19-0	AI4025000
0351	2-Methylpropyl ester of acetic acid	110-19-0	AI4025000
0351	beta-Methylpropyl ethanoate	110-19-0	AI4025000
0084	2-(1-Methylpropyl)phenol	89-72-5	SJ8920000
0663	Methylstyrene	25013-15-4	WL5075000
0430*	Metribuzin	21087-64-9	XZ2990000
0503	Mevinphos	7786-34-7	GQ5250000
0431*	Mica (containing less than 1% quartz)	12001-26-2	VV8760000
0306	Mineral carbon	7782-42-5	MD9659600
0569	Mineral spirits	8052-41-3	WJ8925000
0308	Mineral white	13397-24-5	MG2360000
0432*	Mineral wool fiber		PY8070000
0064	Molecular bromine	7726-95-6	EF9100000
0115	Molecular chlorine	7782-50-5	FO2100000
0342	Molecular iodine	7553-56-2	NN1575000
0433*	Molybdenum	7439-98-7	QA4680000
0434*	Molybdenum (soluble compounds, as Mo)		
0433	Molybdenum metal	7439-98-7	QA4680000
0030	Monoammonium salt of sulfamic acid	7773-06-0	WO6125000
0265	Monobromoethane	74-96-4	KH6475000
0657	Monobromoethylene	593-60-2	KU8400000
0400	Monobromomethane	74-83-9	PA4900000
0634	Monobromotrifluoromethane	75-63-8	PA5425000
0120	Monochloroacetyl chloride	79-04-9	AO6475000
0121	Monochlorobenzene	108-90-7	CZ0175000
0124	Monochlorodifluoromethane	75-45-6	PA6390000
0267	Monochloroethane	75-00-3	KH7525000
0658	Monochloroethene	75-01-4	KU9625000
0658	Monochloroethylene	75-01-4	KU9625000
0403	Monochloromethane	74-87-3	PA6300000
0131	Monochloropentafluoroethane	76-15-3	KH7877500
0435	Monocron	6923-22-4	TC4375000
0435*	Monocrotophos	6923-22-4	TC4375000
0256	Monoethanolamine	141-43-5	KJ5775000
0263	Monoethylamine	75-04-7	KH2100000
0272	Monoethylene glycol	107-21-1	KW2975000
0660	Monofluoroethylene	75-02-5	YZ7351000

0290	Monofluorotrichloromethane	75-69-4	PB6125000
0300	Monogermane	7782-65-2	LY4900000
0493	Monohydroxybenzene	108-95-2	SJ3325000
0420	Monoiodomethane	74-88-4	PA9450000
0360	Monoisopropylamine	75-31-0	NT8400000
0436*	Monomethyl aniline	100-61-8	BY4550000
0390	Monomethyl ether hydroquinone	150-76-5	SL7700000
0398	Monomethylamine	74-89-5	PF6300000
0419	Monomethylhydrazine	60-34-4	MV5600000
0448	Mononitrogen monoxide	10102-43-9	QX0525000
0485	Monopentaerythritol	115-77-5	RZ2490000
0499	Monophenylhydrazine	100-63-0	MW8925000
0556	Monosilane	7803-62-5	VV1400000
0561	Monosodium salt of sulfurous acid	7631-90-5	VZ2000000
0105	Monoxide	630-08-0	FG3500000
0437*	Morpholine	110-91-8	QD6475000
0299	Motor fuel	8006-61-9	LX3300000
0299	Motor spirits	8006-61-9	LX3300000
0332	Muriatic acid)	7647-01-0	MW4025000
0267	Muriatic ether	75-00-3	KH7525000
0431	Muscovite	12001-26-2	VV8760000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0478	N,N'-Dimethyl-4,4'-bipyridinium dichlori	1910-42-5	DW2275000
0185	N,N-Dibutylethanolamine	102-81-8	KK3850000
0209	N,N-Diethylamine	109-89-7	HZ8750000
0210	N,N-Diethylethanolamine	100-37-8	KK5075000
0218	N,N-Dimethyl acetamide	127-19-5	AB7700000
0220	N,N-Dimethyl-4-aminoazobenzene	60-11-7	BX7350000
0222	N,N-Dimethylamino-3-propionitrile	1738-25-6	UG1575000
0223*	N,N-Dimethylaniline	121-69-7	BX4725000
0223	N,N-Dimethylbenzeneamine	121-69-7	BX4725000
0224	N,N-Dimethylcarbamoyl chloride	79-44-7	FD4200000
0226	N,N-Dimethylformamide	68-12-2	LQ2100000
0636	N,N-Dimethylmethanamine	75-50-3	PA0350000
0461	N,N-Dimethylnitrosamine	62-75-9	IQ0525000
0223	N,N-Dimethylphenylamine	121-69-7	BX4725000
0643	N,N-Diphenylaniline	603-34-9	YK2680000
0643	N,N-Diphenylbenzenamine	603-34-9	YK2680000
0276	N,N-Ethylenethiourea	96-45-7	NI9625000
0098	N-((1,1,2,2-Tetrachloroethyl)thio)-4-cyc	2425-06-1	GS4900000
0217	N-(1-Methylethyl)-2-propanamine	108-18-9	IM4025000
0361	N-(1-Methylethyl)-benzenamine	768-52-5	BY4190000
0211	N-(2-Aminoethyl)1,2-ethanediamine	111-40-0	IE1225000
0007	N-Acetyl-2-aminofluorene	53-96-3	AB9450000
0185*	2-N-Dibutylaminoethanol	102-81-8	KK3850000
0209	N-Ethylethanamine	109-89-7	HZ8750000
0281*	N-Ethylmorpholine	100-74-3	QE4025000
0361	N-IPA	768-52-5	BY4190000
0361*	N-Isopropylaniline	768-52-5	BY4190000
0436	N-Methyl aniline	100-61-8	BY4550000
0531	N-Methyl-2-isopropoxyphenyl-carbamate	114-26-1	FC3150000
0607	N-Methyl-N,2,4,6-tetranitroaniline	479-45-8	BY6300000
0461	N-Methyl-N-nitroso-methanamine	62-75-9	IQ0525000
0219	N-Methylmethanamine	124-40-3	IP8750000
0461	N-Nitroso-N,N-dimethylamine	62-75-9	IQ0525000
0461*	N-Nitrosodimethylamine	62-75-9	IQ0525000
0500*	N-Phenyl-beta-naphthylamine	135-88-6	QM4550000
0240	N-Phenylaniline	122-39-4	JJ7800000
0240	N-Phenylbenzenamine	122-39-4	JJ7800000
0361	N-Phenylisopropylamine	768-52-5	BY4190000
0436	N-Phenylmethylamine	100-61-8	BY4550000
0099	N-Trichloromethylmercapto-4-cyclohexene-	133-06-2	GW5075000
0136	N-serve®	1929-82-4	US7525000
0440	NDI	3173-72-6	NQ9600000
0461	NDMA	62-75-9	IQ0525000
0456	NG	55-63-0	QX2100000
0221	NIAX® A99	3033-62-3	KR9460000
0221	NIAX® Catalyst A1	3033-62-3	KR9460000

0459	1-NP	108-03-2	TZ5075000
0460	2-NP	79-46-9	TZ5250000
0225	Naled	300-76-5	TB9450000
0438	Naphtha	8030-30-6	DE3030000
0438*	Naphtha (coal tar)	8030-30-6	DE3030000
0439*	Naphthalene	91-20-3	QJ0525000
0440*	Naphthalene diisocyanate	3173-72-6	NQ9600000
0440	1,5-Naphthalene diisocyanate	3173-72-6	NQ9600000
0440	1,5-Naphthalene ester of isocyanic acid	3173-72-6	NQ9600000
0439	Naphthalin	91-20-3	QJ0525000
0100	1-Naphthyl N-Methyl-carbamate	63-25-2	FC5950000
0100	alpha-Naphthyl N-methyl-carbamate	63-25-2	FC5950000
0037	alpha-Naphthyl thiocarbamide	86-88-4	YT9275000
0037	1-Naphthyl thiourea	86-88-4	YT9275000
0037	alpha-Naphthyl thiourea	86-88-4	YT9275000
0441	1-Naphthylamine	134-32-7	QM1400000
0442	2-Naphthylamine	91-59-8	QM2100000
0442*	beta-Naphthylamine	91-59-8	QM2100000
0441*	alpha-Naphthylamine	134-32-7	QM1400000
0500	beta-Naphthylphenylamine	135-88-6	QM4550000
0250	Natural aluminum oxide	1302-74-5	GN0231000
0369	Natural calcium carbonate	1317-65-3	EV9580000
0382	Natural calcium carbonate	1317-65-3	EV9580000
0299	Natural gasoline	8006-61-9	LX3300000
0238	Navadel®	78-34-2	TE3350000
0283	Nemacur®	22224-92-6	TB3675000
0443*	Niax® Catalyst ESN	62765-93-9	QR3900000
0630	Nibren wax	1321-65-9	QK4025000
0600	Nibren wax	1335-88-2	QK3700000
0444*	Nickel carbonyl	13463-39-3	QR6300000
0445*	Nickel metal and other compounds (as Ni)	7440-02-0	QR5950000
0444	Nickel tetracarbonyl	13463-39-3	QR6300000
0446*	Nicotine	54-11-5	QS5250000
0607	Nitramine	479-45-8	BY6300000
0136	Nitrapyrin	1929-82-4	US7525000
0447*	Nitric acid	7697-37-2	QU5775000
0448*	Nitric oxide	10102-43-9	QX0525000
0449*	p-Nitroaniline	100-01-6	BY7000000
0449	4-Nitroaniline	100-01-6	BY7000000
0449	4-Nitrobenzenamine	100-01-6	BY7000000
0450*	Nitrobenzene	98-95-3	DA6475000
0450	Nitrobenzol	98-95-3	DA6475000
0451	p-Nitrobipheny	92-93-3	DV5600000
0451*	4-Nitrobiphenyl	92-93-3	DV5600000
0457	Nitrocarbol	75-52-5	PA9800000
0452	4-Nitrochlorobenzene	100-00-5	CZ1050000
0452*	p-Nitrochlorobenzene	100-00-5	CZ1050000
0132	Nitrochloroform	76-06-2	PB6300000
0451	p-Nitrodiphenyl	92-93-3	DV5600000
0451	4-Nitrodiphenyl	92-93-3	DV5600000
0453	Nitroetan	79-24-3	K15600000
0453*	Nitroethane	79-24-3	K15600000
0454*	Nitrogen dioxide	10102-44-0	QW9800000
0455	Nitrogen fluoride	7783-54-2	QX1925000
0091	Nitrogen lime	156-62-7	GS6000000
0448	Nitrogen monoxide	10102-43-9	QX0525000
0454	Nitrogen peroxide	10102-44-0	QW9800000
0455*	Nitrogen trifluoride	7783-54-2	QX1925000
0456*	Nitroglycerine	55-63-0	QX2100000
0273	Nitroglycol	628-96-6	KW5600000
0457*	Nitromethane	75-52-5	PA9800000
0458*	2-Nitronaphthalene	581-89-5	QJ9760000
0458	beta-Nitronaphthalene	581-89-5	QJ9760000
0449	p-Nitrophenylamine	100-01-6	BY7000000
0459	Nitropropane	108-03-2	TZ5075000
0459*	1-Nitropropane	108-03-2	TZ5075000
0460*	2-Nitropropane	79-46-9	TZ5250000
0460	iso-Nitropropane	79-46-9	TZ5250000
0462	2-Nitrotoluene	88-72-2	XT3150000
0462*	o-Nitrotoluene	88-72-2	XT3150000
0463	3-Nitrotoluene	99-08-1	XT2975000

0463*	m-Nitrotoluene	99-08-1	XT2975000
0464*	p-Nitrotoluene	99-99-0	XT3325000
0464	4-Nitrotoluene	99-99-0	XT3325000
0463	meta-Nitrotoluene	99-08-1	XT2975000
0464	para-Nitrotoluene	99-99-0	XT3325000
0462	ortho-Nitrotoluene	88-72-2	XT3150000
0132	Nitrotrichloromethane	76-06-2	PB6300000
0465*	Nitrous oxide	10024-97-2	QX1350000
0466*	Nonane	111-84-2	RA6115000
0466	n-Nonane	111-84-2	RA6115000
0467*	1-Nonanethiol	1455-21-6	
0305	None		MD7900000
0443	None	62765-93-9	QR3900000
0597	None	630-20-6	KI8450000
0466	Nonyl hydride	111-84-2	RA6115000
0467	n-Nonyl mercaptan	1455-21-6	
0467	Nonylthiol	1455-21-6	
0480	Nuisance dusts		
0570	Nux vomica	57-24-9	WL2275000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0257	O,O,O',O'-Tetraethyl S,S'-methylene di(p	563-12-2	TE4550000
0589	O,O,O'O'-Tetramethyl O,O'-thiodi-p-pheny	3383-96-8	TF6890000
0284	O,O-Diethyl O-(p-methylsulfinyl)phenyl)p	115-90-2	TF3850000
0137	O,O-Diethyl O-3,5,6-trichloro-2-pyridyl	2921-88-2	TF6300000
0502	O,O-Diethyl S-(ethylthio)methylphosphoro	298-02-2	TD9450000
0245	O,O-Diethyl S-2-(ethylthio)-ethyl phosph	298-04-4	TD9275000
0502	O,O-Diethyl S-ethylthiomethylthiothionop	298-02-2	TD9450000
0479	O,O-Diethyl-O(p-nitrophenyl) phosphoroth	56-38-2	TF4550000
0181	O,O-Diethyl-O-2-isopropyl-4-methyl-6-pyr	333-41-5	TF3325000
0410	O,O-Dimethyl 2-ethylmercaptoethyl thioph	8022-00-2	TG1760000
0546	O,O-Dimethyl O-(2,4,5-trichlorophenyl) p	299-84-3	TG0525000
0285	O,O-Dimethyl O-3-methyl-4-methylthiophen	55-38-9	TF9625000
0427	O,O-Dimethyl-O-p-nitrophenylphosphorothi	298-00-0	TG0175000
0044	O,O-Dimethyl-S-4-oxo-1,2,3-benzotriazin-	86-50-0	TE1925000
0582	O-Ethyl O-(4-methylthio)phenyl S-propylp	35400-43-2	TE4165000
0255	O-Ethyl O-(4-nitrophenyl) phenylphosphon	2104-64-5	TB1925000
0292	O-Ethyl-S-phenyl ethylphosphorothioate	944-22-9	TA5950000
0177	O-O-Diethyl-O(and S)-2-(ethylthio)ethyl	8065-48-3	TF3150000
0122	OCBM	2698-41-1	OO3675000
0147	Octacarbonyldicobalt	10210-68-1	GG0300000
0112	1,2,4,5,6,7,8,8-Octachloro-3a,4,7,7a-tet	57-74-9	PB9800000
0113	Octachlorocamphene	8001-35-2	XW5250000
0468*	Octachloronaphthalene	2234-13-1	QK0250000
0468	1,2,3,4,5,6,7,8-Octachloronaphthalene	2234-13-1	QK0250000
0469*	1-Octadecanethiol	2885-00-9	
0469	Octadecyl mercaptan	2885-00-9	
0016	Octalene	309-00-2	IO2100000
0470*	Octane	111-65-9	RG8400000
0470	n-Octane	111-65-9	RG8400000
0470	normal-Octane	111-65-9	RG8400000
0471*	1-Octanethiol	111-88-6	
0471	n-Octyl mercaptan	111-88-6	
0236	Octyl phthalate	117-81-7	TI0350000
0471	Octylthiol	111-88-6	
0471	1-Octylthiol	111-88-6	
0472*	Oil mist (mineral)	8012-95-1	PY8030000
0450	Oil of mirbane	98-95-3	DA6475000
0577	Oil of vitriol	7664-93-9	WS5600000
0020	Onion oil	2179-59-1	JO0350000
0506	Orthophosphoric acid	7664-38-2	TB6300000
0473	Osmic acid anhydride	20816-12-0	RN1140000
0473	Osmium oxide	20816-12-0	RN1140000
0473*	Osmium tetroxide	20816-12-0	RN1140000
0474*	Oxalic acid	144-62-7	RO2450000
0474	Oxalic acid (aqueous)	144-62-7	RO2450000
0474	Oxalic acid dihydrate	144-62-7	RO2450000
0161	Oxalonitrile	460-19-5	GT1925000
0528	2-Oxetanone	57-57-8	RQ7350000

0275	Oxirane	75-21-8	KX2450000
0097	2-Oxohexamethyleneimine	105-60-2	CM3675000
0354	Oxooctyl alcohol	26952-21-6	NS7700000
0221	2,2'-Oxybis(N,N-dimethyl ethylamine)	3033-62-3	KR9460000
0128	Oxybis(chloromethane)	542-88-1	KN1575000
0475*	Oxygen difluoride	7783-41-7	RS2100000
0475	Oxygen fluoride	7783-41-7	RS2100000
0476*	Ozone	10028-15-6	RS8225000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0512	PAN	85-44-9	TI3150000
0500	PBNA	135-88-6	QM4550000
0126	PCB	11097-69-1	TQ1360000
0125	PCB	53469-21-9	TQ1356000
0489	PCM	594-42-3	PB0370000
0452	PCNB	100-00-5	CZ1050000
0484	PCP	87-86-5	SM6300000
0513	m-PDN	626-17-5	CZ1900000
0485	PE	115-77-5	RZ2490000
0501	PF	638-21-1	SZ2100000
0535	PGDN	6423-43-4	TY6300000
0498	PGE	122-60-1	TZ3675000
0489	PMM	594-42-3	PB0370000
0449	PNA	100-01-6	BY7000000
0451	PNB	92-93-3	DV5600000
0452	PNCB	100-00-5	CZ1050000
0480	PNOR		
0664	Painters naphtha	8032-32-4	OI6180000
0477	Paraffin fume	8002-74-2	RV0350000
0472	Paraffin oil mist	8012-95-1	PY8030000
0477	Paraffin scale fume	8002-74-2	RV0350000
0477*	Paraffin wax fume	8002-74-2	RV0350000
0478*	Paraquat (Paraquat dichloride)	1910-42-5	DW2275000
0478	Paraquat chloride	1910-42-5	DW2275000
0478	Paraquat dichloride	1910-42-5	DW2275000
0479*	Parathion	56-38-2	TF4550000
0427	Parathion methyl	298-00-0	TG0175000
0479	Parathion-ethyl	56-38-2	TF4550000
0480*	Particulates not otherwise regulated		
0093	Pebble lime	1305-78-8	EW3100000
0484	Penta	87-86-5	SM6300000
0481*	Pentaborane	19624-22-7	RY8925000
0481	Pentaboron nonahydride	19624-22-7	RY8925000
0345	Pentacarbonyl iron	13463-40-6	NO4900000
0482*	Pentachloroethane	76-01-7	KI6300000
0483*	Pentachloronaphthalene	1321-64-8	QK0300000
0483	1,2,3,4,5-Pentachloronaphthalene	1321-64-8	QK0300000
0484*	Pentachlorophenol	87-86-5	SM6300000
0484	2,3,4,5,6-Pentachlorophenol	87-86-5	SM6300000
0509	Pentachlorophosphorus	10026-13-8	TB6125000
0485*	Pentaerythritol	115-77-5	RZ2490000
0482	Pentalin	76-01-7	KI6300000
0171	Pentamethylene	287-92-3	GY2390000
0652	Pentanal	110-62-3	YV3600000
0486	Pentane	109-66-0	RZ9450000
0486*	n-Pentane	109-66-0	RZ9450000
0486	normal-Pentane	109-66-0	RZ9450000
0301	1,5-Pentanedial	111-30-8	MA2450000
0487*	1-Pentanethiol	110-66-7	SA3150000
0032	2-Pentanol acetate	626-38-0	AJ2100000
0031	1-Pentanol acetate	628-63-7	AJ1925000
0488*	2-Pentanone	107-87-9	SA7875000
0212	3-Pentanone	96-22-0	SA8050000
0389	Penthrane	76-38-0	KN7820000
0031	Pentyl ester of acetic acid	628-63-7	AJ1925000
0032	2-Pentyl ester of acetic acid	626-38-0	AJ2100000
0487	Pentyl mercaptan	110-66-7	SA3150000
0599	Perchlorethylene	127-18-4	KX3850000
0314	Perchlorobutadiene	87-68-3	EJ0700000

0315	Perchlorocyclopentadiene	77-47-4	GY1225000
0316	Perchloroethane	67-72-1	KI4025000
0599	Perchloroethylene	127-18-4	KX3850000
0489*	Perchloromethyl mercaptan	594-42-3	PB0370000
0468	Perchloronaphthalene	2234-13-1	QK0250000
0490*	Perchloryl fluoride	7616-94-6	SD1925000
0319	Perfluoroacetone	684-16-2	UC2450000
0599	Perk	127-18-4	KX3850000
0491*	Perlite	93763-70-3	SO5254000
0335	Peroxide	7722-84-1	MX0900000
0299	Petrol	8006-61-9	LX3300000
0042	Petroleum asphalt	8052-42-4	CI9900000
0042	Petroleum bitumen	8052-42-4	CI9900000
0492*	Petroleum distillates (naphtha)	8002-05-9	SE7449000
0664	Petroleum ether	8032-32-4	OI6180000
0492	Petroleum naphtha	8002-05-9	SE7449000
0569	Petroleum solvent	8052-41-3	WJ8925000
0664	Petroleum spirit	8032-32-4	OI6180000
0119	Phenacyl chloride	532-27-4	AM6300000
0283	Phenamiphos	22224-92-6	TB3675000
0493*	Phenol	108-95-2	SJ3325000
0515	Phenol trinitrate	88-89-1	TJ7875000
0494*	Phenothiazine	92-84-2	SN5075000
0496	Phenoxy benzene	101-84-8	KN8970000
0498	Phenyl 2,3-epoxypropyl ether	122-60-1	TZ3675000
0493	Phenyl alcohol	108-95-2	SJ3325000
0239	Phenyl benzene	92-52-4	DU8050000
0121	Phenyl chloride	108-90-7	CZ0175000
0119	Phenyl chloromethyl ketone	532-27-4	AM6300000
0496*	Phenyl ether (vapor)	101-84-8	KN8970000
0497*	Phenyl ether-biphenyl mixture (vapor)	8004-13-5	DV1500>

Transfer interrupted!

NT SIZE=3>0498* Phenyl glycidyl ether 122-60-1 TZ3675000

0049	Phenyl hydride	71-43-2	CY1400000
0493	Phenyl hydroxide	108-95-2	SJ3325000
0050	Phenyl mercaptan	108-98-5	DC0525000
0619	Phenyl methane	108-88-3	XS5250000
0496	Phenyl oxide	101-84-8	KN8970000
0644	Phenyl phosphate	115-86-6	TC8400000
0159	2-Phenyl propane	98-82-8	GR8575000
0429	2-Phenyl propylene	98-83-9	WL5075300
0500	Phenyl-beta-naphthylamine	135-88-6	QM4550000
0033	Phenylamine	62-53-3	BW6650000
0500	2-Phenylaminonaphthalene	135-88-6	QM4550000
0240	Phenylaniline	122-39-4	JJ7800000
0025	4-Phenylaniline	92-67-1	DU8925000
0591	2-Phenylbiphenyl	84-15-1	WZ6472000
0592	3-Phenylbiphenyl	92-06-8	WZ6470000
0593	4-Phenylbiphenyl	92-94-4	WZ6475000
0495*	p-Phenylene diamine	106-50-3	SS8050000
0495	1,4-Phenylene diamine	106-50-3	SS8050000
0671	m-Phenylenebis(methylamine)	1477-55-0	PF8970000
0264	Phenylethane	100-41-4	DA0700000
0571	Phenylethylene	100-42-5	WL3675000
0499*	Phenylhydrazine	100-63-0	MW8925000
0451	4-Phenylnitrobenzene	92-93-3	DV5600000
0451	p-Phenylnitrobenzene	92-93-3	DV5600000
0501*	Phenylphosphine	638-21-1	SZ2100000
0431	Phlogopite	12001-26-2	VV8760000
0502*	Phorate	298-02-2	TD9450000
0503*	Phosdrin	7786-34-7	GQ5250000
0504*	Phosgene	75-44-5	SY5600000
0501	Phosphaniline	638-21-1	SZ2100000
0505*	Phosphine	7803-51-2	SY7525000
0505	Phosphorated hydrogen	7803-51-2	SY7525000
0506*	Phosphoric acid	7664-38-2	TB6300000
0506	Phosphoric acid (aqueous)	7664-38-2	TB6300000
0509	Phosphoric chloride	10026-13-8	TB6125000
0507*	Phosphorus (yellow)	7723-14-0	TH3500000

0508	Phosphorus chloride	10025-87-3	TH4897000
0511	Phosphorus chloride	7719-12-2	TH3675000
0505	Phosphorus hydride	7803-51-2	SY7525000
0508*	Phosphorus oxychloride	10025-87-3	TH4897000
0508	Phosphorus oxytrichloride	10025-87-3	TH4897000
0509*	Phosphorus pentachloride	10026-13-8	TB6125000
0510*	Phosphorus pentasulfide	1314-80-3	TH4375000
0509	Phosphorus perchloride	10026-13-8	TB6125000
0510	Phosphorus persulfide	1314-80-3	TH4375000
0510	Phosphorus sulfide	1314-80-3	TH4375000
0511*	Phosphorus trichloride	7719-12-2	TH3675000
0505	Phosphorus trihydride	7803-51-2	SY7525000
0508	Phosphoryl chloride	10025-87-3	TH4897000
0512	Phthalic acid anhydride	85-44-9	TI3150000
0512*	Phthalic anhydride	85-44-9	TI3150000
0513*	m-Phthalodinitrile	626-17-5	CZ1900000
0514*	Picloram	1918-02-1	TJ7525000
0515*	Picric acid	88-89-1	TJ7875000
0166	Pimelic ketone	108-94-1	GW1050000
0516*	Pindone	83-26-1	NK6300000
0517*	Piperazine dihydrochloride	142-64-3	TL4025000
0517	Piperazine hydrochloride	142-64-3	TL4025000
0516	Pivalyl	83-26-1	NK6300000
0516	2-Pivalyl-1,3-indandione	83-26-1	NK6300000
0516	Pival®	83-26-1	NK6300000
0518*	Plaster of Paris	26499-65-0	TP0700000
0519*	Platinum	7440-06-4	TP2160000
0520*	Platinum (soluble salts, as Pt)		
0519	Platinum black	7440-06-4	TP2160000
0519	Platinum metal	7440-06-4	TP2160000
0519	Platinum sponge	7440-06-4	TP2160000
0306	Plumbago	7782-42-5	MD9659600
0368	Plumbum	7439-92-1	OF7525000
0126	Polychlorinated biphenyl	11097-69-1	TQ1360000
0125	Polychlorinated biphenyl	53469-21-9	TQ1356000
0113	Polychlorocamphene	8001-35-2	XW5250000
0364	Porcelain clay	1332-58-7	GF1670500
0521*	Portland cement	65997-15-1	VV8770000
0521	Portland cement silicate	65997-15-1	VV8770000
0522*	Potassium cyanide (as CN)	151-50-8	TS8750000
0523	Potassium hydrate	1310-58-3	TT2100000
0523*	Potassium hydroxide	1310-58-3	TT2100000
0522	Potassium salt of hydrocyanic acid	151-50-8	TS8750000
0552	Precipitated amorphous silica	7631-86-9	VV7310000
0031	Primary amyl acetate	628-63-7	AJ1925000
0348	Primary isoamyl alcohol	123-51-3	EL5425000
0393	Propadiene-methyl acetylene	59355-75-8	UK4920000
0524*	Propane	74-98-6	TX2275000
0524	n-Propane	74-98-6	TX2275000
0525*	Propane sultone	1120-71-4	RP5425000
0525	1,3-Propane sultone	1120-71-4	RP5425000
0526	Propane-1-thiol	107-03-9	TZ7300000
0377	Propanedial	542-78-9	TX6475000
0377	1,3-Propanedial	542-78-9	TX6475000
0530	Propanenitrile	107-12-0	UF9625000
0526*	1-Propanethiol	107-03-9	TZ7300000
0302	1,2,3-Propanetriol	56-81-5	MA8050000
0456	1,2,3-Propanetriol trinitrate	55-63-0	QX2100000
0529	Propanoic acid	79-09-4	UE5950000
0359	2-Propanol	67-63-0	NT8050000
0533	n-Propanol	71-23-8	UH8225000
0533	1-Propanol	71-23-8	UH8225000
0004	2-Propanone	67-64-1	AL3150000
0527*	Propargyl alcohol	107-19-7	UK5075000
0192	Propellant 12	75-71-8	PA8200000
0017	1-Propen-3-ol	107-18-6	BA5075000
0011	Propenal	107-02-8	AS1050000
0011	2-Propenal	107-02-8	AS1050000
0012	Propenamide	79-06-1	AS3325000
0012	2-Propenamide	79-06-1	AS3325000
0538	Propene oxide	75-56-9	TZ2975000

0014	Propenenitrile	107-13-1	AT5250000
0014	2-Propenenitrile	107-13-1	AT5250000
0013	2-Propenoic acid	79-10-7	AS4375000
0017	Propenol	107-18-6	BA5075000
0017	2-Propenol	107-18-6	BA5075000
0020	2-Propenyl propyl disulfide	2179-59-1	JO0350000
0019	[(2-Propenyloxy)methyl] oxirane	106-92-3	RR0875000
0392	Propine	74-99-7	UK4250000
0528	3-Propiolacetone	57-57-8	RQ7350000
0528*	beta-Propiolactone	57-57-8	RQ7350000
0212	Propione	96-22-0	SA8050000
0529*	Propionic acid	79-09-4	UE5950000
0530	Propionic nitrile	107-12-0	UF9625000
0530*	Propionitrile	107-12-0	UF9625000
0530	Propiononitrile	107-12-0	UF9625000
0531*	Propoxur	114-26-1	FC3150000
0358	2-Propyl acetate	108-21-4	AI4930000
0532*	n-Propyl acetate	109-60-4	AJ3675000
0533	Propyl alcohol	71-23-8	UH8225000
0533*	n-Propyl alcohol	71-23-8	UH8225000
0359	sec-Propyl alcohol	67-63-0	NT8050000
0020	Propyl allyl disulfide	2179-59-1	JO0350000
0076	n-Propyl carbinol	71-36-3	EO1400000
0086	Propyl cyanide	109-74-0	ET8750000
0086	n-Propyl cyanide	109-74-0	ET8750000
0532	n-Propyl ester of acetic acid	109-60-4	AJ3675000
0539	Propyl ester of nitric acid	627-13-4	UK0350000
0524	Propyl hydride	74-98-6	TX2275000
0242	Propyl ketone	123-19-3	MJ5600000
0526	Propyl mercaptan	107-03-9	TZ7300000
0526	n-Propyl mercaptan	107-03-9	TZ7300000
0539*	n-Propyl nitrate	627-13-4	UK0350000
0532	Propylacetate	109-60-4	AJ3675000
0360	2-Propylamine	75-31-0	NT8400000
0360	sec-Propylamine	75-31-0	NT8400000
0157	Propylene aldehyde	4170-30-3	GP9499000
0534*	Propylene dichloride	78-87-5	TX9625000
0535*	Propylene glycol dinitrate	6423-43-4	TY6300000
0535	1,2-Propylene glycol dinitrate	6423-43-4	TY6300000
0536	Propylene glycol methyl ether	107-98-2	UB7700000
0339	Propylene glycol monoacrylate	999-61-1	AT1925000
0536*	Propylene glycol monomethyl ether	107-98-2	UB7700000
0535	Propylene glycol-1,2-dinitrate	6423-43-4	TY6300000
0537*	Propylene imine	75-55-8	CM8050000
0537	Propylene imine (inhibited)	75-55-8	CM8050000
0538*	Propylene oxide	75-56-9	TZ2975000
0538	1,2-Propylene oxide	75-56-9	TZ2975000
0537	Propyleneimine	75-55-8	CM8050000
0537	Propylenimine	75-55-8	CM8050000
0527	2-Propyn-1-ol	107-19-7	UK5075000
0527	1-Propyn-3-ol	107-19-7	UK5075000
0392	Propyne	74-99-7	UK4250000
0392	1-Propyne	74-99-7	UK4250000
0393	Propyne-allene mixture	59355-75-8	UK4920000
0393	Propyne-propadiene mixture	59355-75-8	UK4920000
0527	2-Propynyl alcohol	107-19-7	UK5075000
0572	Proteolytic enzymes	1395-21-7 (	CO9450000
0333	Prussic acid	74-90-8	MW6825000
0638	Pseudocumene	95-63-6	DC3325000
0540	Pyrethrin I or II	8003-34-7	UR4200000
0540*	Pyrethrum	8003-34-7	UR4200000
0540	Pyrethrum I or II	8003-34-7	UR4200000
0541*	Pyridine	110-86-1	UR8400000
0026	alpha-Pyridylamine	504-29-0	US1575000
0109	Pyrocatechol	120-80-9	UX1050000
0110	Pyrocellulose	9004-34-6	FJ5691460
0397	Pyroligneous spirit	67-56-1	PC1400000
0606	Pyrophosphate	7722-88-5	UX7350000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO

0553	Quartz	14808-60-7	VV7330000
0093	Quick lime	1305-78-8	EW3100000
0383	Quicksilver	7439-97-6	OV4550000
0338	Quinol	123-31-9	MX3500000
0542*	Quinone	106-51-4	DK2625000
0542	p-Quinone	106-51-4	DK2625000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0169	RDX	121-82-4	XY9450000
0528	beta-lactone	57-57-8	RQ7350000
0366	Range oil	8008-20-6	OA5500000
0152	Raw cotton dust		GN2275000
0447	Red fuming nitric acid (RFNA)	7697-37-2	QU5775000
0549	Red iron oxide	1309-37-1	NO7400000
0549	Red oxide	1309-37-1	NO7400000
0412	Reduced MDI	5124-30-1	NQ9250000
0664	Refined solvent naphtha	8032-32-4	OI6180000
0290	Refrigerant 11	75-69-4	PB6125000
0596	Refrigerant 112	76-12-0	KI1420000
0595	Refrigerant 112a	76-11-9	KI1425000
0632	Refrigerant 113	76-13-1	KJ4000000
0201	Refrigerant 114	76-14-2	KI1101000
0192	Refrigerant 12	75-71-8	PA8200000
0634	Refrigerant 13B1	75-63-8	PA5425000
0197	Refrigerant 21	75-43-4	PA8400000
0124	Refrigerant 22	75-45-6	PA6390000
0543*	Resorcinol	108-46-3	VG9625000
0544*	Rhodium (metal fume and insoluble compou	7440-16-6	VI9069000
0545*	Rhodium (soluble compounds, as Rh)		
0567	Rice starch	9005-25-8	GM5090000
0244	Ro-Sulfiram®	97-77-8	JO1225000
0042	Road asphalt	8052-42-4	CI9900000
0574	Rock candy	57-50-1	WN6500000
0432	Rock wool		PY8070000
0546*	Ronnel	299-84-3	TG0525000
0042	Roofing asphalt	8052-42-4	CI9900000
0431	Roscoelite	12001-26-2	VV8760000
0547*	Rosin core solder, pyrolysis products (a		
0547	Rosin core soldering flux pyrolysis prod		
0547	Rosin flux pyrolysis products		
0548*	Rotenone	83-79-4	DJ2800000
0549*	Rouge	1309-37-1	NO7400000
0492	Rubber solvent	8002-05-9	SE7449000
0359	Rubbing alcohol	67-63-0	NT8050000
0158	Ruelene®	299-86-5	TB3850000
0617	Rutile	13463-67-7	XR2275000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0387	S-Methyl-N-(methylcarbamoyloxy)thioaceti	16752-77-5	AK2975000
0375	S-[1,2-bis(ethoxycarbonyl) ethyl]O,O-dim	121-75-5	WM8400000
0564	SFA	62-74-8	AH9100000
0574	Saccarose	57-50-1	WN6500000
0029	Sal ammoniac fume	12125-02-9	BP4550000
0412	Saturated MDI	5124-30-1	NQ9250000
0349	Secondary isoamyl alcohol	6032-29-7 <	
0630	Seekay wax	1321-65-9	QK4025000
0600	Seekay wax	1335-88-2	QK3700000
0550*	Selenium	7782-49-2	VS7700000
0550	Selenium alloy	7782-49-2	VS7700000
0336	Selenium dihydride	7783-07-5	MX1050000
0551	Selenium fluoride	7783-79-1	VS9450000
0551*	Selenium hexafluoride	7783-79-1	VS9450000
0336	Selenium hydride	7783-07-5	MX1050000
0153	Sesone	136-78-7	KK4900000
0100	Sevin®	63-25-2	FC5950000
0337	Sewer gas	7783-06-4	MX1225000

0556	Silane	7803-62-5	VV1400000
0552	Silica gel	7631-86-9	VV7310000
0552*	Silica, amorphous	7631-86-9	VV7310000
0553*	Silica, crystalline (as respirable dust)	14808-60-7	VV7330000
0556	Silicane	7803-62-5	VV1400000
0554*	Silicon	7440-21-3	VW0400000
0555*	Silicon carbide	409-21-2	VW0450000
0552	Silicon dioxide (amorphous)	7631-86-9	VV7310000
0555	Silicon monocarbide	409-21-2	VW0450000
0556*	Silicon tetrahydride	7803-62-5	VV1400000
0557*	Silver (metal dust and soluble compounds	7440-22-4	VW3500000
0306	Silver graphite	7782-42-5	MD9659600
0432	Slag wool		PY8070000
0092	Slaked lime	1305-62-0	EW2800000
0558*	Soapstone (containing less than 1% quart		VV8780000
0558	Soapstone silicate		VV8780000
0565	Soda lye	1310-73-2	WB4900000
0561	Sodium acid bisulfite	7631-90-5	VZ2000000
0559*	Sodium aluminum fluoride (as F)	15096-52-3	WA9625000
0560*	Sodium azide	26628-22-8	VY8050000
0561*	Sodium bisulfite	7631-90-5	VZ2000000
0561	Sodium bisulphite	7631-90-5	VZ2000000
0057	Sodium borate (anhydrous)	1330-43-4	ED4588000
0058	Sodium borate decahydrate	1303-96-4	VZ2275000
0059	Sodium borate pentahydrate	12179-04-3	
0562*	Sodium cyanide (as CN)	143-33-9	VZ7530000
0563*	Sodium fluoride (as F)	7681-49-4	WB0350000
0564*	Sodium fluoroacetate	62-74-8	AH9100000
0559	Sodium hexafluoroaluminate	15096-52-3	WA9625000
0565	Sodium hydrate	1310-73-2	WB4900000
0561	Sodium hydrogen sulfite	7631-90-5	VZ2000000
0565*	Sodium hydroxide	1310-73-2	WB4900000
0566*	Sodium metabisulfite	7681-57-4	UX8225000
0566	Sodium metabisulphite	7681-57-4	UX8225000
0563	Sodium monofluoride	7681-49-4	WB0350000
0564	Sodium monofluoroacetate	62-74-8	AH9100000
0606	Sodium pyrophosphate	7722-88-5	UX7350000
0566	Sodium pyrosulfite	7681-57-4	UX8225000
0560	Sodium salt of hydrazoic acid	26628-22-8	VY8050000
0562	Sodium salt of hydrocyanic acid	143-33-9	VZ7530000
0057	Sodium tetraborate	1330-43-4	ED4588000
0058	Sodium tetraborate decahydrate	1303-96-4	VZ2275000
0059	Sodium tetraborate pentahydrate	12179-04-3	
0667	Soft wood dust		ZC9850000
0277	Solvent ether	60-29-7	KI5775000
0567	Sorghum gum	9005-25-8	GM5090000
0181	Spectracide®	333-41-5	TF3325000
0648	Spirits of turpentine	8006-64-2	YO8400000
0569	Spotting naphtha	8052-41-3	WJ8925000
0616	Stannic dioxide	18282-10-5	XQ4000000
0616	Stannic oxide	18282-10-5	XQ4000000
0615	Stannous oxide	21651-19-4	
0567*	Starch	9005-25-8	GM5090000
0567	alpha-Starch	9005-25-8	GM5090000
0567	Starch gum	9005-25-8	GM5090000
0648	Steam distilled turpentine	8006-64-2	YO8400000
0469	Stearyl mercaptan	2885-00-9	
0558	Steatite		VV8780000
0584	Steatite talc	14807-96-6	WW2710000
0568*	Stibine	7803-52-3	WJ0700000
0036	Stibium	7440-36-0	CC4025000
0569*	Stoddard solvent	8052-41-3	WJ8925000
0306	Stove black	7782-42-5	MD9659600
0570*	Strychnine	57-24-9	WL2275000
0570	Strynchnos	57-24-9	WL2275000
0571*	Styrene	100-42-5	WL3675000
0571	Styrene monomer	100-42-5	WL3675000
0571	Styrol	100-42-5	WL3675000
0572	Subtilisin BPN	1395-21-7	CO9450000
0572	Subtilisin Carlsburg	1395-21-7	CO9450000
0572*	Subtilisins	1395-21-7	CO9450000

0573	Succinic dinitrile	110-61-2	WN3850000
0573*	Succinonitrile	110-61-2	WN3850000
0574*	Sucrose	57-50-1	WN6500000
0574	Sugar	57-50-1	WN6500000
0030	Sulfamate	7773-06-0	WO6125000
0648	Sulfate wood turpentine	8006-64-2	YO8400000
0611	Sulfinyl chloride	7719-09-7	XM5150000
0586	Sulfotep	3689-24-5	XN4375000
0578	Sulfur chloride	10025-67-9	WS4300000
0611	Sulfur chloride oxide	7719-09-7	XM5150000
0579	Sulfur decafluoride	5714-22-7	WS4480000
0581	Sulfur difluoride dioxide	2699-79-8	WT5075000
0575*	Sulfur dioxide	7446-09-5	WS4550000
0576	Sulfur fluoride	2551-62-4	WS4900000
0576*	Sulfur hexafluoride	2551-62-4	WS4900000
0578*	Sulfur monochloride	10025-67-9	WS4300000
0575	Sulfur oxide	7446-09-5	WS4550000
0579*	Sulfur pentafluoride	5714-22-7	WS4480000
0510	Sulfur phosphide	1314-80-3	TH4375000
0578	Sulfur subchloride	10025-67-9	WS4300000
0580*	Sulfur tetrafluoride	7783-60-0	WT4800000
0337	Sulfuretted hydrogen	7783-06-4	MX1225000
0577*	Sulfuric acid	7664-93-9	WS5600000
0577	Sulfuric acid (aqueous)	7664-93-9	WS5600000
0575	Sulfurous acid anhydride	7446-09-5	WS4550000
0611	Sulfurous dichloride	7719-09-7	XM5150000
0575	Sulfurous oxide	7446-09-5	WS4550000
0611	Sulfurous oxychloride	7719-09-7	XM5150000
0581*	Sulfuryl fluoride	2699-79-8	WT5075000
0582*	Sulprofos	35400-43-2	TE4165000
0009	Symmetrical tetrabromoethane	79-27-6	KI8225000
0598	Symmetrical tetrachloroethane	79-34-5	KI8575000
0639	Symmetrical trimethylbenzene	108-67-8	OX6825000
0096	Synthetic camphor	76-22-2	EX1225000
0432	Synthetic vitreous fibers		PY8070000
0177	Systox®	8065-48-3	TF3150000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0583*	2,4,5-T	93-76-5	AJ8400000
0009	TBE	79-27-6	KI8225000
0625	TBP	126-73-8	TC7700000
0626	TCA	76-03-9	AJ7875000
0594	TCDBD	1746-01-6	HP3500000
0594	TCDD	1746-01-6	HP3500000
0594	2,3,7,8-TCDD	1746-01-6	HP3500000
0629	TCE	79-01-6	KX4550000
0172	TCHH	13121-70-5	WH8750000
0642	TCP	78-30-8	TD0350000
0620	TDA	25376-45-8	XS9445000
0621	TDI	584-84-9	CZ6300000
0621	2,4-TDI	584-84-9	CZ6300000
0633	TEA	121-44-8	YE0175000
0586*	TEDP	3689-24-5	XN4375000
0601	TEL	78-00-2	TP4550000
0590*	TEPP	107-49-3	UX6825000
0244	TETD	97-77-8	JO1225000
0602	THF	109-99-9	LU5950000
0635	TMA	552-30-7	DC2050000
0636	TMA	75-50-3	PA0350000
0635	TMAN	552-30-7	DC2050000
0603	TML	75-74-1	TP4725000
0604	TMSN	3333-52-6	WN4025000
0605	TNM	509-14-8	PB4025000
0641	TNT	118-96-7	XU0175000
0642	TOCP	78-30-8	TD0350000
0644	TPP	115-86-6	TC8400000
0606	TSPP	7722-88-5	UX7350000
0632	TTE	76-13-1	KJ4000000
0574	Table sugar	57-50-1	WN6500000

0584*	Talc (containing no asbestos and less th	14807-96-6	WW2710000
0585*	Tantalum (metal and oxide dust, as Ta)	7440-25-7	WW5505000
0585	Tantalum-181	7440-25-7	WW5505000
0567	Tapioca starch	9005-25-8	GM5090000
0439	Tar camphor	91-20-3	QJ0525000
0119	Tear gas	532-27-4	AM6300000
0587*	Tellurium	13494-80-9	WY2625000
0588	Tellurium fluoride	7783-80-4	WY2800000
0588*	Tellurium hexafluoride	7783-80-4	WY2800000
0056	Tellurobismuthite	1304-82-1	EB3110000
0199	Telone®	542-75-6	UC8310000
0589	Temefos	3383-96-8	TF6890000
0589*	Temephos	3383-96-8	TF6890000
0591*	o-Terphenyl	84-15-1	WZ6472000
0592*	m-Terphenyl	92-06-8	WZ6470000
0593*	p-Terphenyl	92-94-4	WZ6475000
0591	1,2-Terphenyl	84-15-1	WZ6472000
0592	1,3-Terphenyl	92-06-8	WZ6470000
0593	1,4-Terphenyl	92-94-4	WZ6475000
0592	meta-Terphenyl	92-06-8	WZ6470000
0593	para-Terphenyl	92-94-4	WZ6475000
0591	ortho-Terphenyl	84-15-1	WZ6472000
0284	Terracur P®	115-90-2	TF3850000
0605	Tetan	509-14-8	PB4025000
0009	Tetrabromoacetylene	79-27-6	KI8225000
0009	Tetrabromoethane	79-27-6	KI8225000
0009	1,1,2,2-Tetrabromoethane	79-27-6	KI8225000
0106	Tetrabromomethane	558-13-4	FG4725000
0444	Tetracarbonyl nickel	13463-39-3	QR6300000
0148	Tetracarbonylhydridocobalt	16842-03-8	GG0900000
0148	Tetracarbonylhydrocobalt	16842-03-8	GG0900000
0599	Tetrachlorethylene	127-18-4	KX3850000
0596*	1,1,2,2-Tetrachloro-1,2-difluoroethane	76-12-0	KI1420000
0595*	1,1,1,2-Tetrachloro-2,2-difluoroethane	76-11-9	KI1425000
0136	2,2,2,6-Tetrachloro-2-picoline	1929-82-4	US7525000
0594*	2,3,7,8-Tetrachloro-dibenzo-p-dioxin	1746-01-6	HP3500000
0597*	1,1,1,2-Tetrachloroethane	630-20-6	KI8450000
0598*	1,1,2,2-Tetrachloroethane	79-34-5	KI8575000
0599*	Tetrachloroethylene	127-18-4	KX3850000
0107	Tetrachloromethane	56-23-5	FG4900000
0600*	Tetrachloronaphthalene	1335-88-2	QK3700000
0282	Tetraethoxysilane	78-10-4	VV9450000
0586	Tetraethyl dithionopyrophosphate	3689-24-5	XN4375000
0586	Tetraethyl dithiopyrophosphate	3689-24-5	XN4375000
0601*	Tetraethyl lead (as Pb)	78-00-2	TP4550000
0282	Tetraethyl orthosilicate	78-10-4	VV9450000
0590	Tetraethyl pyrophosphate	107-49-3	UX6825000
0282	Tetraethyl silicate	78-10-4	VV9450000
0601	Tetraethylplumbane	78-00-2	TP4550000
0244	Tetraethylthiuram disulfide	97-77-8	JO1225000
0580	Tetrafluorosulfurane	7783-60-0	WT4800000
0437	Tetrahydro-1,4-oxazine	110-91-8	QD6475000
0204	3a,4,7,7a-Tetrahydro-4,7-methanoindene	77-73-6	PC1050000
0548	1,2,12,12a-Tetrahydro-8,9-dimethoxy-2-(1	83-79-4	DJ2800000
0437	Tetrahydro-p-oxazine	110-91-8	QD6475000
0167	Tetrahydrobenzene	110-83-8	GW2500000
0602*	Tetrahydrofuran	109-99-9	LU5950000
0485	Tetrahydroxymethylolmethane	115-77-5	RZ2490000
0428	Tetramethoxysilane	681-84-5	VV9800000
0428	Tetramethyl ester of silicic acid	681-84-5	VV9800000
0603*	Tetramethyl lead (as Pb)	75-74-1	TP4725000
0428	Tetramethyl silicate	681-84-5	VV9800000
0604	Tetramethyl succinodinitrile	3333-52-6	WN4025000
0604*	Tetramethyl succinonitrile	3333-52-6	WN4025000
0015	Tetramethylene cyanide	111-69-3	AV2625000
0602	Tetramethylene oxide	109-99-9	LU5950000
0485	Tetramethylolmethane	115-77-5	RZ2490000
0603	Tetramethylplumbane	75-74-1	TP4725000
0612	Tetramethylthiuram disulfide	137-26-8	JO1400000
0605*	Tetranitromethane	509-14-8	PB4025000
0606	Tetrasodium diphosphate	7722-88-5	UX7350000

0606*	Tetrasodium pyrophosphate	7722-88-5	UX7350000
0606	Tetrasodium pyrophosphate (anhydrous)	7722-88-5	UX7350000
0590	Tetron®	107-49-3	UX6825000
0607*	Tetryl	479-45-8	BY6300000
0607	2,4,6-Tetryl	479-45-8	BY6300000
0608*	Thallium (soluble compounds, as Tl)		
0102	Thermal black	1333-86-4	FF5800000
0502	Thimet	298-02-2	TD9450000
0609	1,1'-Thiobis(2-methyl-4-hydroxy-5-tert-b	96-69-5	GP3150000
0609	4,4'-Thiobis(3-methyl-6-tert-butylphenol	96-69-5	GP3150000
0609*	4,4'-Thiobis(6-tert-butyl-m-cresol)	96-69-5	GP3150000
0251	Thiodan®	115-29-7	RB9275000
0245	Thiodemeton	298-04-4	TD9275000
0494	Thiodiphenylamine	92-84-2	SN5075000
0610*	Thioglycolic acid	68-11-1	AI5950000
0610	2-Thioglycolic acid	68-11-1	AI5950000
0611*	Thionyl chloride	7719-09-7	XM5150000
0611	Thionyl dichloride	7719-09-7	XM5150000
0050	Thiophenol	108-98-5	DC0525000
0578	Thiosulfurous dichloride	10025-67-9	WS4300000
0586	Thiotepp®	3689-24-5	XN4375000
0610	Thiovanic acid	68-11-1	AI5950000
0612*	Thiram	137-26-8	JO1400000
0502	Timet	298-02-2	TD9450000
0613*	Tin	7440-31-5	XP7320000
0614*	Tin (organic compounds, as Sn)		
0613	Tin flake	7440-31-5	XP7320000
0613	Tin metal	7440-31-5	XP7320000
0613	Tin powder	7440-31-5	XP7320000
0615	Tin protoxide	21651-19-4	
0615*	Tin(II) oxide (as Sn)	21651-19-4	
0616*	Tin(IV) oxide (as Sn)	18282-10-5	XQ4000000
0617*	Titanium dioxide	13463-67-7	XR2275000
0617	Titanium oxide	13463-67-7	XR2275000
0617	Titanium peroxide	13463-67-7	XR2275000
0618*	o-Tolidine	119-93-7	DD1225000
0618	3,3'-Tolidine	119-93-7	DD1225000
0619*	Toluene	108-88-3	XS5250000
0621	2,4-Toluene diisocyanate	584-84-9	CZ6300000
0621*	Toluene-2,4-diisocyanate	584-84-9	CZ6300000
0620*	Toluenediamine	25376-45-8	XS9445000
0620	Toluenediamine isomers	25376-45-8	XS9445000
0624	4-Toluidine	106-49-0	XU3150000
0624*	p-Toluidine	106-49-0	XU3150000
0623	3-Toluidine	108-44-1	XU2800000
0623*	m-Toluidine	108-44-1	XU2800000
0622*	o-Toluidine	95-53-4	XU2975000
0622	ortho-Toluidine	95-53-4	XU2975000
0619	Toluol	108-88-3	XS5250000
0663	Tolyethylene	25013-15-4	WL5075000
0135	o-Tolyl chloride	95-49-8	XS9000000
0624	Tolylamine	106-49-0	XU3150000
0623	m-Tolylamine	108-44-1	XU2800000
0620	Tolylenediamine	25376-45-8	XS9445000
0514	Tordon®	1918-02-1	TJ7525000
0113	Toxaphene	8001-35-2	XW5250000
0376	Toxilic anhydride	108-31-6	ON3675000
0041	Tremolite	1332-21-4	CI6475000
0041	Tremolite asbestos	1332-21-4	CI6475000
0625	Tri-n-butyl phosphate	126-73-8	TC7700000
0642	Tri-o-cresyl ester of phosphoric acid	78-30-8	TD0350000
0642	Tri-o-cresyl phosphate	78-30-8	TD0350000
0476	Triatomic oxygen	10028-15-6	RS8225000
0061	Tribromoborane	10294-33-4	ED7400000
0066	Tribromomethane	75-25-2	PB5600000
0625	Tributyl ester of phosphoric acid	126-73-8	TC7700000
0625*	Tributyl phosphate	126-73-8	TC7700000
0089	Tricalcium arsenate	7778-44-1	CG0830000
0089	Tricalcium ortho-arsenate	7778-44-1	CG0830000
0632*	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	KJ4000000
0174	1,1,1-Trichloro-2,2-bis(p-chlorophenyl)e	50-29-3	KJ3325000

0388	1,1,1-Trichloro-2,2-bis-(p-methoxyphenyl	72-43-5	KJ3675000
0626*	Trichloroacetic acid	76-03-9	AJ7875000
0627	unsym-Trichlorobenzene	120-82-1	DC2100000
0627*	1,2,4-Trichlorobenzene	120-82-1	DC2100000
0627	1,2,4-Trichlorobenzol	120-82-1	DC2100000
0628	beta-Trichloroethane	79-00-5	KJ3150000
0404	1,1,1-Trichloroethane	71-55-6	KJ2975000
0628*	1,1,2-Trichloroethane	79-00-5	KJ3150000
0404	1,1,1-Trichloroethane (stabilized)	71-55-6	KJ2975000
0626	Trichloroethanoic acid	76-03-9	AJ7875000
0629	Trichloroethene	79-01-6	KX4550000
0629*	Trichloroethylene	79-01-6	KX4550000
0290	Trichlorofluoromethane	75-69-4	PB6125000
0631	Trichlorohydrin	96-18-4	TZ9275000
0127	Trichloromethane	67-66-3	FS9100000
0489	Trichloromethane sulfenyl chloride	594-42-3	PB0370000
0489	Trichloromethyl sulfur chloride	594-42-3	PB0370000
0290	Trichloromonofluoromethane	75-69-4	PB6125000
0630*	Trichloronaphthalene	1321-65-9	QK4025000
0132	Trichloronitromethane	76-06-2	PB6300000
0583	2,4,5-Trichlorophenoxyacetic acid	93-76-5	AJ8400000
0631*	1,2,3-Trichloropropane	96-18-4	TZ9275000
0172	Tricyclohexylhydroxystannane	13121-70-5	WH8750000
0172	Tricyclohexylhydroxytin	13121-70-5	WH8750000
0172	Tricyclohexylstannium hydroxide	13121-70-5	WH8750000
0172	Tricyclohexyltin hydroxide	13121-70-5	WH8750000
0553	Tridymite	14808-60-7	VV7330000
0633*	Triethylamine	121-44-8	YE0175000
0455	Trifluoramine	7783-54-2	QX1925000
0455	Trifluorammonia	7783-54-2	QX1925000
0310	2,2,2-Trifluoro-1-bromo-1-chloroethane	151-67-7	KH6550000
0310	1,1,1-Trifluoro-2-bromo-2-chloroethane	151-67-7	KH6550000
0062	Trifluoroborane	7637-07-2	ED2275000
0634*	Trifluorobromomethane	75-63-8	PA5425000
0291	2,2,2-Trifluoroethoxyethene	406-90-6	KO4250000
0291	2,2,2-Trifluoroethyl vinyl ether	406-90-6	KO4250000
0634	Trifluoromonobromomethane	75-63-8	PA5425000
0302	Trihydroxypropane	56-81-5	MA8050000
0343	Triiodomethane	75-47-8	PB7000000
0629	Trilene	79-01-6	KX4550000
0381	Trimanganese tetraoxide	1317-35-7	OP0895000
0381	Trimanganese tetroxide	1317-35-7	OP0895000
0635	Trimellic acid anhydride	552-30-7	DC2050000
0635*	Trimellitic anhydride	552-30-7	DC2050000
0640	Trimethoxyphosphine	121-45-9	TH1400000
0078	Trimethyl carbinol	75-65-0	EO1925000
0640	Trimethyl ester of phosphorous acid	121-45-9	TH1400000
0640*	Trimethyl phosphite	121-45-9	TH1400000
0355	3,5,5-Trimethyl-2-cyclo-hexen-1-one	78-59-1	GW7700000
0355	3,5,5-Trimethyl-2-cyclohexenone	78-59-1	GW7700000
0636*	Trimethylamine	75-50-3	PA0350000
0639	sym-Trimethylbenzene	108-67-8	OX6825000
0639*	1,3,5-Trimethylbenzene	108-67-8	OX6825000
0637*	1,2,3-Trimethylbenzene	526-73-8	DC330000
0638*	1,2,4-Trimethylbenzene	95-63-6	DC3325000
0169	Trimethylenetrinitramine	121-82-4	XY9450000
0169	1,3,5-Trinitro-1,3,5-triazacyclohexane	121-82-4	XY9450000
0456	Trinitroglycerine	55-63-0	QX2100000
0515	2,4,6-Trinitrophenol	88-89-1	TJ7875000
0607	2,4,6-Trinitrophenyl-N-methylnitramine	479-45-8	BY6300000
0641	Trinitrotoluene	118-96-7	XU0175000
0641	sym-Trinitrotoluene	118-96-7	XU0175000
0641*	2,4,6-Trinitrotoluene	118-96-7	XU0175000
0641	Trinitrotoluol	118-96-7	XU0175000
0642*	Triorthocresyl phosphate	78-30-8	TD0350000
0490	Trioxychlorofluoride	7616-94-6	SD1925000
0591	o-Triphenyl	84-15-1	WZ6472000
0592	m-Triphenyl	92-06-8	WZ6470000
0593	p-Triphenyl	92-94-4	WZ6475000
0644	Triphenyl ester of phosphoric acid	115-86-6	TC8400000
0644*	Triphenyl phosphate	115-86-6	TC8400000

0643*	Triphenylamine	603-34-9	YK2680000
0553	Tripoli	14808-60-7	VV7330000
0321	Tris(dimethylamino)phosphine oxide	680-31-9	TD0875000
0645*	Tungsten	7440-33-7	YO7175000
0646*	Tungsten (soluble compounds, as W)		
0647*	Tungsten carbide (cemented)	11107-01-0	YO7350000
0645	Tungsten metal	7440-33-7	YO7175000
0648*	Turpentine	8006-64-2	YO8400000
0648	Turps	8006-64-2	YO8400000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0227	UDMH	57-14-7	MV2450000
0649*	1-Undecanethiol	5332-52-5	
0649	Undecyl mercaptan	5332-52-5	
0093	Unslaked lime	1305-78-8	EW3100000
0227	Unsymmetrical dimethylhydrazine	57-14-7	MV2450000
0650*	Uranium (insoluble compounds, as U)	7440-61-1	YR3490000
0651*	Uranium (soluble compounds, as U)		
0650	Uranium I	7440-61-1	YR3490000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0656	VAC	108-05-4	AK0875000
0658	VC	75-01-4	KU9625000
0014	VCN	107-13-1	AT5250000
0661	VDC	75-35-4	KV9275000
0662	VDF	75-38-7	KW0560000
0664*	VM & P Naphtha	8032-32-4	OI6180000
0652	Valeral	110-62-3	YV3600000
0652	Valeraldehyde	110-62-3	YV3600000
0652*	n-Valeraldehyde	110-62-3	YV3600000
0652	Valeric aldehyde	110-62-3	YV3600000
0216	Valerone	108-83-8	MJ5775000
0653	Vanadic anhydride dust	1314-62-1	YW2450000
0654	Vanadic anhydride fume	1314-62-1	YW2460000
0653*	Vanadium dust	1314-62-1	YW2450000
0654*	Vanadium fume	1314-62-1	YW2460000
0653	Vanadium oxide dust	1314-62-1	YW2450000
0654	Vanadium oxide fume	1314-62-1	YW2460000
0653	Vanadium pentaoxide dust	1314-62-1	YW2450000
0654	Vanadium pentaoxide fume	1314-62-1	YW2460000
0664	Varnish makers' & painters' naphtha	8032-32-4	OI6180000
0655	Vegetable mist	68956-68-3	YX1850000
0655*	Vegetable oil mist	68956-68-3	YX1850000
0581	Vikane®	2699-79-8	WT5075000
0656*	Vinyl acetate	108-05-4	AK0875000
0656	Vinyl acetate monomer	108-05-4	AK0875000
0571	Vinyl benzene	100-42-5	WL3675000
0657*	Vinyl bromide	593-60-2	KU8400000
0017	Vinyl carbinol	107-18-6	BA5075000
0658*	Vinyl chloride	75-01-4	KU9625000
0658	Vinyl chloride monomer (VCM)	75-01-4	KU9625000
0014	Vinyl cyanide	107-13-1	AT5250000
0659*	Vinyl cyclohexene dioxide	106-87-6	RN8640000
0656	Vinyl ethanoate	108-05-4	AK0875000
0660*	Vinyl fluoride	75-02-5	YZ7351000
0660	Vinyl fluoride monomer	75-02-5	YZ7351000
0663*	Vinyl toluene	25013-15-4	WL5075000
0628	Vinyl trichloride	79-00-5	KJ3150000
0659	4-Vinyl-1-cyclohexene dioxide	106-87-6	RN8640000
0659	4-Vinylcyclohexene diepoxide	106-87-6	RN8640000
0067	Vinylethylene	106-99-0	EI9275000
0661*	Vinylidene chloride	75-35-4	KV9275000
0661	Vinylidene chloride monomer	75-35-4	KV9275000
0661	Vinylidene dichloride	75-35-4	KV9275000
0662	Vinylidene difluoride	75-38-7	KW0560000
0662*	Vinylidene fluoride	75-38-7	KW0560000
0248	Vinylstyrene	1321-74-0	CZ9370000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0665	WARF	81-81-2	GN4550000
0665*	Warfarin	81-81-2	GN4550000
0666*	Welding fumes		ZC2550000
0667	Western red cedar dust		ZC9850000
0447	White fuming nitric acid (WFNA)	7697-37-2	QU5775000
0472	White mineral oil mist	8012-95-1	PY8030000
0506	White phosphoric acid	7664-38-2	TB6300000
0507	White phosphorus	7723-14-0	TH3500000
0439	White tar	91-20-3	QJ0525000
0616	White tin oxide	18282-10-5	XQ4000000
0645	Wolfram	7440-33-7	YO7175000
0094	Wollastonite (mineral)	1344-95-2	VV9150000
0397	Wood alcohol	67-56-1	PC1400000
0667*	Wood dust		ZC9850000
0397	Wood naphtha	67-56-1	PC1400000
0397	Wood spirit	67-56-1	PC1400000
0648	Wood turpentine	8006-64-2	YO8400000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0670*	p-Xylene	106-42-3	ZE2625000
0669*	m-Xylene	108-38-3	ZE2275000
0668*	o-Xylene	95-47-6	ZE2450000
0670	para-Xylene	106-42-3	ZE2625000
0669	meta-Xylene	108-38-3	ZE2275000
0668	ortho-Xylene	95-47-6	ZE2450000
0671*	m-Xylene-alpha,alpha'-diamine	1477-55-0	PF8970000
0672*	Xylidine	1300-73-8	ZE8575000
0672	Xylidine isomers (e.g.	1300-73-8	ZE8575000
0670	p-Xylol	106-42-3	ZE2625000
0669	m-Xylol	108-38-3	ZE2275000
0668	o-Xylol	95-47-6	ZE2450000
0671	m-Xylylenediamine	1477-55-0	PF8970000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0673*	Yttrium	7440-65-5	ZG2980000
0673	Yttrium metal	7440-65-5	ZG2980000

GUIDE	CHEMICAL NAME	CAS NO	RTECS NO
0431	Zimmwaldite	12001-26-2	VV8760000
0674*	Zinc chloride fume	7646-85-7	ZH1400000
0674	Zinc dichloride fume	7646-85-7	ZH1400000
0676	Zinc distearate	557-05-1	ZH5200000
0675*	Zinc oxide	1314-13-2	ZH4810000
0675	Zinc peroxide	1314-13-2	ZH4810000
0676	Zinc salt of stearic acid	557-05-1	ZH5200000
0676*	Zinc stearate	557-05-1	ZH5200000
0677	Zirconium	7440-67-7	ZH7070000
0677*	Zirconium compounds (as Zr)	7440-67-7	ZH7070000
0230	Zoalene	148-01-6	XS4200000

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

This page last updated: June 23, 1999

NIOSH CDC

Online NIOSH Pocket Guide to Chemical Hazards

INDEX of Chemical Abstract Numbers (CAS NO.)

GUIDE	CAS NO
0023	
0024	
0039	
0055	
0114	
0139	
0140	
0144	
0149	
0152	
0207	
0288	
0294	
0305	
0323	
0346	
0384	
0432	
0434	

0480	
0520	
0545	
0547	
0558	
0608	
0614	
0646	
0651	
0666	
0667	
0293	50-00-0
0174	50-29-3
0010	50-78-2
0007	53-96-3
0446	54-11-5
0285	55-38-9
0456	55-63-0
0107	56-23-5
0479	56-38-2
0302	56-81-5
0227	57-14-7
0570	57-24-9
0574	57-50-1
0528	57-57-8

0112	57-74-9
0370	58-89-9
0220	60-11-7
0277	60-29-7
0419	60-34-4
0206	60-57-1
0027	61-82-5
0033	62-53-3
0202	62-73-7
0564	62-74-8
0461	62-75-9
0100	63-25-2
0262	64-17-5
0296	64-18-6
0002	64-19-7
0397	67-56-1
0359	67-63-0
0004	67-64-1
0127	67-66-3
0316	67-72-1
0610	68-11-1
0226	68-12-2
0533	71-23-8
0076	71-36-3
0049	71-43-2

0404	71-55-6
0252	72-20-8
0388	72-43-5
0400	74-83-9
0008	74-86-2
0403	74-87-3
0420	74-88-4
0398	74-89-5
0333	74-90-8
0425	74-93-1
0265	74-96-4
0123	74-97-5
0524	74-98-6
0392	74-99-7
0267	75-00-3
0658	75-01-4
0660	75-02-5
0263	75-04-7
0006	75-05-8
0001	75-07-0
0280	75-08-1
0414	75-09-2
0295	75-12-7
0104	75-15-0
0275	75-21-8

0066	75-25-2
0350	75-28-5
0360	75-31-0
0194	75-34-3
0661	75-35-4
0662	75-38-7
0197	75-43-4
0504	75-44-5
0124	75-45-6
0343	75-47-8
0636	75-50-3
0457	75-52-5
0537	75-55-8
0538	75-56-9
0214	75-61-6
0634	75-63-8
0078	75-65-0
0290	75-69-4
0192	75-71-8
0603	75-74-1
0005	75-86-5
0200	75-99-0
0482	76-01-7
0626	76-03-9
0132	76-06-2

0595	76-11-9
0596	76-12-0
0632	76-13-1
0201	76-14-2
0131	76-15-3
0096	76-22-2
0389	76-38-0
0311	76-44-8
0315	77-47-4
0204	77-73-6
0229	77-78-1
0601	78-00-2
0282	78-10-4
0642	78-30-8
0238	78-34-2
0355	78-59-1
0353	78-82-0
0352	78-83-1
0534	78-87-5
0077	78-92-2
0069	78-93-3
0628	79-00-5
0629	79-01-6
0120	79-04-9
0012	79-06-1

0529	79-09-4
0013	79-10-7
0391	79-20-9
0453	79-24-3
0009	79-27-6
0598	79-34-5
0386	79-41-4
0224	79-44-7
0460	79-46-9
0426	80-62-6
0665	81-81-2
0516	83-26-1
0548	83-79-4
0591	84-15-1
0213	84-66-2
0187	84-74-2
0243	85-00-7
0512	85-44-9
0044	86-50-0
0037	86-88-4
0314	87-68-3
0484	87-86-5
0462	88-72-2
0515	88-89-1
0084	89-72-5

0034	90-04-0
0439	91-20-3
0442	91-59-8
0191	91-94-1
0592	92-06-8
0239	92-52-4
0025	92-67-1
0494	92-84-2
0051	92-87-5
0451	92-93-3
0593	92-94-4
0583	93-76-5
0052	94-36-0
0173	94-75-7
0340	95-13-6
0668	95-47-6
0154	95-48-7
0135	95-49-8
0189	95-50-1
0622	95-53-4
0638	95-63-6
0184	96-12-8
0631	96-18-4
0212	96-22-0
0394	96-33-3

0276	96-45-7
0609	96-69-5
0244	97-77-8
0298	98-00-0
0297	98-01-1
0085	98-51-1
0159	98-82-8
0429	98-83-9
0450	98-95-3
0463	99-08-1
0232	99-65-0
0464	99-99-0
0452	100-00-5
0449	100-01-6
0233	100-25-4
0210	100-37-8
0264	100-41-4
0571	100-42-5
0053	100-44-7
0436	100-61-8
0499	100-63-0
0281	100-74-3
0411	101-14-4
0413	101-68-8
0415	101-77-9

0496	101-84-8
0205	102-54-5
0185	102-81-8
0035	104-94-9
0073	105-46-4
0097	105-60-2
0266	106-35-4
0670	106-42-3
0156	106-44-5
0190	106-46-7
0624	106-49-0
0495	106-50-3
0542	106-51-4
0659	106-87-6
0254	106-89-8
0019	106-92-3
0270	106-93-4
0068	106-97-8
0067	106-99-0
0011	107-02-8
0526	107-03-9
0018	107-05-1
0271	107-06-2
0268	107-07-3
0530	107-12-0

0014	107-13-1
0269	107-15-3
0304	107-16-4
0017	107-18-6
0527	107-19-7
0118	107-20-0
0272	107-21-1
0129	107-30-2
0417	107-31-3
0328	107-41-5
0590	107-49-3
0186	107-66-4
0488	107-87-9
0536	107-98-2
0459	108-03-2
0656	108-05-4
0326	108-10-1
0422	108-11-2
0217	108-18-9
0362	108-20-3
0358	108-21-4
0003	108-24-7
0376	108-31-6
0669	108-38-3
0155	108-39-4

0623	108-44-1
0543	108-46-3
0639	108-67-8
0216	108-83-8
0327	108-84-9
0406	108-87-2
0619	108-88-3
0121	108-90-7
0168	108-91-8
0165	108-93-0
0166	108-94-1
0493	108-95-2
0050	108-98-5
0357	109-59-1
0532	109-60-4
0486	109-66-0
0079	109-73-9
0086	109-74-0
0378	109-77-3
0083	109-79-5
0401	109-86-4
0396	109-87-5
0209	109-89-7
0278	109-94-4
0602	109-99-9

0421	110-12-3
0351	110-19-0
0399	110-43-0
0402	110-49-6
0322	110-54-3
0573	110-61-2
0652	110-62-3
0487	110-66-7
0258	110-80-5
0163	110-82-7
0167	110-83-8
0541	110-86-1
0437	110-91-8
0259	111-15-9
0301	111-30-8
0324	111-31-9
0211	111-40-0
0208	111-42-2
0196	111-44-4
0470	111-65-9
0015	111-69-3
0070	111-76-2
0466	111-84-2
0471	111-88-6
0071	112-07-2

0249	112-55-0
0531	114-26-1
0251	115-29-7
0485	115-77-5
0644	115-86-6
0284	115-90-2
0236	117-81-7
0193	118-52-5
0641	118-96-7
0180	119-90-4
0618	119-93-7
0109	120-80-9
0627	120-82-1
0633	121-44-8
0640	121-45-9
0223	121-69-7
0375	121-75-5
0169	121-82-4
0240	122-39-4
0498	122-60-1
0242	123-19-3
0338	123-31-9
0178	123-42-2
0348	123-51-3
0072	123-86-4

0237	123-91-1
0347	123-92-2
0103	124-38-9
0219	124-40-3
0625	126-73-8
0395	126-98-7
0133	126-99-8
0599	127-18-4
0218	127-19-5
0246	128-37-0
0228	131-11-3
0099	133-06-2
0441	134-32-7
0500	135-88-6
0153	136-78-7
0405	137-05-3
0612	137-26-8
0082	138-22-7
0261	140-88-5
0075	141-32-2
0256	141-43-5
0203	141-66-2
0260	141-78-6
0385	141-79-7
0517	142-64-3

0312	142-82-5
0176	143-10-2
0562	143-33-9
0365	143-50-0
0474	144-62-7
0230	148-01-6
0390	150-76-5
0522	151-50-8
0274	151-56-4
0310	151-67-7
0091	156-62-7
0171	287-92-3
0427	298-00-0
0502	298-02-2
0245	298-04-4
0546	299-84-3
0158	299-86-5
0225	300-76-5
0329	302-01-2
0016	309-00-2
0063	314-40-9
0247	330-54-1
0181	333-41-5
0182	334-88-3
0108	353-50-4

0291	406-90-6
0555	409-21-2
0160	420-04-2
0161	460-19-5
0367	463-51-4
0607	479-45-8
0026	504-29-0
0162	506-77-4
0605	509-14-8
0637	526-73-8
0231	528-29-0
0119	532-27-4
0234	534-52-1
0195	540-59-0
0074	540-88-5
0418	541-85-5
0199	542-75-6
0377	542-78-9
0128	542-88-1
0170	542-92-7
0373	546-93-0
0635	552-30-7
0303	556-52-5
0676	557-05-1
0106	558-13-4

0257	563-12-2
0424	563-80-4
0458	581-89-5
0408	583-60-8
0621	584-84-9
0325	591-78-6
0657	593-60-2
0489	594-42-3
0198	594-72-9
0130	600-25-9
0643	603-34-9
0179	615-05-4
0423	624-83-9
0513	626-17-5
0032	626-38-0
0539	627-13-4
0031	628-63-7
0273	628-96-6
0105	630-08-0
0597	630-20-6
0501	638-21-1
0321	680-31-9
0428	681-84-5
0319	684-16-2
0361	768-52-5

0320	822-06-0
0292	944-22-9
0339	999-61-1
0525	1120-71-4
0080	1189-85-1
0672	1300-73-8
0250	1302-74-5
0060	1303-86-2
0058	1303-96-4
0056	1304-82-1
0092	1305-62-0
0093	1305-78-8
0088	1306-19-0
0344	1309-37-1
0549	1309-37-1
0374	1309-48-4
0523	1310-58-3
0565	1310-73-2
0675	1314-13-2
0653	1314-62-1
0654	1314-62-1
0510	1314-80-3
0381	1317-35-7
0151	1317-38-0
0090	1317-65-3

0369	1317-65-3
0382	1317-65-3
0483	1321-64-8
0630	1321-65-9
0248	1321-74-0
0057	1330-43-4
0041	1332-21-4
0364	1332-58-7
0138	1333-82-0
0102	1333-86-4
0317	1335-87-1
0600	1335-88-2
0416	1338-23-4
0021	1344-28-1
0094	1344-95-2
0572	1395-21-7
0467	1455-21-6
0671	1477-55-0
0101	1563-66-2
0164	1569-69-3
0313	1639-09-4
0222	1738-25-6
0594	1746-01-6
0478	1910-42-5
0043	1912-24-9

0514	1918-02-1
0136	1929-82-4
0134	2039-87-4
0255	2104-64-5
0020	2179-59-1
0468	2234-13-1
0215	2238-07-5
0098	2425-06-1
0081	2426-08-6
0576	2551-62-4
0122	2698-41-1
0581	2699-79-8
0469	2885-00-9
0318	2917-26-2
0137	2921-88-2
0143	2971-90-6
0221	3033-62-3
0440	3173-72-6
0604	3333-52-6
0589	3383-96-8
0586	3689-24-5
0363	4016-14-2
0356	4098-71-9
0157	4170-30-3
0412	5124-30-1

0649	5332-52-5
0579	5714-22-7
0349	6032-29-7
0535	6423-43-4
0435	6923-22-4
0022	7429-90-5
0368	7439-92-1
0379	7439-96-5
0383	7439-97-6
0433	7439-98-7
0445	7440-02-0
0519	7440-06-4
0544	7440-16-6
0554	7440-21-3
0557	7440-22-4
0585	7440-25-7
0613	7440-31-5
0645	7440-33-7
0036	7440-36-0
0038	7440-38-2
0054	7440-41-7
0087	7440-43-9
0307	7440-44-0
0141	7440-47-3
0146	7440-48-4

0150	7440-50-8
0309	7440-58-6
0650	7440-61-1
0673	7440-65-5
0677	7440-67-7
0341	7440-74-6
0575	7446-09-5
0342	7553-56-2
0188	7572-29-4
0371	7580-67-8
0490	7616-94-6
0552	7631-86-9
0561	7631-90-5
0062	7637-07-2
0674	7646-85-7
0332	7647-01-0
0506	7664-38-2
0334	7664-39-3
0028	7664-41-7
0577	7664-93-9
0563	7681-49-4
0566	7681-57-4
0447	7697-37-2
0611	7719-09-7
0511	7719-12-2

0335	7722-84-1
0606	7722-88-5
0507	7723-14-0
0064	7726-95-6
0047	7727-43-7
0030	7773-06-0
0095	7778-18-9
0089	7778-44-1
0289	7782-41-4
0306	7782-42-5
0550	7782-49-2
0115	7782-50-5
0300	7782-65-2
0337	7783-06-4
0336	7783-07-5
0475	7783-41-7
0455	7783-54-2
0580	7783-60-0
0551	7783-79-1
0588	7783-80-4
0040	7784-42-1
0503	7786-34-7
0065	7789-30-2
0117	7790-91-2
0505	7803-51-2

0568	7803-52-3
0556	7803-62-5
0113	8001-35-2
0492	8002-05-9
0477	8002-74-2
0540	8003-34-7
0497	8004-13-5
0299	8006-61-9
0648	8006-64-2
0366	8008-20-6
0472	8012-95-1
0410	8022-00-2
0438	8030-30-6
0664	8032-32-4
0569	8052-41-3
0042	8052-42-4
0177	8065-48-3
0110	9004-34-6
0567	9005-25-8
0046	10022-31-8
0465	10024-97-2
0578	10025-67-9
0508	10025-87-3
0509	10026-13-8
0476	10028-15-6

0331	10035-10-6
0116	10049-04-4
0448	10102-43-9
0454	10102-44-0
0147	10210-68-1
0061	10294-33-4
0045	10361-37-2
0126	11097-69-1
0647	11107-01-0
0431	12001-26-2
0380	12079-65-1
0409	12108-13-3
0029	12125-02-9
0059	12179-04-3
0287	12604-58-9
0172	13121-70-5
0308	13397-24-5
0444	13463-39-3
0345	13463-40-6
0617	13463-67-7
0587	13494-80-9
0253	13838-16-9
0286	14484-64-1
0584	14807-96-6
0553	14808-60-7

0142	14977-61-8
0559	15096-52-3
0279	16219-75-3
0387	16752-77-5
0148	16842-03-8
0175	17702-41-9
0048	17804-35-2
0616	18282-10-5
0183	19287-45-7
0481	19624-22-7
0473	20816-12-0
0430	21087-64-9
0111	21351-79-1
0615	21651-19-4
0283	22224-92-6
0663	25013-15-4
0235	25321-14-6
0620	25376-45-8
0407	25639-42-3
0518	26499-65-0
0560	26628-22-8
0354	26952-21-6
0241	34590-94-8
0582	35400-43-2
0125	53469-21-9

0393	59355-75-8
0330	61788-32-7
0443	62765-93-9
0145	65996-93-2
0521	65997-15-1
0372	68476-85-7
0655	68956-68-3
0491	93763-70-3

NIOSH Pocket Guide to Chemical Hazards

Aluminum (pyro powders and welding fumes, as Al)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific aluminum compound.	**DOT ID & Guide** 1383 135 (powder, pyrophoric)

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific aluminum compound.

Properties vary depending upon the specific aluminum compound.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 7300
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation skin, respiratory system; pulmonary fibrosis	
Target Organs Skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards
First Aid Procedures

Code	Definition
Eye: Irrigate immediately	If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical.
Eye: Irrigate promptly	If this chemical contacts the eyes, promptly wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention if any discomfort continues. Contact lenses should not be worn when working with this chemical.
Eye: Frostbite	If eye tissue is frozen, seek medical attention immediately; if tissue is not frozen, immediately and thoroughly flush the eyes with large amounts of water for at least 15 minutes, occasionally lifting the lower and upper eyelids. If irritation, pain, swelling, lacrimation, or photophobia persist, get medical attention as soon as possible.
Eye: Medical attention	Self-explanatory
Skin: Blot/brush away	If irritation occurs, gently blot or brush away excess.

Skin: Dust off solid; water flush	If this solid chemical contacts the skin, dust it off immediately and then flush the contaminated skin with water. If this chemical or liquids containing this chemical penetrate the clothing, promptly remove the clothing and flush the skin with water. Get medical attention immediately.
Skin: Frostbite	If frostbite has occurred, seek medical attention immediately; do NOT rub the affected areas or flush them with water. In order to prevent further tissue damage, do NOT attempt to remove frozen clothing from frostbitten areas. If frostbite has NOT occurred, immediately and thoroughly wash contaminated skin with soap and water.
Skin: Molten flush immediately/solid-liquid soap wash immediately	If this molten chemical contacts the skin, immediately flush the skin with large amounts of water. Get medical attention immediately. If this chemical (or liquids containing this chemical) contacts the skin, promptly wash the contaminated skin with soap and water. If this chemical or liquids containing this chemical penetrate the clothing, immediately remove the clothing and wash the skin with soap and water. If irritation persists after washing, get medical attention.
Skin: Soap flush immediately	If this chemical contacts the skin, immediately flush the contaminated skin with soap and water. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water. If irritation persists after washing, get medical attention.

Skin: Soap flush promptly	If this chemical contacts the skin, promptly flush the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly remove the clothing and flush the skin with water. If irritation persists after washing, get medical attention.
Skin: Soap promptly/molten flush immediately	If this solid chemical or a liquid containing this chemical contacts the skin, promptly wash the contaminated skin with soap and water. If irritation persists after washing, get medical attention. If this molten chemical contacts the skin or nonimpervious clothing, immediately flush the affected area with large amounts of water to remove heat. Get medical attention immediately.
Skin: Soap wash	If this chemical contacts the skin, wash the contaminated skin with soap and water.
Skin: Soap wash immediately	If this chemical contacts the skin, immediately wash the contaminated skin with soap and water. If this chemical penetrates the clothing, immediately remove the clothing, wash the skin with soap and water, and get medical attention promptly.
Skin: Soap wash promptly	If this chemical contacts the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly.
Skin: Water flush	If this chemical contacts the skin, flush the contaminated skin with water. Where there is evidence of skin irritation, get medical attention.

Skin: Water flush immediately	If this chemical contacts the skin, immediately flush the contaminated skin with water. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water. Get medical attention promptly.
Skin: Water flush promptly	If this chemical contacts the skin, flush the contaminated skin with water promptly. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water promptly. If irritation persists after washing, get medical attention.
Skin: Water wash	If this chemical contacts the skin, wash the contaminated skin with water.
Skin: Water wash immediately	If this chemical contacts the skin, immediately wash the contaminated skin with water. If this chemical penetrates the clothing, immediately remove the clothing and wash the skin with water. If symptoms occur after washing, get medical attention immediately.
Skin: Water wash promptly	If this chemical contacts the skin, promptly wash the contaminated skin with water. If this chemical penetrates the clothing, promptly remove the clothing and wash the skin with water. If irritation persists after washing, get medical attention.
Breath: Respiratory support	If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible.

Breath: Fresh air	If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. Other measures are usually unnecessary.
Breath: Fresh air, 100% O_2	If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. When breathing is difficult, properly trained personnel may assist the affected person by administering 100% oxygen. Keep the affected person warm and at rest. Get medical attention as soon as possible.
Swallow: Medical attention immediately	If this chemical has been swallowed, get medical attention immediately.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

Introduction

The *NIOSH Pocket Guide to Chemical Hazards* is intended as a source of general industrial hygiene information for workers, employers, and occupational health professionals. The *Pocket Guide* presents key information and data in abbreviated tabular form for 677 chemicals or substance groupings (e.g., manganese compounds, tellurium compounds, inorganic tin compounds, etc.) that are found in the work environment. The industrial hygiene information found in the *Pocket Guide* should help users recognize and control occupational chemical hazards. The chemicals or substances contained in this revision include all substances for which the National Institute for Occupational Safety and Health (NIOSH) has recommended exposure limits (RELs) and those with permissible exposure limits (PELs) as found in the Occupational Safety and Health Administration (OSHA) General Industry Air Contaminants Standard (29 CFR 1910.1000).

Background

In 1974, NIOSH (which is responsible for recommending health and safety standards) joined OSHA (whose jurisdictions include promulgation and enforcement activities) in developing a series of occupational health standards for substances with existing PELs. This joint effort was labeled the Standards Completion Program and involved the cooperative efforts of several contractors and personnel from various divisions within NIOSH and OSHA. The Standards Completion Program developed 380 substance-specific draft standards with supporting documentation that contained technical information and recommendations needed for the promulgation of new occupational health regulations. The *Pocket Guide* was developed to make the technical information in those draft standards more conveniently available to workers, employers, and occupational health professionals. The *Pocket Guide* is updated periodically to reflect new data regarding the toxicity of various substances and any changes in exposure standards or recommendations.

Data Collection and Application

The data were collected from a variety of sources, including NIOSH policy documents such as criteria documents and Current Intelligence Bulletins (CIBs), and recognized references in the fields of industrial hygiene, occupational medicine, toxicology, and analytical chemistry.

NIOSH RECOMMENDATIONS

Acting under the authority of the Occupational Safety and Health Act of 1970 (29 USC

Chapter 15) and the Federal Mine Safety and Health Act of 1977 (30 USC Chapter 22), NIOSH develops and periodically revises recommended exposure limits (RELs) for hazardous substances or conditions in the workplace. NIOSH also recommends appropriate preventive measures to reduce or eliminate the adverse health and safety effects of these hazards. To formulate these recommendations, NIOSH evaluates all known and available medical, biological, engineering, chemical, trade, and other information relevant to the hazard. These recommendations are then published and transmitted to OSHA and the Mine Safety and Health Administration (MSHA) for use in promulgating legal standards.

NIOSH recommendations are published in a variety of documents. Criteria documents recommend workplace exposure limits and appropriate preventive measures to reduce or eliminate adverse health effects and accidental injuries.

Current Intelligence Bulletins (CIBs) are issued to disseminate new scientific information about occupational hazards. A CIB may draw attention to a formerly unrecognized hazard, report new data on a known hazard, or present information on hazard control.

Alerts, Special Hazard Reviews, Occupational Hazard Assessments, and Technical Guidelines support and complement the other standards development activities of the Institute. Their purpose is to assess the safety and health problems associated with a given agent or hazard (e.g., the potential for injury or for carcinogenic, mutagenic, or teratogenic effects) and to recommend appropriate control and surveillance methods. Although these documents are not intended to supplant the more comprehensive criteria documents, they are prepared to assist OSHA and MSHA in the formulation of regulations.

In addition to these publications, NIOSH periodically presents testimony before various Congressional committees and at OSHA and MSHA rulemaking hearings.

A complete list of occupational safety and health issues for which NIOSH has formal policies (e.g., recommendations for occupational exposure to chemical and physical hazards, engineering controls, work practices, safety considerations, etc.) can be found in *NIOSH Recommendations for Occupational Safety and Health: Compendium of Policy Documents and Statements* [DHHS (NIOSH) Publication No. 92-100].

HOW TO USE THIS POCKET GUIDE

The Pocket Guide has been designed to provide chemical-specific data to supplement general industrial hygiene knowledge. To maximize the amount of data provided in this limited space, abbreviations and codes have been used extensively. These abbreviations and codes, which have been designed to permit rapid comprehension by the regular user, are discussed for each column in the following subsections.

Chemical Name and Structure/Formula, AS and RTECS Numbers, and DOT ID

and Guide Numbers

Chemical Name and Structure/Formula - The chemical name found in the OSHA General Industry Air Contaminants Standard (29 CFR 1910.1000) is listed first. The chemical formula is also provided under the chemical name.

CAS and RTECS Numbers - The Chemical Abstracts Service (CAS) number, in the format xxx-xx-x, is unique for each chemical and allows efficient searching on computerized data bases. The *NIOSH Registry of Toxic Effects of Chemical Substances* (RTECS) number, in the format ABxxxxxxx, may be useful for obtaining additional toxicologic information on a specific substance.

DOT ID and GUIDE Number - The U.S. Department of Transportation (DOT) identification number and the corresponding guide number. Their format is xxxx xxx. The Identification number (xxxx) indicates that the chemical is regulated by DOT. The Guide number (xxx) refers to actions to be taken to stabilize an emergency situation; this information can be found in the *1996 North American Emergency Response Guidebook* (Office of Hazardous Materials Training and Initiatives [DHM-50], Research and Special Programs Administration, U.S. Department of Transportation, Washington, D.C. 20590-0001; for sale by the U.S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, D.C. 20402-9328). A page index for all DOT ID numbers listed is included at the back of the *Pocket Guide* to help the user locate a specific substance; please note however, that many DOT numbers are NOT unique for specific substances.

Synonyms, Trade Names, and Conversion Factors

Common synonyms and trade names are listed alphabetically for each chemical. Factors for the conversion of ppm (parts of vapor or gas per million parts of contaminated air by volume) to mg/m^3 (milligrams of vapor or gas per cubic meter of contaminated air) at 25 °C and 1 atmosphere are listed for chemicals with exposure limits expressed in ppm.

Exposure Limits

The NIOSH recommended exposure limits (RELs) are listed first in this column. Unless noted otherwise, RELs are time-weighted average (TWA) concentrations for up to a 10-hour workday during a 40-hour workweek. A short-term exposure limit (STEL) is designated by "ST" preceding the value; unless noted otherwise, the STEL is a 15-minute TWA exposure that should not be exceeded at any time during a workday. A ceiling REL is designated by "C" preceding the value; unless noted otherwise, the ceiling value should not be exceeded at any time. Any substance that NIOSH considers to be a potential occupational carcinogen is designated by the notation "Ca" see (Appendix A, which contains a brief discussion of potential occupational carcinogens).

The OSHA permissible exposure limits (PELs), as found in Tables Z-1, Z-2, and Z-3 of

the OSHA General Industry Air Contaminants Standard (29 CFR 1910.1000), that were effective on July 1, 1993* and which are currently enforced by OSHA are listed next. [*Note: In July 1992, the 11th Circuit Court of Appeals in its decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992) vacated more protective PELs set by OSHA in 1989 for 212 substances, moving them back to PELs established in 1971. The appeals court also vacated new PELs for 164 substances that were not previously regulated. The substances for which OSHA PELs were vacated on June 30, 1993 are indicated by the symbol "†" following OSHA PEL in this column. A number of RELs are based on NIOSH concurrence with the data presented and the airborne exposure limits proposed in this rulemaking.] Unless noted otherwise, PELs are TWA concentrations that must not be exceeded during any 8-hour workshift of a 40-hour workweek. A STEL is designated by "ST" preceding the value and is measured over a 15-minute period unless noted otherwise. OSHA ceiling concentrations (designated by "C" preceding the value) must not be exceeded during any part of the workday; if instantaneous monitoring is not feasible, the ceiling must be assessed as a 15-minute TWA exposure. In addition, there are a number of substances from Table Z-2 (e.g., beryllium, ethylene dibromide, etc.) that have PEL ceiling values that must not be exceeded except for specified excursions. For example, a "5-minute maximum peak in any 2 hours" means that a 5-minute exposure above the ceiling value, but never above the maximum peak, is allowed in any 2 hours during an 8-hour workday. Appendix B contains a brief discussion of substances regulated as carcinogens by OSHA.

Concentrations are given in ppm, mg/m^3, mppcf (millions of particles per cubic foot of air as determined from counting an impinger sample), or fibers/cm^3 (fibers per cubic centimeter). The "[skin]" designation indicates the potential for dermal absorption; skin exposure should be prevented as necessary through the use of good work practices and gloves, coveralls, goggles, and other appropriate equipment. The "(total)" designation indicates that the REL or PEL listed is for "total particulate" versus the "(resp)" designation which refers to the "respirable fraction" of the airborne particulate. Appendix C contains more detailed discussions of the specific exposure limits for certain low-molecular-weight aldehydes, asbestos, various dyes (benzidine-, o-tolidine-, and o-dianisidine-based), carbon black, the various chromium compounds (chromic acid and chromates, chromium(II) and chromium(III) compounds, and chromium metal), coal tar pitch volatiles, coke oven emissions, cotton dust, lead, NIAX Catalyst ESN, trichloroethylene, and tungsten carbide (cemented). Appendix D contains a brief discussion of substances included in the *Pocket Guide* with no established RELs at this time and Appendix F contains miscellaneous notes regarding the OSHA PELs. Appendix G lists the OSHA PELs that were vacated on June 30, 1993.]

IDLH

For the June 1994 Edition of the *Pocket Guide*, immediately dangerous to life or health concentrations (IDLHs) were reviewed and, in many cases, were revised and made more protective. As a consequence of the IDLH changes, many of the respirator recommendations for these substances were also revised. The criteria utilized to determine the adequacy of existing IDLH values were a combination of those used during the Standards Completion Program and a newer methodology developed by NIOSH. These "interim" criteria form a tiered approach with acute human toxicity data

being used preferentially, followed next by acute animal inhalation toxicity data, and then finally by acute animal oral toxicity data to determine an updated IDLH value. When relevant acute toxicity data were insufficient or unavailable, the use of chronic toxicity data or an analogy to a chemically similar substance was considered. The criteria and information sources for both the original and revised IDLH values are given in *Documentation for Immediately Dangerous to Life and Health Concentrations (IDLHs)* (NTIS Publication No. PB-94-195047). NIOSH is currently assessing the various uses of IDLHs and whether the original criteria used to derive the IDLH values are valid or if other information or criteria should be utilized. Based on this assessment, NIOSH will develop a new strategy for revising the IDLH values currently listed, as well as for developing new IDLH values for the more than 300 substances listed in the *Pocket Guide* without IDLHs.

The definition of IDLH that was derived during the Standards Completion Program was based on the Mine Safety and Health Administration (MSHA) definition stipulated in 30 CFR 11.3(t). The purpose for establishing an IDLH value in the Standards Completion Program was to ensure that a worker could escape without injury or irreversible health effects from an IDLH exposure in the event of the failure of respiratory protection equipment. The IDLH was considered a maximum concentration above which only a highly reliable breathing apparatus providing maximum worker protection was permitted. In determining IDLH values, the ability of a worker to escape without loss of life or irreversible health effects was considered along with severe eye or respiratory irritation and other deleterious effects (e.g., disorientation or incoordination) that could prevent escape. As a safety margin, the Standards Completion Program IDLH values were based on the effects that might occur as a consequence of a 30-minute exposure. However, the 30-minute period was NOT meant to imply that workers should stay in the work environment any longer than necessary, in fact, EVERY EFFORT SHOULD BE MADE TO EXIT IMMEDIATELY!

The current NIOSH definition for an IDLH exposure condition, as stipulated in the *NIOSH Respirator Decision Logic* (DHHS [NIOSH] Publication No. 87-108, NTIS Publication No. PB-91-151183), is a condition "that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment." The purpose of establishing an IDLH exposure concentration is to "ensure that the worker can escape from a given contaminated environment in the event of failure of the respiratory protection equipment." The *NIOSH Respirator Decision Logic* uses these IDLH values as one of several respirator selection criteria. Under the *NIOSH Respirator Decision Logic*, the most protective respirators (e.g., a self-contained breathing apparatus equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode) would be selected for firefighting, exposure to carcinogens, entry into oxygen-deficient atmospheres, in emergency situations, during entry into an atmosphere that contains a substance at a concentration greater than 2,000 times the NIOSH REL or OSHA PEL, and for entry into IDLH atmospheres.

IDLH values are listed for over 380 substances. The notation "Ca" appears in this column for all substances that NIOSH considers to be potential occupational carcinogens. However, IDLH values that were originally determined in the Standards

Completion Program or were recently revised are shown in brackets following the "Ca" designations. "10%LEL" indicates that the IDLH was based on 10% of the lower explosive limit for safety considerations even though the relevant toxicological data indicated that irreversible health effects or impairment of escape existed only at higher concentrations. "N.D." indicates that an IDLH has not as yet been determined.

Physical Description

This entry provides a brief description of the appearance and odor of each substance. Notations are made as to whether a substance can be shipped as a liquefied compressed gas or whether it has major use as a pesticide.

Chemical and Physical Properties

The following abbreviations are used for the chemical and physical properties given for each substance. "NA" indicates that a property is not applicable, and a question mark (?) indicates that it is unknown.

MW	Molecular weight
BP	Boiling point at 1 atmosphere, °F
Sol	Solubility in water at 68 °F (unless a different temperature is noted), % by weight (i.e., g/100 ml)
Fl.P	Flash point (i.e., the temperature at which the liquid phase gives off enough vapor to flash when exposed to an external ignition source), closed cup (unless annotated "(oc)" for open cup), °F
IP	Ionization potential, eV (electron volts) [Ionization potentials are given as a guideline for the selection of photoionization detector lamps used in some direct-reading instruments.]
VP	Vapor pressure at 68 °F (unless a different temperature is noted), mm Hg; "approx" indicates approximately
MLT	Melting point for solids, °F
FRZ	Freezing point for liquids and gases, °F
UEL	Upper explosive (flammable) limit in air, % by volume (at room temperature unless otherwise noted)
LEL	Lower explosive (flammable) limit in air, % by volume (at room temperature unless otherwise noted)
MEC	Minimum explosive concentration, g/m^3 (when available)
Sp.Gr	Specific gravity at 68 °F (unless a different temperature is noted) referenced to water at 39.2 °F (4 °C)

RGasD Relative density of gases referenced to air = 1 (indicates how many times a gas is heavier than air at the same temperature)

When possible, the flammability/combustibility of a substance was determined and listed after the specific gravity. The following OSHA criteria (29 CFR 1910.106) were used to classify flammable or combustible liquids:

Class IA flammable liquid	Fl.P. below 73 °F and BP below 100 °F.
Class IB flammable liquid	Fl.P. below 73 °F and BP at or above 100 °F.
Class IC flammable liquid	Fl.P. at or above 73 °F and below 100 °F.
Class II combustible liquid	Fl.P. at or above 100 °F and below 140 °F.
Class IIIA combustible liquid	Fl.P. at or above 140 °F and below 200 °F.
Class IIIB combustible liquid	Fl.P. at or above 200 °F.

Incompatibilities and Reactivities

This entry lists important hazardous incompatibilities or reactivities of each substance.

Measurement Methods

This entry provides a source (NIOSH or OSHA) and the method number for which a measurement method can be used to determine the exposure. Unless otherwise noted, the NIOSH methods are from the 4th edition of the *NIOSH Manual of Analytical Methods* (DHHS [NIOSH] Publication No. 94-113). If a different edition of the *NIOSH Manual of Analytical Methods* is cited, the appropriate edition and, where applicable, the volume number would be noted [e.g., II-4 (2nd edition, volume 4)]. The OSHA methods are from the OSHA web site, http://www.osha-slc.gov/dts/sltc/methods/. "None available" means that no method is available from the NIOSH or OSHA source.

Personal Protection and Sanitation

This column presents a summary of recommended practices for each toxic substance. These recommendations supplement general work practices (e.g., no eating, drinking, or smoking where chemicals are used). Table 3 explains the codes used. Each category is described as follows:

SKIN:	Recommends the need for personal protective clothing.
EYES:	Recommends the need for eye protection.
WASH SKIN:	Recommends when workers should wash the spilled chemical from the body in addition to normal washing (e.g., before eating).

REMOVE:	Advises workers when to remove clothing that has accidentally become wet or significantly contaminated.
CHANGE:	Recommends whether the routine changing of clothing is needed.
PROVIDE:	Recommends the need for eyewash fountains and/or quick drench facilities.

First Aid

This entry lists emergency procedures for eye and skin contact, inhalation, and ingestion of the toxic substance.

Respirator Recommendations

This entry provides a condensed table of allowable respirator use for those substances for which IDLH values have been determined. NIOSH is currently reevaluating the IDLH values, and as new or revised IDLH values are developed, respirator selection recommendations will be incorporated into subsequent editions of the *Pocket Guide*. In the interim no respirator recommendations will be made for substances without IDLH values (these will be noted by "To be added later").

NIOSH has developed a new set of regulations in 42 CFR 84 (also referred to as "Part 84") for testing and certifying nonpowered, air-purifying, particulate-filter respirators. The new Part 84 respirators have passed a more demanding certification test than the old respirators (e.g.; dust; dust and mist; dust, mist, and fume; spray paint; pesticide; etc.) certified under 30 CFR 11 (also referred to as "Part 11"). Under Part 84, NIOSH is allowing manufacturers to continue selling and shipping Part 11 particulate filters as NIOSH-certified until July 10, 1998. It is important to see the *NIOSH Guide to the Selection and Use of Particulate Respirators* (DHHS [NIOSH] publication 96-101) for substitution of Part 84 respirators for Part 11 respirators.

The first line in the entry indicates whether the "NIOSH" or the "OSHA" exposure limit is used on which to base the respirator recommendations. The more protective limit between the NIOSH REL or the OSHA PEL is always used. "NIOSH/OSHA" indicates that the limits are equivalent.

Each subsequent line lists a maximum use concentration (MUC) followed by the classes of respirators, with their assigned protection factors (APFs), that are acceptable for use up to the MUC. Individual respirator classes are separated by diagonal lines (/). More protective respirators may be worn. Emergency or planned entry into unknown concentrations or entry into IDLH conditions are followed by the classes of respirators acceptable for these conditions. "Escape" indicates that the respirators are to be used only for escape purposes. For each MUC or condition this entry lists only those respirators with the required APF and other use restrictions based on the *NIOSH Respirator Decision Logic*.

In certain cases, the recommended respirators are annotated with the following

symbols as additonal information:

* Substance reported to cause eye irritation or damage; may require eye protection
£ Substance causes eye irritation or damage; eye protection needed
^ If not present as a fume
¿ Only nonoxidizable sorbents allowed (not charcoal)
† End of service life indicator (ESLI) required

All respirators selected must be approved by NIOSH and MSHA under the provisions of 30 CFR 11 or by NIOSH under 42 CFR 84. The current listing of NIOSH/MSHA certified respirators can be found in the *NIOSH Certified Equipment List* (DHHS [NIOSH] Publication No. 94-104). A list of Part 84 respirators can be found on the NIOSH Home Page (http://www.cdc.gov/niosh/) or obtained by calling 1-800-35-NIOSH.

A complete respiratory protection program must be implemented and must fulfill all requirements of 29 CFR 1910.134. A respiratory protection program must include a written standard operating procedure covering regular training, fit-testing, fit-checking, periodic environmental monitoring, maintenance, medical monitoring, inspection, cleaning, storage and periodic program evaluation. Selection of a specific respirator within a given class of recommended respirators depends on the particular situation; this choice should be made only by a knowledgeable person. *REMEMBER:* Air-purifying respirators will not protect users against oxygen-deficient atmospheres, and they are not to be used in IDLH conditions. The only respirators recommended for fire fighting are self-contained breathing apparatuses that have full facepieces and are operated in a pressure-demand or other positive-pressure modes. Additional information on the selection and use of respirators can be found in the *NIOSH Respirator Decision Logic* and the *NIOSH Guide to Industrial Respiratory Protection* (DHHS [NIOSH] Publication No. 87-116).

Route of Health Hazard

This entry lists the toxicologically important routes of entry for each substance and whether contact with the skin or eyes is potentially hazardous.

Symptoms

This entry lists the potential symptoms of exposure.

Target Organs

This entry lists the organs that are affected by exposure to each substance.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

APPENDICES

A B C D E F G

APPENDIX A
NIOSH Potential Occupational Carcinogens

New Policy

For the past 20 plus years, NIOSH has subscribed to a carcinogen policy that was published in 1976 by Edward J. Fairchild, II, Associate Director for Cincinnati Operations, which called for "no detectable exposure levels for proven carcinogenic substances" (Annals of the New York Academy of Sciences, 271:200-207, 1976). This was in response to a generic OSHA rulemaking on carcinogens. Because of advances in science and in approaches to risk assessment and risk management, NIOSH has adopted a more inclusive policy. NIOSH recommended exposure limits (RELs) will be based on risk evaluations using human or animal health effects data, and on an assessment of what levels can be feasibly achieved by engineering controls and measured by analytical techniques. To the extent feasible, NIOSH will project not only a no-effect exposure, but also exposure levels at which there may be residual risks. This policy applies to all workplace hazards, including carcinogens, and is responsive to Section 20(a)(3) of the Occupational Safety and Health Act of 1970, which charges NIOSH to ". . .describe exposure levels that are safe for various periods of employment, including but not limited to the exposure levels at which no employee will suffer impaired health or functional capacities or diminished life expectancy as a result of his work experience."

The effect of this new policy will be the development, whenever possible, of quantitative RELs that are based on human and/or animal data, as well as on the consideration of technological feasibility for controlling workplace exposures to the REL. Under the old policy, RELs for most carcinogens were non-quantitative values labeled "lowest feasible concentration (LFC)." [Note: There are a few exceptions to LFC RELs for carcinogens (e.g., RELs for asbestos, formaldehyde, benzene, and ethylene oxide are quantitative values based primarily on analytical limits of detection or technological feasibility). Also, in 1989, NIOSH adopted several quantitative RELs for carcinogens from OSHA's permissible exposure limit (PEL) update.]

Under the new policy, NIOSH will also recommend the complete range of respirators (as determined by the NIOSH Respirator Decision Logic) for carcinogens

with quantitative RELs. In this way, respirators will be consistently recommended regardless of whether a substance is a carcinogen or a non-carcinogen.

Old Policy

In the past, NIOSH identified numerous substances that should be treated as potential occupational carcinogens even though OSHA might not have identified them as such. In determining their carcinogenicity, NIOSH used the OSHA classification outlined in 29 CFR 1990.103, which states in part:

> Potential occupational carcinogen means any substance, or combination or mixture of substances, which causes an increased incidence of benign and/or malignant neoplasms, or a substantial decrease in the latency period between exposure and onset of neoplasms in humans or in one or more experimental mammalian species as the result of any oral, respiratory or dermal exposure, or any other exposure which results in the induction of tumors at a site other than the site of administration. This definition also includes any substance which is metabolized into one or more potential occupational carcinogens by mammals.

When thresholds for carcinogens that would protect 100% of the population had not been identified, NIOSH usually recommended that occupational exposures to carcinogens be limited to the lowest feasible concentration. To ensure maximum protection from carcinogens through the use of respiratory protection, NIOSH also recommended that only the most reliable and protective respirators be used. These respirators include (1) a self-contained breathing apparatus (SCBA) that has a full facepiece and is operated in a positive-pressure mode, or (2) a supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in a pressure-demand or other positive-pressure mode.

Recommendations to be Revised

The RELs and respirator recommendations for carcinogens listed in this edition of the *Pocket Guide* still reflect the old policy. Changes in the RELs and respirator recommendations that reflect the new policy will be included in future editions.

Return to Top of Page

APPENDIX B
Thirteen OSHA-Regulated Carcinogens

Without establishing PELs, OSHA promulgated standards in 1974 to regulate the industrial use of 13 chemicals identified as potential occupational carcinogens.

- 2-acetylaminofluorene

- 4-aminodiphenyl
- benzidine
- bis-chloromethyl ether
- 3,3'-dichlorobenzidine
- 4-dimethylaminoazobenzene
- ethyleneimine
- methyl chloromethyl ether
- alpha-naphthylamine
- beta-naphthylamine
- 4-nitrobiphenyl
- N-nitrosodimethylamine
- beta-propiolactone

Exposures of workers to these 13 chemicals are to be controlled through the required use of engineering controls, work practices, and personal protective equipment, including respirators. See 29 CFR 1910.1003-1910.1016 for specific details of these requirements.

Respirator selections in the Pocket Guide are based on NIOSH policy, which considers the 13 chemicals to be potential occupational carcinogens.

Return to Top of Page

APPENDIX C
Supplementary Exposure Limits

Aldehydes (Low-Molecular-Weight)

Exposure to acetaldehyde has produced nasal tumors in rats and laryngeal tumors in hamsters, and exposure to malonaldehyde has produced thyroid gland and pancreatic islet cell tumors in rats. NIOSH therefore recommends that acetaldehyde and malonaldehyde be considered potential occupational carcinogens in conformance with the OSHA carcinogen policy.

Testing has not been completed to determine the carcinogenicity of acrolein, butyraldehyde (CAS#: 123-72-8), crotonaldehyde, glutaraldehyde, glyoxal (CAS#: 107-22-2), paraformaldehyde (CAS#: 30525-89-4), propiolaldehyde (CAS#: 624-67-9), propionaldehyde (CAS#: 123-38-6), and n-valeraldehyde, nine related low-molecular-weight-aldehydes.

However, the limited studies to date indicate that these substances have chemical reactivity and mutagenicity similar to acetaldehyde and malonaldehyde. Therefore, NIOSH recommends that careful consideration should be given to reducing exposures to these nine related aldehydes.

Further information can be found in the "NIOSH Current Intelligence Bulletin 55: Carcinogenicity of Acetaldehyde and Malonaldehyde, and Mutagenicity of Related Low-

Molecular-Weight Aldehydes" [DHHS (NIOSH) Publication No. 91-112.]

Asbestos

NIOSH considers asbestos to be a potential occupational carcinogen and recommends that exposures be reduced to the lowest feasible concentration. For asbestos fibers >5 micrometers in length, NIOSH recommends a REL of 100,000 fibers per cubic meter of air (100,000 fibers/m^3), which is equal to 0.1 fiber per cubic centimeter of air (0.1 fiber/cm^3), as determined by a 400-liter air sample collected over 100 minutes in accordance with NIOSH Analytical Method #7400. Airborne asbestos fibers are defined as those particles having (1) an aspect ratio of 3 to 1 or greater and (2) the mineralogic characteristics (that is, the crystal structure and elemental composition) of the asbestos minerals and their nonasbestiform analogs. The asbestos minerals are defined as chrysotile, crocidolite, amosite (cummingtonite-grunerite), anthophyllite, tremolite, and actinolite. In addition, airborne cleavage fragments from the nonasbestiform habits of the serpentine minerals antigorite and lizardite, and the amphibole minerals contained in the series cummingtonite-grunerite, tremolite-ferroactinolite, and glaucophane-riebeckite should also be counted as fibers provided they meet the criteria for a fiber when viewed microscopically.

As found in 29 CFR 1910.1001, the OSHA PEL for asbestos fibers (i.e., actinolite asbestos, amosite, anthophyllite asbestos, chrysotile, crocidolite, and tremolite asbestos) is an 8-hour TWA airborne concentration of 0.1 fiber (longer than 5 micrometers and having a length-to-diameter ratio of at least 3 to 1) per cubic centimeter of air (0.1 fiber/cm^3), as determined by the membrane filter method at approximately 400X magnification with phase contrast illumination. No worker should be exposed in excess of 1 fiber/cm^3 (excursion limit)as averaged over a sampling period of 30 minutes.

Benzidine-, o-Tolidine, and o-Dianisidine-based Dyes

In December 1980, OSHA and NIOSH jointly published the Health Hazard Alert: Benzidine-, o-Tolidine-, and o-Dianisidine-based Dyes.

In this Alert, OSHA and NIOSH concluded that benzidine and benzidine-based dyes were potential occupational carcinogens and recommended that worker exposure be reduced to the lowest feasible level.

OSHA and NIOSH further concluded that o-tolidine and o-dianisidine (and dyes based on them) may present a cancer risk to workers and should be handled with caution and exposure minimized.

Carbon Black

NIOSH considers "Carbon Black" to be the material consisting of more than 80% elemental carbon in the form of near-spherical colloidal particles and coalesced particle aggregates of colloidal size that is obtained by the partial combustion or thermal

decomposition of hydrocarbons.

The NIOSH REL (10-hour TWA) for carbon black is 3.5 mg/m^3. Polycyclic aromatic hydrocarbons (PAHs), particulate polycyclic organic material (PPOM), and polynuclear aromatic hydrocarbons (PNAs) are terms frequently used to describe various petroleum-based substances that NIOSH considers to be potential occupational carcinogens.

Since some of these aromatic hydrocarbons may be formed during the manufacture of carbon black (and become adsorbed on the carbon black), the NIOSH REL (10-hour TWA) for carbon black in the presence of PAHs is also 0.1 mg PAHs/m^3 (measured as the cyclohexane-extractable fraction).

The OSHA PEL (8-hour TWA) for carbon black is 3.5 mg/m^3.

Chloroethanes

NIOSH considers ethylene dichloride; hexachloroethane; 1,1,2,2-tetrachloroethane; and 1,1,2-trichloroethane; to be potential occupational carcinogens.

Additionally, NIOSH recommends that the other five chloroethane compounds:

- 1,1-dichloroethane
- ethyl chloride
- methyl chloroform
- pentachloroethane
- 1,1,1,2-tetrachloroethane

be treated in the workplace with caution because of their structural similarity to the four chloroethanes shown to be carcinogenic in animals.

Chromic Acid and Chromates (as CrO_3), chromium(II) and Chromium(III) Compounds (as Cr), and Chromium Metal (as Cr)

The NIOSH REL (10-hour TWA) is 0.001 mg Cr(VI)/m^3 for all hexavalent chromium [Cr(VI)] compounds. NIOSH considers all Cr(VI) compounds (including chromic acid, tert-butyl chromate, zinc chromate, and chromyl chloride) to be potential occupational carcinogens.

The NIOSH REL (8-hour TWA) is 0.5 mg Cr/m^3 for chromium metal and chromium(II) and chromium(III) compounds.

The OSHA PEL is 0.1 mg CrO_3/m^3 (ceiling) for chromic acid and chromates (including tert-butyl chromate with a "skin" designation and zinc chromate); 0.5 mg Cr/m^3 (8-hour TWA) for chromium(II) and chromium(III) compounds; and 1 mg Cr/m^3

(8-hour TWA) for chromium metal and insoluble salts.

Coal Tar Pitch Volatiles

NIOSH considers coal tar products (i.e., coal tar, coal tar pitch, or creosote) to be potential occupational carcinogens; the NIOSH REL (10-hour TWA) for coal tar products is 0.1 mg/m^3 (cyclohexane-extractable fraction).

The OSHA PEL (8-hour TWA) for coal tar pitch volatiles is 0.2 mg/m^3 (benzene-soluble fraction). OSHA defines "coal tar pitch volatiles" in 29 CFR 1910.1002 as the fused polycyclic hydrocarbons that volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter and includes substances such as anthracene, benzo(a)pyrene (BaP), phenanthrene, acridine, chrysene, pyrene, etc.

Coke Oven Emissions

The production of coke by the carbonization of bituminous coal leads to the release of chemically-complex emissions from coke ovens that include both gases and particulate matter of varying chemical composition.

The emissions include coal tar pitch volatiles (e.g., particulate polycyclic organic matter [PPOM], polycyclic aromatic hydrocarbons [PAHs], and polynuclear aromatic hydrocarbons [PNAs]), aromatic compounds (e.g., benzene and beta-naphthylamine), trace metals (e.g., arsenic, beryllium, cadmium, chromium, lead, and nickel), and gases (e.g., nitric oxides and sulfur dioxide).

Cotton Dust (raw)

NIOSH recommends reducing exposures to cotton dust to the lowest feasible concentration to reduce the prevalence and severity of byssinosis; the REL is <0.200 mg/m^3 (as lint-free cotton dust).

As found in OSHA Table Z-1 (29 CFR 1910.1000), the PEL for cotton dust (raw) is 1 mg/m^3 for the cotton waste processing operations of waste recycling (sorting, blending, cleaning, and willowing) and garnetting.

PELs for other sectors (as found in 29 CFR 1910.1043) are 0.200 mg/m^3 for yarn manufacturing and cotton washing operations, 0.500 mg/m^3 for textile mill waste house operations or for dust from "lower grade washed cotton" used during yarn manufacturing, and 0.750 mg/m^3 for textile slashing and weaving operations.

The OSHA standard in 29 CFR 1910.1043 does not apply to cotton harvesting, ginning, or the handling and processing of woven or knitted materials and washed cotton.

All PELs for cotton dust are mean concentrations of lint-free, respirable cotton dust collected by the vertical elutriator or an equivalent method and averaged over an 8-hour period.

Lead

NIOSH considers "Lead" to mean metallic lead, lead oxides, and lead salts (including organic salts such as lead soaps but excluding lead arsenate).

The NIOSH REL for lead (8-hour TWA) is 0.050 mg/m^3; air concentrations should be maintained so that worker blood lead remains less than 0.060 mg Pb/100 g of whole blood.

OSHA considers "Lead" to mean metallic lead, all inorganic lead compounds (lead oxides and lead salts), and a class of organic compounds called soaps; all other lead compounds are excluded from this definition.

The OSHA PEL (8-hour TWA) is 0.050 mg/m^3; other OSHA requirements can be found in 29 CFR 1910.1025. The OSHA PEL (8-hour TWA) for lead in "non-ferrous foundries with less than 20 employees" is 0.075 mg/m^3.

Mineral Dusts

These OSHA PELs for "mineral dusts" listed below are from Table Z-3 of 29 CFR 1910.1000.

The OSHA PEL (8-hour TWA) for crystalline silica (as respirable quartz) is either 250 mppcf divided by the value "$\%SiO_2$ + 5" or 10 mg/m^3 divided by the value "$\%SiO_2$ + 2".

The OSHA PEL (8-hour TWA) for crystalline silica (as total quartz) is 30 mg/m^3 divided by the value "$\%SiO_2$ + 2".

The OSHA PELs (8-hour TWAs) for cristobalite and tridymite are the values calculated above using the count or mass formulae for quartz.

The OSHA PEL (8-hour TWA) for amorphous silica (including diatomaceous earth) is either 80 mg/m^3 divided by the value "$\%SiO_2$", or 20 mppcf.

The OSHA PELs (8-hour TWAs) for mica, soapstone, and talc (not containing asbestos) are 20 mppcf.

The OSHA PEL (8-hour TWA) for Portland cement is 50 mppcf. The OSHA PEL (8-hour TWA) for graphite (natural) is 15 mppcf.

The OSHA PEL (8-hour TWA) for coal dust (as the respirable fraction) containing less than 5% SiO_2 is 2.4 mg/m^3.

The OSHA PEL (8-hour TWA) for coal dust (as the respirable fraction) containing greater than 5% SiO_2 is 10 mg/m^3 divided by the value "%SiO_2 + 2".

NIAX® Catalyst ESN

In May 1978, OSHA and NIOSH jointly published the Current Intelligence Bulletin (CIB) 26: NIAX® Catalyst ESN.

In this CIB, OSHA and NIOSH recommended that occupational exposure to NIAX® Catalyst ESN, its components, dimethylaminopropionitrile and bis(2-(dimethylamino)ethyl)ether, as well as formulations containing either component, be minimized.

Exposures should be limited to as few workers as possible, while minimizing workplace exposure concentrations with effective work practices and engineering controls.

Exposed workers should be carefully monitored for potential disorders of the nervous and genitourinary system. Although substitution is a possible control measure, alternatives to NIAX® Catalyst ESN or its components should be carefully evaluated with regard to possible adverse health effects.

Trichloroethylene

NIOSH considers trichloroethylene (TCE) to be a potential occupational carcinogen and recommends a REL of 2 ppm (as a 60-minute ceiling) during the usage of TCE as an anesthetic agent and 25 ppm (as a 10-hour TWA) during all other exposures.

Tungsten Carbide (Cemented)

"Cemented tungsten carbide" or "hard metal" refers to a mixture of tungsten carbide, cobalt, and sometimes metal oxides or carbides and other metals (including nickel).

When the cobalt (Co) content exceeds 2%, its contribution to the potential hazard is judged to exceed that of tungsten carbide.

Therefore, the NIOSH REL (10-hour TWA) for cemented tungsten carbide containing >2% Co is 0.05 mg Co/m^3; the applicable OSHA PEL is 0.1 mg Co/m^3 (8-hour TWA). Nickel (Ni) may sometimes be used as a binder rather than cobalt.

NIOSH considers cemented tungsten carbide containing nickel to be a potential

occupational carcinogen and recommends a REL of 0.015 mg Ni/m^3 (10-hour TWA).

The OSHA PEL for Insoluble Nickel (i.e., a 1 mg Ni/m^3 8-hour TWA) applies to mixtures of tungsten carbide and nickel.

Return to Top of Page

APPENDIX D
Substances With No Established RELs

After reviewing available published literature, NIOSH provided comments to OSHA on August 1, 1988, regarding the "Proposed Rule on Air Contaminants" (29 CFR 1910, Docket No. H-020).

In these comments, NIOSH questioned whether the PELs proposed (and listed below) for the following substances included in the Pocket Guide were adequate to protect workers from recognized health hazards:

- acetylene tetrabromide [TWA 1 ppm]
- chlorobenzene [TWA 75 ppm]
- coal dust (<5%SiO_2) [2 mg/m^3 (as the respirable dust fraction)], coal dust (>/= 5% SiO_2) [0.1 mg/m^3 (as the respirable quartz fraction)]
- ethyl bromide [TWA 200 ppm; STEL 250 ppm]
- ethylene glycol [Ceiling 50 ppm]
- ethyl ether [TWA 400 ppm; STEL 500 ppm]
- fenthion [TWA 0.2 mg/m^3 (skin)]
- furfural [TWA 2 ppm (skin)]
- 2-isopropoxyethanol [TWA 25 ppm]
- isopropyl acetate [TWA 250 ppm; STEL 310 ppm]
- isopropylamine [TWA 5 ppm; STEL 10 ppm]
- manganese tetroxide (as Mn) [TWA 1 mg/m^3]
- molybdenum (soluble compounds as Mo) [TWA 5 mg/m^3]
- nitromethane [TWA 100 ppm]
- m-toluidine [TWA 2 ppm (skin)]
- triethylamine [TWA 10 ppm; STEL 15 ppm]

At that time, NIOSH also conducted a limited evaluation of the literature and concluded that the documentation cited by OSHA was inadequate to support the proposed PEL (as an 8-hour TWA) of 10 mg/m^3 for alpha-alumina, benomyl, emery, glycerine (mist), graphite (synthetic), magnesium oxide fume, molybdenum (insoluble compounds as Mo), particulates not otherwise regulated, picloram, and rouge.

Return to Top of Page

APPENDIX E

Respirator Recommendations for Selected Chemicals

Mercury compounds [except (organo) alkyls]

Mercury vapor:
NIOSH

Up to 0.5 mg/m^3:	(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern†/ (APF = 10) Any supplied air respirator
Up to 1.25 mg/m^3:	(APF = 25) Any supplied-air respirator operated in a continuous-flow mode/ (APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†
Up to 2.5 mg/m^3:	(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern†/ (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†/ (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/ (APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern†/ (APF = 50) Any self-contained breathing apparatus that has a full facepiece/ (APF = 50) Any supplied-air respirator with a full facepiece
Up to 10 mg/m^3:	(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:	(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/ (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode
Escape:	(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compund of concern†/ Any appropriate escape-type, self-contained breathing apparatus

† End of service life indicator (ESLI) required

Other non (organo) alkyl mercury compounds: NIOSH/OSHA

Up to 1 mg/m^3:	(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern†/ (APF = 10) Any supplied air respirator
Up to 2.5 mg/m^3:	(APF = 25) Any supplied-air respirator operated in a continuous-flow mode/ (APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†

Up to 5 mg/m^3:	(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern†/ (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†/ (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/ (APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern†/ (APF = 50) Any self-contained breathing apparatus that has a full facepiece/ (APF = 50) Any supplied-air respirator with a full facepiece
Up to 10 mg/m^3:	(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions:	(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/ (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode
Escape:	(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compund of concern†/ Any appropriate escape-type, self-contained breathing apparatus

† End of service life indicator (ESLI) required

Return to Top of Page

APPENDIX F
Miscellaneous Notes

Benzene: The final OSHA Benzene standard in 1910.1028 applies to all occupational exposures to benzene except some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sales of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply (i.e., an 8-hour TWA of 10 ppm, an acceptable ceiling of 25 ppm, and 50 ppm for a maximum duration of 10 minutes as an acceptable maximum peak above the acceptable ceiling).

Return to TOP of PAGE

APPENDIX G
1989 Air Contaminants Update Project: Exposure Limits Not in Effect

TR valign=top>

Acetaldehyde	TWA 100 ppm (180 mg/m^3) ST 150 ppm (270 mg/m^3)
Acetic anhydride	C 5 ppm (20 mg/m^3)
Acetone	TWA 750 ppm (1800 mg/m^3) ST 1000 ppm (2400 mg/m^3)
Acetonitrile	TWA 40 ppm (70 mg/m^3) ST 60 ppm (105 mg/m^3)
Acetylsalicyclic acid	TWA 5 mg/m^3
Acrolein	TWA 0.1 ppm (0.25 mg/m^3) ST 0.3 ppm (0.8 mg/m^3)
Acrylamide	TWA 0.03 mg/m^3 [skin]
Acrylic acid	TWA 10 ppm (30 mg/m^3) [skin]
Allyl alcohol	TWA 2 ppm (5 mg/m^3) ST 4 ppm (10 mg/m^3) [skin]
Allyl chloride	TWA 1 ppm (3 mg/m^3) ST 2 ppm (6 mg/m^3)
Allyl glycidyl ether	TWA 5 ppm (22 mg/m^3) ST 10 ppm (44 mg/m^3)

Allyl propyl disulfide	TWA 2 ppm (12 mg/m^3) ST 3 ppm (18 mg/m^3)
alpha-Alumina	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Aluminum (pyro powders & welding fumes, as Al)	TWA 5 mg/m^3
Aluminum (soluble salts & alkyls, as Al)	TWA 2 mg/m^3
Amitrole	TWA 0.2 mg/m^3
Ammonia	ST 35 ppm (27 mg/m^3)
Ammonium chloride fume	TWA 10 mg/m^3 ST 20 mg/m^3
Ammonium sulfamate	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Aniline (and homologs)	TWA 2 ppm (8 mg/m^3) [skin]
Atrazine	TWA 5 mg/m^3
Barium sulfate	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Benomyl	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Benzenethiol	TWA 0.5 ppm (2 mg/m^3)
Bismuth telluride (doped with selenium sulfide, as Bi2Te3)	TWA 5 mg/m^3
Borates, tetra, sodium salts (Anhydrous)	TWA 10 mg/m^3
Borates, tetra, sodium salts (Decahydrate)	TWA 10 mg/m^3
Borates, tetra, sodium salts (Pentahydrate)	TWA 10 mg/m^3
Boron oxide	TWA 10 mg/m^3
Boron tribromide	C 1 ppm (10 mg/m^3)
Bromacil	TWA 1 ppm (10 mg/m^3)
Bromine	TWA 0.1 ppm (0.7 mg/m^3) ST 0.3 ppm (2 mg/m^3)
Bromine pentafluoride	TWA 0.1 ppm (0.7 mg/m^3)
n-Butane	TWA 800 ppm (1900 mg/m^3)

2-Butanone	TWA 200 ppm (590 mg/m^3) ST 300 ppm (885 mg/m^3)
2-Butoxyethanol	TWA 25 ppm (120 mg/m^3) [skin]
n-Butyl acetate	TWA 150 ppm (710 mg/m^3) ST 200 ppm (950 mg/m^3)
Butyl acrylate	TWA 10 ppm (55 mg/m^3)
n-Butyl alcohol	C 50 ppm (150 mg/m^3) [skin]
sec-Butyl alcohol	TWA 100 ppm (305 mg/m^3)
tert-Butyl alcohol	TWA 100 ppm (300 mg/m^3) ST 150 ppm (450 mg/m^3)
n-Butyl glycidyl ether	TWA 25 ppm (135 mg/m^3)
n-Butyl lactate	TWA 5 ppm (25 mg/m^3)
n-Butyl mercaptan	TWA 0.5 ppm (1.5 mg/m^3)
o-sec-Butylphenol	TWA 5 ppm (30 mg/m^3) [skin]
p-tert-Butyltoluene	TWA 10 ppm (60 mg/m^3) ST 20 ppm (120 mg/m^3)
Calcium cyanamide	TWA 0.5 mg/m^3
Caprolactam	Dust: TWA 1 mg/m^3 ST 3 mg/m^3 Vapor: TWA 5 ppm (20 mg/m^3) ST 10 ppm (40 mg/m^3)
Captafol	TWA 0.1 mg/m^3
Captan	TWA 5 mg/m^3
Carbofuran	TWA 0.1 mg/m^3
Carbon dioxide	TWA 10,000 ppm (18,000 mg/m^3) ST 30,000 ppm (54,000 mg/m^3)
Carbon disulfide	TWA 4 ppm (12 mg/m^3) ST 12 ppm (36 mg/m^3) [skin]
Carbon monoxide	TWA 35 ppm (40 mg/m^3) C 200 ppm (229 mg/m^3)

Carbon tetrabromide	TWA 0.1 ppm (1.4 mg/m^3) ST 0.3 ppm (4 mg/m^3)
Carbon tetrachloride	TWA 2 ppm (12.6 mg/m^3)
Carbonyl fluoride	TWA 2 ppm (5 mg/m^3) ST 5 ppm (15 mg/m^3)
Catechol	TWA 5 ppm (20 mg/m^3) [skin]
Cesium hydroxide	TWA 2 mg/m^3
Chlorinated camphene	TWA 0.5 mg/m^3 ST 1 mg/m^3 [skin]
Chlorine	TWA 0.5 ppm (1.5 mg/m^3) ST 1 ppm (3 mg/m^3)
Chlorine dioxide	TWA 0.1 ppm (0.3 mg/m^3) ST 0.3 ppm (0.9 mg/m^3)
Chloroacetyl chloride	TWA 0.05 ppm (0.2 mg/m^3)
o-Chlorobenzylidene malononitrile	C 0.05 ppm (0.4 mg/m^3) [skin]
Chlorodifluoromethane	TWA 1000 ppm (3500 mg/m^3)
Chloroform	TWA 2 ppm (9.78 mg/m^3)
1-Chloro-1-nitropropane	TWA 2 ppm (10 mg/m^3)
Chloropentafluoroethane	TWA 1000 ppm (6320 mg/m^3)
beta-Chloroprene	TWA 10 ppm (35 mg/m^3) [skin]
o-Chlorostyrene	TWA 50 ppm (285 mg/m^3) ST 75 ppm (428 mg/m^3)
o-Chlorotoluene	TWA 50 ppm (250 mg/m^3)
Chlorpyrifos	TWA 0.2 mg/m^3 [skin]
Coal dust	TWA 2 mg/m^3 (<5% SiO_2)(resp dust) TWA 0.1 mg/m^3 (>/= 5% SiO_2) (resp quartz)
Cobalt metal dust & fume, as Co)	TWA 0.05 mg/m^3
Cobalt carbonyl (as Co)	TWA 0.1 mg/m^3
Cobalt hydrocarbonyl (as Co)	TWA 0.1 mg/m^3
Crag® herbicide	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)

Crufomate	TWA 5 mg/m^3
Cyanamide	TWA 2 mg/m^3
Cyanogen	TWA 10 ppm (20 mg/m^3)
Cyanogen chloride	C 0.3 ppm (0.6 mg/m^3)
Cyclohexanol	TWA 50 ppm (200 mg/m^3) [skin]
Cyclohexanone	TWA 25 ppm (100 mg/m^3) [skin]
Cyclohexylamine	TWA 10 ppm (40 mg/m^3)
Cyclonite	TWA 1.5 mg/m^3 [skin]
Cyclopentane	TWA 600 ppm (1720 mg/m^3)
Cyhexatin	TWA 5 mg/m^3
Decaborane	TWA 0.3 mg/m^3 (0.05 ppm) ST 0.9 mg/m^3 (0.15 ppm) [skin]
Diazinon	TWA 0.1 mg/m^3 [skin]
2-N-Dibutylaminoethanol	TWA 2 ppm (14 mg/m^3)
Dibutyl phosphate	TWA 1 ppm (5 mg/m^3) ST 2 ppm (10 mg/m^3)
Dichloroacetylene	C 0.1 ppm (0.4 mg/m^3)
p-Dichlorobenzene	TWA 75 ppm (450 mg/m^3) ST 110 ppm (675 mg/m^3)
1,3-Dichloro-5,5-dimethylhydantoin	TWA 0.2 mg/m^3 ST 0.4 mg/m^3
Dichloroethyl ether	TWA 5 ppm (30 mg/m^3) ST 10 ppm (60 mg/m^3) [skin]
Dichloromonofluoromethane	TWA 10 ppm (40 mg/m^3)
1,1-Dichloro-1-nitroethane	TWA 2 ppm (10 mg/m^3)
1,3-Dichloropropene	TWA 1 ppm (5 mg/m^3) [skin]
2,2-Dichloropropionic acid	TWA 1 ppm (6 mg/m^3)
Dicrotophos	TWA 0.25 mg/m^3 [skin]
Dicyclopentadiene	TWA 5 ppm (30 mg/m^3)
Dicyclopentadienyl iron	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)

Diethanolamine	TWA 3 ppm (15 mg/m^3)
Diethylamine	TWA 10 ppm (30 mg/m^3) ST 25 ppm (75 mg/m^3)
Diethylenetriamine	TWA 1 ppm (4 mg/m^3)
Diethyl ketone	TWA 200 ppm (705 mg/m^3)
Diethyl phthalate	TWA 5 mg/m^3
Diglycidyl ether	TWA 0.1 ppm (0.5 mg/m^3)
Diisobutyl ketone	TWA 25 ppm (150 mg/m^3)
N,N-Dimethylaniline	TWA 5 ppm (25 mg/m^3) ST 10 ppm (50 mg/m^3) [skin]
Dimethyl-1,2-dibromo-2,2-dichlorethyl phosphate	TWA 3 mg/m^3 [skin]
Dimethyl sulfate	TWA 0.1 ppm (0.5 mg/m^3) [skin]
Dinitolmide	TWA 5 mg/m^3
Di-sec octyl phthalate	TWA 5 mg/m^3 ST 10 mg/m^3
Dioxane	TWA 25 ppm (90 mg/m^3) [skin]
Dioxathion	TWA 0.2 mg/m^3 [skin]
Diphenylamine	TWA 10 mg/m^3
Dipropylene glycol methyl ether	TWA 100 ppm (600 mg/m^3) ST 150 ppm (900 mg/m^3) [skin]
Dipropyl ketone	TWA 50 ppm (235 mg/m^3)
Diquat (Diquat dibromide)	TWA 0.5 mg/m^3
Disulfiram	TWA 2 mg/m^3
Disulfoton	TWA 0.1 mg/m^3 [skin]
2,6-Di-tert-butyl-p-cresol	TWA 10 mg/m^3
Diuron	TWA 10 mg/m^3
Divinyl benzene	TWA 10 ppm (50 mg/m^3)
Emery	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Endosulfan	TWA 0.1 mg/m^3 [skin]

Epichlorohydrin	TWA 2 ppm (8 mg/m^3) [skin]
Ethanolamine	TWA 3 ppm (8 mg/m^3) ST 6 ppm (15 mg/m^3)
Ethion	0.4 mg/m^3 [skin]
Ethyl acrylate	TWA 5 ppm (20 mg/m^3) ST 25 ppm (100 mg/m^3) [skin]
Ethyl benzene	TWA 100 ppm (435 mg/m^3) ST 125 ppm (545 mg/m^3)
Ethyl bromide	TWA 200 ppm (890 mg/m^3) ST 250 ppm (1110 mg/m^3)
Ethylene chlorohydrin	C 1 ppm (3 mg/m^3) [skin]
Ethylene dichloride	TWA 1 ppm (4 mg/m^3) ST 2 ppm (8 mg/m^3)
Ethylene glycol	C 50 ppm (125 mg/m^3)
Ethylene glycol dinitrate	ST 0.1 mg/m^3 [skin]
Ethyl ether	TWA 400 ppm (1200 mg/m^3) ST 500 ppm (1500 mg/m^3)
Ethylidene norbornene	C 5 ppm (25 mg/m^3)
Ethyl mercaptan	TWA 0.5 ppm (1 mg/m^3)
N-Ethylmorpholine	TWA 5 ppm (23 mg/m^3) [skin]
Ethyl silicate	TWA 10 ppm (85 mg/m^3)
Fenamiphos	TWA 0.1 mg/m^3 [skin]
Fensulfothion	TWA 0.1 mg/m^3
Fenthion	TWA 0.2 mg/m^3 [skin]
Ferbam	TWA 10 mg/m^3
Ferrovanadium dust	TWA 1 mg/m^3 ST 3 mg/m^3
Fluorotrichloromethane	C 1000 ppm (5600 mg/m^3)
Fonofos	TWA 0.1 mg/m^3 [skin]
Formamide	TWA 20 ppm (30 mg/m^3) ST 30 ppm (45 mg/m^3)

Furfural	TWA 2 ppm (8 mg/m^3) [skin]
Furfuryl alcohol	TWA 10 ppm (40 mg/m^3) ST 15 ppm (60 mg/m^3) [skin]
Gasoline	TWA 300 ppm (900 mg/m^3) ST 500 ppm (1500 mg/m^3)
Germanium tetrahydride	TWA 0.2 ppm (0.6 mg/m^3)
Glutaraldehyde	C 0.2 ppm (0.8 mg/m^3)
Glycerin (mist)	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Glycidol	TWA 25 ppm (75 mg/m^3)
Graphite (natural)	TWA 2.5 mg/m^3 (resp)
Graphite (synthetic)	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
n-Heptane	TWA 400 ppm (1600 mg/m^3) ST 500 ppm (2000 mg/m^3)
Hexachlorobutadiene	TWA 0.02 ppm (0.24 mg/m^3)
Hexachlorocyclopentadiene	TWA 0.01 ppm (0.1 mg/m^3)
Hexafluoroacetone	TWA 0.1 ppm (0.7 mg/m^3) [skin]
n-Hexane	TWA 50 ppm (180 mg/m^3)
Hexane isomers (except n-Hexane)	TWA 500 ppm (1800 mg/m^3) ST 1000 ppm (3600 mg/m^3)
2-Hexanone	TWA 5 ppm (20 mg/m^3)
Hexone	TWA 50 ppm (205 mg/m^3) ST 75 ppm (300 mg/m^3)
Hexylene glycol	C 25 ppm (125 mg/m^3)
Hydrazine	TWA 0.1 ppm (0.1 mg/m^3) [skin]
Hydrogenated terphenyls	TWA 0.5 ppm (5 mg/m^3)
Hydrogen bromide	C 3 ppm (10 mg/m^3)
Hydrogen cyanide	ST 4.7 ppm (5 mg/m^3) [skin]
Hydrogen fluoride (as F)	TWA 3 ppm ST 6 ppm

Hydrogen sulfide	TWA 10 ppm (14 mg/m^3) ST 15 ppm (21 mg/m^3)
2-Hydroxypropyl acrylate	TWA 0.5 ppm (3 mg/m^3) [skin]
Indene	TWA 10 ppm (45 mg/m^3)
Indium	TWA 0.1 mg/m^3
Iodoform	TWA 0.6 ppm (10 mg/m^3)
Iron pentacarbonyl (as Fe)	TWA 0.1 ppm (0.8 mg/m^3) ST 0.2 ppm (1.6 mg/m^3)
Iron salts (soluble, as Fe)	TWA 1 mg/m^3
Isoamyl alcohol (primary & secondary)	TWA 100 ppm (360 mg/m^3) ST 125 ppm (450 mg/m^3)
Isobutane	TWA 800 ppm (1900 mg/m^3)
Isobutyl alcohol	TWA 50 ppm (150 mg/m^3)
Isooctyl alcohol	TWA 50 ppm (270 mg/m^3) [skin]
Isophorone	TWA 4 ppm (23 mg/m^3)
Isophorone diisocyanate	TWA 0.005 ppm ST 0.02 ppm [skin]
2-Isopropoxyethanol	TWA 25 ppm (105 mg/m^3)
Isopropyl acetate	TWA 250 ppm (950 mg/m^3) ST 310 ppm (1185 mg/m^3)
Isopropyl alcohol	TWA 400 ppm (980 mg/m^3) ST 500 ppm (1225 mg/m^3)
Isopropylamine	TWA 5 ppm (12 mg/m^3) ST 10 ppm (24 mg/m^3)
N-Isopropylaniline	TWA 2 ppm (10 mg/m^3) [skin]
Isopropyl glycidyl ether	TWA 50 ppm (240 mg/m^3) ST 75 ppm (360 mg/m^3)
Kaolin	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Ketene	TWA 0.5 ppm (0.9 mg/m^3) ST 1.5 ppm (3 mg/m^3)
Magnesium oxide fume	TWA 10 mg/m^3

Malathion	TWA 10 mg/m^3 [skin]
Manganese compounds and fume (as Mn)	Compounds: C 5 mg/m^3 Fume: TWA 1 mg/m^3 ST 3 mg/m^3
Manganese cyclopentadienyl tricarbonyl (as Mn)	TWA 0.1 mg/m^3 [skin]
Manganese tetroxide (as Mn)	TWA 1 mg/m^3
Mercury compounds, as Hg [except(organo) alkyls]	
Hg Vapor	TWA 0.05 mg/m^3 [skin]
Non-alkyl compounds	C 0.1 mg/m^3 [skin]
Mercury (organo) alkyl compounds (as Hg)	TWA 0.01 mg/m^3 ST 0.03 mg/m^3 [skin]
Mesityl oxide	TWA 15 ppm (60 mg/m^3) ST 25 ppm (100 mg/m^3)
Methacrylic acid	TWA 20 ppm (70 mg/m^3) [skin]
Methomyl	TWA 2.5 mg/m^3
Methoxychlor	TWA 10 mg/m^3
4-Methoxyphenol	TWA 5 mg/m^3
Methyl acetate	TWA 200 ppm (610 mg/m^3) ST 250 ppm (760 mg/m^3)
Methyl acetylene-propadiene mixture	TWA 1000 ppm (1800 mg/m^3) ST 1250 ppm (2250 mg/m^3)
Methylacrylonitrile	TWA 1 ppm (3 mg/m^3) [skin]
Methyl alcohol	TWA 200 ppm (260 mg/m^3) ST 250 ppm (325 mg/m^3) [skin]
Methyl bromide	TWA 5 ppm (20 mg/m^3) [skin]
Methyl chloride	TWA 50 ppm (105 mg/m^3) ST 100 ppm (210 mg/m^3)

Methyl chloroform	TWA 350 ppm (1900 mg/m^3) ST 450 ppm (2450 mg/m^3)
Methyl-2-cyanoacrylate	TWA 2 ppm (8 mg/m^3) ST 4 ppm (16 mg/m^3)
Methylcyclohexane	TWA 400 ppm (1600 mg/m^3)
Methylcyclohexanol	TWA 50 ppm (235 mg/m^3)
o-Methylcyclohexanone	TWA 50 ppm (230 mg/m^3) ST 75 ppm (345 mg/m^3) [skin]
Methyl cyclopentadienyl manganese tricarbonyl (as Mn)	TWA 0.2 mg/m^3 [skin]
Methyl demeton	TWA 0.5 mg/m^3 [skin]
4,4'-Methylenebis(2-chloroaniline)	TWA 0.02 ppm (0.22 mg/m^3) [skin]
Methylene bis(4-cyclo-hexylisocyanate)	C 0.01 ppm (0.11 mg/m^3) [skin]
Methyl ethyl ketone peroxide	C 0.7 ppm (5 mg/m^3)
Methyl formate	TWA 100 ppm (250 mg/m^3) ST 150 ppm (375 mg/m^3)
Methyl iodide	TWA 2 ppm (10 mg/m^3) [skin]
Methyl isoamyl ketone	TWA 50 ppm (240 mg/m^3)
Methyl isobutyl carbinol	TWA 25 ppm (100 mg/m^3) ST 40 ppm (165 mg/m^3) [skin]
Methyl isopropyl ketone	TWA 200 ppm (705 mg/m^3)
Methyl mercaptan	TWA 0.5 ppm (1 mg/m^3)
Methyl parathion	TWA 0.2 mg/m^3 [skin]
Methyl silicate	TWA 1 ppm (6 mg/m^3)
alpha-Methyl styrene	TWA 50 ppm (240 mg/m^3) ST 100 ppm (485 mg/m^3)
Metribuzin	TWA 5 mg/m^3
Mica	TWA 3 mg/m^3 (resp)
Molybdenum (insoluble compounds, as Mo)	TWA 10 mg/m^3
Monocrotophos	TWA 0.25 mg/m^3
Monomethyl aniline	TWA 0.5 ppm (2 mg/m^3) [skin]

Morpholine	TWA 20 ppm (70 mg/m^3) ST 30 ppm (105 mg/m^3) [skin]
Naphthalene	TWA 10 ppm (50 mg/m^3) ST 15 ppm (75 mg/m^3)
Nickel metal & other compounds (as Ni)	
Metal & insoluble compounds	TWA 1 mg/m^3
Soluble compounds	TWA 0.1 mg/m^3
Nitric acid	TWA 2 ppm (5 mg/m^3) ST 4 ppm (10 mg/m^3)
p-Nitroaniline	TWA 3 mg/m^3 [skin]
Nitrogen dioxide	ST 1 ppm (1.8 mg/m^3)
Nitroglycerine	ST 0.1 mg/m^3) [skin]
2-Nitropropane	TWA 10 ppm (35 mg/m^3)
Nitrotoluene (o-, m-, p-isomers)	TWA 2 ppm (11 mg/m^3) [skin]
Nonane	TWA 200 ppm (1050 mg/m^3)
Octachloronaphthalene	TWA 0.1 mg/m^3 ST 0.3 mg/m^3 [skin]
Octane	TWA 300 ppm (1450 mg/m^3) ST 375 ppm (1800 mg/m^3)
Osmium tetroxide (as Os)	TWA 0.002 mg/m^3 (0.0002 ppm) ST 0.006 mg/m^3 (0.0006 ppm)
Oxalic acid	TWA 1 mg/m^3 ST 2 mg/m^3
Oxygen difluoride	C 0.05 ppm (0.1 mg/m^3)
Ozone	TWA 0.1 ppm (0.2 mg/m^3) ST 0.3 ppm (0.6 mg/m^3)
Paraffin wax fume	TWA 2 mg/m^3
Paraquat	TWA 0.1 mg/m^3 (resp) [skin]
Pentaborane	TWA 0.005 ppm (0.01 mg/m^3) ST 0.015 ppm (0.03 mg/m^3)
Pentaerythritol	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)

n-Pentane	TWA 600 ppm (1800 mg/m^3) ST 750 ppm (2250 mg/m^3)
2-Pentanone	TWA 200 ppm (700 mg/m^3) ST 250 ppm (875 mg/m^3)
Perchloryl fluoride	TWA 3 ppm (14 mg/m^3) ST 6 ppm (28 mg/m^3)
Petroleum distillates (naphtha)	TWA 400 ppm (1600 mg/m^3)
Phenothiazine	TWA 5 mg/m^3 [skin]
Phenyl glycidyl ether	TWA 1 ppm (6 mg/m^3)
Phenylhydrazine	TWA 5 ppm (20 mg/m^3) ST 10 ppm (45 mg/m^3) [skin]
Phenylphosphine	C 0.05 ppm (0.25 mg/m^3)
Phorate	TWA 0.05 mg/m^3 ST 0.2 mg/m^3 [skin]
Phosdrin	TWA 0.01 ppm (0.1 mg/m^3) ST 0.03 ppm (0.3 mg/m^3) [skin]
Phosphine	TWA 0.3 ppm (0.4 mg/m^3) ST 1 ppm (1 mg/m^3)
Phosphoric acid	TWA 1 mg/m^3 ST 3 mg/m^3
Phosphorus oxychloride	TWA 0.1 ppm (0.6 mg/m^3)
Phosphorus pentasulfide	TWA 1 mg/m^3 ST 3 mg/m^3
Phosphorus trichloride	TWA 0.2 ppm (1.5 mg/m^3) ST 0.5 ppm (3 mg/m^3)
Phthalic anhydride	TWA 6 mg/m^3 (1 ppm)
m-Phthalodinitrile	TWA 5 mg/m^3
Picloram	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Piperazine dihydrochloride	TWA 5 mg/m^3
Platinum metal (as Pt)	TWA 1 mg/m^3

Portland cement	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Potassium hydroxide	TWA 2 mg/m^3
Propargyl alcohol	TWA 1 ppm (2 mg/m^3) [skin]
Propionic acid	TWA 10 ppm (30 mg/m^3)
Propoxur	TWA 0.5 mg/m^3
n-Propyl acetate	TWA 200 ppm (840 mg/m^3) ST 250 ppm (1050 mg/m^3)
n-Propyl alcohol	TWA 200 ppm (500 mg/m^3) ST 250 ppm (625 mg/m^3)
Propylene dichloride	TWA 75 ppm (350 mg/m^3) ST 110 ppm (510 mg/m^3)
Propylene glycol dinitrate	TWA 0.05 ppm (0.3 mg/m^3)
Propylene glycol monomethyl ether	TWA 100 ppm (360 mg/m^3) ST 150 ppm (540 mg/m^3)
Propylene oxide	TWA 20 ppm (50 mg/m^3)
n-Propyl nitrate	TWA 25 ppm (105 mg/m^3) ST 40 ppm (170 mg/m^3)
Resorcinol	TWA 10 ppm (45 mg/m^3) ST 20 ppm (90 mg/m^3)
Ronnel	TWA 10 mg/m^3
Rosin core solder, pyrolysis products (as formaldehyde)	TWA 0.1 mg/m^3
Rouge	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Silica, amorphous	TWA 6 mg/m^3 TWA 0.1 mg/m^3 (fused)
Silica, crystalline (as respirable dust)	TWA 0.05 mg/m^3 (cristobalite) TWA 0.05 mg/m^3 (tridymite) TWA 0.1 mg/m^3 (quartz) TWA 0.1 mg/m^3 (tripoli)
Silicon	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)

Silicon carbide	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Silicon tetrahydride	TWA 5 ppm (7 mg/m^3)
Soapstone	TWA 6 mg/m^3 (total) TWA 3 mg/m^3 (resp)
Sodium azide	C 0.1 ppm (as HN_3) [skin] C 0.3 mg/m^3 (as NaN_3) [skin]
Sodium bisulfite	TWA 5 mg/m^3 /TD>
Sodium fluoroacetate	TWA 0.05 mg/m^3 ST 0.15 mg/m^3 [skin]
Sodium hydroxide	C 2 mg/m^3
Sodium metabisulfite	TWA 5 mg/m^3
Stoddard solvent	TWA 525 mg/m^3 (100 ppm)
Styrene	TWA 50 ppm (215 mg/m^3) ST 100 ppm (425 mg/m^3)
Subtilisins	ST 0.00006 mg/m^3 [60-minute]
Sulfur dioxide	TWA 2 ppm (5 g/m^3) ST 5 ppm (13 mg/m^3)
Sulfur monochloride	C 1 ppm (6 mg/m^3)
Sulfur pentafluoride	C 0.01 ppm (0.1 mg/m^3)
Sulfur tetrafluoride	C 0.1 ppm (0.4 mg/m^3)
Sulfuryl fluoride	TWA 5 ppm (20 mg/m^3) ST 10 ppm (40 mg/m^3)
Sulprofos	TWA 1 mg/m^3
Talc	TWA 2 mg/m^3 (resp)
Temephos	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Terphenyl (o-, m-, p-isomers)	C 5 mg/m^3 (0.5 ppm)
1,1,2,2-Tetrachloroethane	TWA 1 ppm (7 mg/m^3) [skin]
Tetrachloroethylene	TWA 25 ppm (170 mg/m^3)

Tetrahydrofuran	TWA 200 ppm (590 mg/m^3) ST 250 ppm (735 mg/m^3)
Tetrasodium pyrophosphate	TWA 5 mg/m^3
4,4'-Thiobis(6-tert-butyl-m-cresol)	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Thioglycolic acid	TWA 1 ppm (4 mg/m^3) [skin]
Thionyl chloride	C 1 ppm (5 mg/m^3)
Tin (organic compounds, as Sn)	TWA 0.1 mg/m^3 [skin]
Tin(II) oxide (as Sn)	TWA 2 mg/m^3
Tin(IV) oxide (as Sn)	TWA 2 mg/m^3
Titanium dioxide	TWA 10 mg/m^3
Toluene	TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
Toluene-2,4-diisocyanate	TWA 0.005 ppm (0.04 mg/m^3) ST 0.02 ppm (0.15 mg/m^3)
m-Toluidine	TWA 2 ppm (9 mg/m^3) [skin]
p-Toluidine	TWA 2 ppm (9 mg/m^3) [skin]
Tributyl phosphate	TWA 0.2 ppm (2.5 mg/m^3)
Trichloroacetic acid	TWA 1 ppm (7 mg/m^3)
1,2,4-Trichlorobenzene	C 5 ppm (40 mg/m^3)
Trichloroethylene	TWA 50 ppm (270 mg/m^3) ST 200 ppm (1080 mg/m^3)
1,2,3-Trichloropropane	TWA 10 ppm (60 mg/m^3)
1,1,2-Trichloro-1,2,2-trifluoroethane	TWA 1000 ppm (7600 mg/m^3) ST 1250 ppm (9500 mg/m^3)
Triethylamine	TWA 10 ppm (40 mg/m^3) ST 15 ppm (60 mg/m^3)
Trimellitic anhydride	TWA 0.005 ppm (0.04 mg/m^3)
Trimethylamine	TWA 10 ppm (24 mg/m^3) ST 15 ppm (36 mg/m^3)
1,2,3-Trimethylbenzene	TWA 25 ppm (125 mg/m^3)

1,2,4-Trimethylbenzene	TWA 25 ppm (125 mg/m^3)
1,3,5-Trimethylbenzene	TWA 25 ppm (125 mg/m^3)
Trimethyl phosphite	TWA 2 ppm (10 mg/m^3)
2,4,6-Trinitrotoluene	TWA 0.5 mg/m^3 [skin]
Triorthocresyl phosphate	TWA 0.1 mg/m^3 [skin]
Triphenylamine	TWA 5 mg/m^3
Tungsten (insoluble compounds, as W)	TWA 5 mg/m^3 ST 10 mg/m^3
Tungsten (soluble compounds, as W)	TWA 1 mg/m^3 ST 3 mg/m^3
Tungsten carbide (cemented)	TWA 5 mg/m^3 (as W) ST 10 mg/m^3 (as W) TWA 0.05 mg/m^3 (as Co) TWA 1 mg/m^3 (as Ni)
Uranium (insoluble compounds, as U)	TWA 0.2 mg/m^3 ST 0.6 mg/m^3
n-Valeraldehyde	TWA 50 ppm (175 mg/m^3)
Vanadium dust	TWA 0.05 mg V_2O_5/m^3 (resp)
Vanadium fume	C 0.05 mg V_2O_5/m^3
Vinyl acetate	TWA 10 ppm (30 mg/m^3) ST 20 ppm (60 mg/m^3)
Vinyl bromide	TWA 5 ppm (20 mg/m^3)
Vinyl cyclohexene dioxide	TWA 10 ppm (60 mg/m^3) [skin]
Vinylidene chloride	TWA 1 ppm (4 mg/m^3)
VM & P Naphtha	TWA 1350 mg/m^3 (300 ppm) ST 1800 mg/m^3 (400 ppm)
Welding fumes	TWA 5 mg/m^3
Wood dust (all wood dusts except Western red cedar)	TWA 5 mg/m^3 ST 10 mg/m^3
Wood dust (Western red cedar)	TWA 2.5 mg/m^3
Xylene (o-, m-, p-isomers)	TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)

m-Xylene alpha, alpha'-diamine	C 0.1 mg/m^3 [skin]
Xylidine	TWA 2 ppm (10 mg/m^3) [skin]
Zinc chloride fume	TWA 1 mg/m^3 ST 2 mg/m^3
Zinc oxide	TWA 5 mg/m^3 (fume) ST 10 mg/m^3 (fume) TWA 10 mg/m^3 (total dust) TWA 5 mg/m^3 (resp dust)
Zinc stearate	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
Zirconium compounds (as Zr)	TWA 5 mg/m^3 ST 10 mg/m^3

Return to TOP of PAGE

NIOSH Pocket Guide to Chemical Hazards

Aluminum (soluble salts and alkyls, as Al)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific aluminum compound.	**DOT ID & Guide** 3051 135 (alkyls)

Exposure Limits	NIOSH REL: TWA 2 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific aluminum compound.

Properties vary depending upon the specific aluminum compound.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 7013, 7300; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation skin, respiratory system; skin burns	
Target Organs Skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Arsenic, organic compounds (as As)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific organic arsenic compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: none
	OSHA PEL: TWA 0.5 mg/m^3
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific organic arsenic compound.

Properties vary depending upon the specific organic arsenic compound.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 5022
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Recommendations regarding personal protective clothing vary depending upon the specific compound. Recommendations regarding eye protection vary depending upon the specific compound. Recommendations regarding washing the skin vary depending upon the specific compound. Recommendations regarding the removal of personal protective clothing that becomes wet or contaminated vary depending upon the specific compound. Recommendations regarding the daily changing of personal protective clothing vary depending upon the specific compound. Recommendations regarding the need for eyewash or quick drench facilities vary depending upon the specific compound.	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation skin, possible dermatitis; respiratory distress; diarrhea; kidney damage; muscle tremor, convulsions; possible gastrointestinal tract, reproductive effects; possible liver damage

Target Organs Skin, respiratory system, kidneys, central nervous system, liver, gastrointestinal tract, reproductive system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Bismuth telluride, doped with Selenium sulfide (as Bi_2Te_3)	**CAS**
	RTECS
Synonyms & Trade Names Doped bismuth sesquitelluride, Doped bismuth telluride, Doped bismuth tritelluride, Doped tellurobismuthite [Note: Doped with selenium sulfide. Commercial mix may contain 80% Bi_2Te_3, 20% stannous telluride, plus some tellurium.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Gray, crystalline solid that has been enhanced (doped) with a small amount of selenium sulfide (SeS). [Note: Doping alters the conductivity of a semiconductor.]

Properties are unavailable but should be similar to Bismuth telluride, undoped.			
			Sp.Gr: ?

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers, moisture

Measurement Methods
NIOSH 0500; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; garlic breath; in animals: pulmonary lesions (nonfibrotic)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Chlorinated diphenyl oxide	**CAS**
$C_{12}H_{10-n}Cl_nO$	**RTECS**
Synonyms & Trade Names Synonyms depend on the degree of chlorination of diphenyl oxide [$(C_6H_5)_2O$], ranging from monochlorodiphenyl oxide [$(C_6H_4Cl)O(C_6H_5)$] to decachlorodiphenyl oxide [$(C_6Cl_5)O(C_6Cl_5)$].	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3
	OSHA PEL: TWA 0.5 mg/m^3
IDLH 5 mg/m^3 See: IDLH INDEX	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific compound.

Properties vary depending upon the specific compound.			

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5025
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor and acid gas canister having a high efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Acne-form dermatitis, liver damage

Target Organs Skin, liver

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Chromium(II) compounds (as Cr)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific Chromium(II) compound. [Note: Chromium(II) compounds include soluble chromous salts.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 See Appendix C
	OSHA PEL: TWA 0.5 mg/m^3 See Appendix C
IDLH 250 mg/m^3 [as Cr(II)] See: cr2m3	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific compound.

Properties vary depending upon the specific compound.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 7024; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2.5 mg/m^3: (APF = 5) Any dust and mist respirator*

Up to 5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*/(APF = 10) Any supplied-air respirator*

Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*

Up to 25 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 250 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes; sensitization dermatitis

Target Organs Eyes, skin

See also: INTRODUCTION See MEDICAL TESTS: 0052

NIOSH Pocket Guide to Chemical Hazards

Chromium(III) compounds (as Cr)	CAS
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific Chromium(III) compound. [Note: Chromium(III) compounds include soluble chromic salts.]	DOT ID & Guide

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 See Appendix C
	OSHA PEL: TWA 0.5 mg/m^3 See Appendix C
IDLH 25 mg/m^3 [as Cr(III)] See: cr3m3	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific compound.

Properties vary depending upon the specific compound.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 7024; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2.5 mg/m^3: (APF = 5) Any dust and mist respirator*

Up to 5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*/(APF = 10) Any supplied-air respirator*

Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*

Up to 25 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes; sensitization dermatitis

Target Organs Eyes, skin

See also: INTRODUCTION See MEDICAL TESTS: 0052

NIOSH Pocket Guide to Chemical Hazards

Coal dust	CAS
	RTECS GF8281000
Synonyms & Trade Names Anthracite coal dust, Bituminous coal dust, Lignite coal dust	**DOT ID & Guide** 1361 133

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 2.4 mg/m^3 (<5% SiO_2) TWA 10 mg/m^3/(%SiO_2 + 2) (>5% SiO_2)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Dark-brown to black solid dispersed in air.

Properties vary depending upon the specific coal type.			

Combustible Solid; slightly explosive when exposed to flame.

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0600, 7500
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation	
Symptoms Chronic bronchitis, decreased pulmonary function, emphysema	
Target Organs respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Coke oven emissions	CAS
	RTECS GH0346000
Synonyms & Trade Names Synonyms vary depending upon the specific constituent.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 0.2 mg/m^3 (benzene-soluble fraction) See Appendix A See Appendix C
	OSHA PEL: [1910.1029] TWA 0.150 mg/m^3 (benzene-soluble fraction)
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Emissions released during the carbonization of bituminous coal for the production of coke. [Note: See Appendix C for more information.]

Properties vary depending upon the constituent.			

Incompatibilities & Reactivities
None reported

Measurement Methods
OSHA 58
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Breathing: Respiratory support

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing; [potential occupational carcinogen]

Target Organs Skin, respiratory system, urinary system

Cancer Site [skin, lung, kidney & bladder cancer]

See also: INTRODUCTION See MEDICAL TESTS: 0056

NIOSH Pocket Guide to Chemical Hazards

Cotton dust (raw)	CAS
	RTECS GN2275000
Synonyms & Trade Names Raw cotton dust	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA <0.200 mg/m^3 See Appendix C
	OSHA PEL: [Z-1-A & 1910.1043] TWA 1 mg/m^3 (waste processing during waste recycling [sorting, blending, cleaning & willowing] & garnetting) TWA 0.200 mg/m^3 (textile yarn manufacturing) TWA 0.750 mg/m^3 (textile slashing & weaving) TWA 0.500 mg/m^3 (all other operations) See Appendix C
IDLH 100 mg/m^3 See: cotdust	**Conversion**

Physical Description
Colorless, odorless solid.

MW: ?	BP: Decomposes	MLT: Decomposes	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
OSHA [1910.1043]
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Breathing: Fresh air

Respirator Recommendations NIOSH

Up to 1 mg/m^3: (APF = 5) Any dust respirator

Up to 2 mg/m^3: (APF = 10) Any dust respirator except single-use and quarter-mask respirators/(APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator

Up to 5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust filter

Up to 10 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 100 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms Byssinosis: chest tightness, cough, wheezing, dyspnea (breathing difficulty); decreased forced expiratory volume; bronchitis; malaise (vague feeling of discomfort); fever, chills, upper respiratory symptoms after initial exposure

Target Organs cardiovascular system, respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0058

NIOSH Pocket Guide to Chemical Hazards

Diesel exhaust	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific diesel exhaust component.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific diesel exhaust component.

Properties vary depending upon the specific component diesel exhaust component.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 5040
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Breathing: Respiratory support

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Eye irritation, pulmonary function changes; [potential occupational carcinogen]

Target Organs Eyes, respiratory system

Cancer Site [in animals: lung tumors]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Fibrous glass dust	**CAS**
	RTECS LK3651000
Synonyms & Trade Names Fiber glas®, Fiberglass, Glass fibers, Glass wool [Note: Usually produced from borosilicate & low alkali silicate glasses.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 3 fibers/cm^3 (fibers 3.5 m in diameter & 10 m in length) TWA 5 mg/m^3 (total)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Typically, glass filaments >3 m in diameter or glass "wool" with diameters down to 0.05 m & >1 m in length.

MW: NA	BP: NA	MLT: ?	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.5
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Fibers

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 7400
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Breathing: Fresh air

Respirator Recommendations NIOSH
Up to 5X REL: (APF = 5) Any dust respirator
Up to 10X REL: (APF = 10) Any dust respirator except single-use and quarter-mask respirators/(APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator
Up to 25X REL: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust filter
Up to 50X REL: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1000X REL: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dyspnea (breathing difficulty)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Formalin (as formaldehyde)	CAS
	RTECS
Synonyms & Trade Names Formaldehyde solution [Note: Formalin is an aqueous solution that is 37% formaldehyde by weight; inhibited solutions usually contain 6-12% methyl alcohol. Also see specific listings for Formaldehyde and Methyl alcohol.]	**DOT ID & Guide** 1198 132 2209 132

Exposure Limits	NIOSH REL: Ca TWA 0.016 ppm C 0.1 ppm [15-minute] See Appendix A
	OSHA PEL: [1910.1048] TWA 0.75 ppm ST 2 ppm
IDLH Ca [20 ppm] See: IDLH INDEX	**Conversion**

Physical Description
Colorless liquid with a pungent odor.

MW: Varies	BP: 214°F	FRZ: ?	Sol: Miscible
VP: 1 mmHg	IP: ?		Sp.Gr(77°F): 1.08
Fl.P: 185°F	UEL: 73%	LEL: 7%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, alkalis & acids; phenols; urea; oxides; isocyanates; caustics; anhydrides

Measurement Methods
NIOSH 2016, 2541, 3500, 3800; OSHA ID205, 52
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat, respiratory system; lacrimation (discharge of tears); cough; wheezing, dermatitis; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system

Cancer Site [nasal cancer]

See also: INTRODUCTION See MEDICAL TESTS: 0110

NIOSH Pocket Guide to Chemical Hazards

Grain dust (oat, wheat, barley)	**CAS**
	RTECS MD7900000
Synonyms & Trade Names None [Note: Grain dust consists of 60-75% organic materials (cereal grains) & 25-40% inorganic materials (soil), and includes fertilizers, pesticides & microorganisms.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 4 mg/m^3
	OSHA PEL: TWA 10 mg/m^3
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Mixture of grain and all the other substances associated with its cultivation & harvesting.

Properties depend upon the specific component of the grain dust.			

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: Daily	Eye: Irrigate immediately Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; cough, dyspnea (breathing difficulty), wheezing, asthma, bronchitis, chronic obstructive pulmonary disease; conjunctivitis, dermatitis, rhinitis, grain fever	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Hexane isomers (excluding n-Hexane)	**CAS**
C_6H_{14}	**RTECS**
Synonyms & Trade Names Diethylmethylmethane; Diisopropyl; 2,2-Dimethylbutane; 2,3-Dimethylbutane; Isohexane; 2-Methylpentane; 3-Methylpentane [Note: Also see specific listing for n-Hexane.]	**DOT ID & Guide** 1208 128

Exposure Limits	NIOSH REL: TWA 100 ppm (350 mg/m^3) C 510 ppm (1800 mg/m^3) [15-minute]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.53 mg/m^3

Physical Description
Clear liquids with mild, gasoline-like odors. [Note: Includes all the isomers of hexane except n-hexane.]

MW: 86.2	BP: 122-145°F	FRZ: -245 to -148°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.65-0.66
Fl.P: -54 to 19°F	UEL: ?	LEL: ?	

Class IB Flammable Liquids

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 1000 ppm: (APF = 10) Any supplied-air respirator*
Up to 2500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 5000 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; headache, dizziness; nausea; chemical pneumonitis (aspiration liquid); dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Iron salts (soluble, as Fe)	CAS
	RTECS
Synonyms & Trade Names $FeSO_4$: Ferrous sulfate, Iron(II) sulfate $FeCl_2$: Ferrous chloride, Iron(II) chloride $Fe(NO_3)_3$: Ferric nitrate, Iron(III) nitrate $Fe(SO_4)_3$: Ferric sulfate, Iron(III) sulfate $FeCl_3$: Ferric chloride, Iron(III) chloride	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description Appearance and odor vary depending upon the specific soluble iron salt.			
Properties vary depending upon the specific soluble iron salt.			
Varies			
Noncombustible Solids			
Incompatibilities & Reactivities			

Measurement Methods
NIOSH 7300; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, mucous membrane; abdominal pain, diarrhea, vomiting; possible liver damage	
Target Organs Eyes, skin, respiratory system, liver, gastrointestinal tract	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Mercury (organo) alkyl compounds (as Hg)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific (organo) alkyl mercury compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.01 mg/m^3 ST 0.03 mg/m^3 [skin]
	OSHA PEL†: TWA 0.01 mg/m^3 C 0.04 mg/m^3
IDLH 2 mg/m^3 (as Hg) See: merc-hg	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific (organo) alkyl mercury compound.

Properties vary depending upon the specific (organo) alkyl mercury compound.			

Incompatibilities & Reactivities
Strong oxidizers such as chlorine

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.1 mg/m^3: (APF = 10) Any supplied-air respirator

Up to 0.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 0.5 mg/m^3: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 2 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Paresthesia; ataxia, dysarthria; vision, hearing disturbance; spasticity, jerking limbs; dizziness; salivation; lacrimation (discharge of tears); nausea, vomiting, diarrhea, constipation; skin burns; emotional disturbance; kidney injury; possible teratogenic effects

Target Organs Eyes, skin, central nervous system, peripheral nervous system, kidneys

See also: INTRODUCTION See MEDICAL TESTS: 0135

NIOSH Pocket Guide to Chemical Hazards

Mineral wool fiber	**CAS**
	RTECS PY8070000
Synonyms & Trade Names Manmade mineral fibers, Rock wool, Slag wool, Synthetic vitreous fibers [Note: Produced by blowing steam or air through molten rock (rock wool) or various furnace slags that are by-products of metal smelting or refining processes (slag wool).]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 3 fibers/cm^3 (fibers 3.5 m diameter & 10 m in length) TWA 5 mg/m^3 (total)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Typically, a mineral "wool" with diameters >0.5 m & >1.5 m in length.

MW: varies	BP: NA	MLT: ?	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Fibers

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0500, 7400
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Breathing: Fresh air

Respirator Recommendations NIOSH
Up to 5X REL: (APF = 5) Any dust respirator
Up to 10X REL: (APF = 10) Any dust respirator except single-use and quarter-mask respirators/(APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator
Up to 25X REL: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust filter
Up to 50X REL: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1000X REL: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; dyspnea (breathing difficulty)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Molybdenum (soluble compounds, as Mo)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific soluble molybdenum compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL: TWA 5 mg/m^3
IDLH 1000 mg/m^3 (as Mo) See: moly-mo	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific soluble molybdenum compound.

Properties vary depending upon the specific soluble molybdenum compound.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 7300; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations OSHA

Up to 25 mg/m^3: (APF = 5) Any dust and mist respirator*

Up to 50 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*/(APF = 10) Any supplied-air respirator*

Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*

Up to 250 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1000 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, nose, throat; anorexia; incoordination; dyspnea (breathing difficulty); anemia

Target Organs Eyes, respiratory system, kidneys, blood

See also: INTRODUCTION See MEDICAL TESTS: 0150

NIOSH Pocket Guide to Chemical Hazards

Particulates not otherwise regulated	**CAS**
	RTECS
Synonyms & Trade Names "Inert" dusts, Nuisance dusts, PNOR [Note: Includes all inert or nuisance dusts, whether mineral, inorganic, not listed specifically in 1910.1000.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Dusts from solid substances without specific occupational exposure standards.

Properties vary depending upon the specific solid.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, throat, upper respiratory system	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Platinum (soluble salts, as Pt)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific soluble platinum salt.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.002 mg/m^3
	OSHA PEL: TWA 0.002 mg/m^3
IDLH 4 mg/m^3 (as Pt) See: platinum	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific soluble platinum salt.

Properties vary depending upon the specific soluble platinum salt.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 7300, S191 (II-7)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.05 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£

Up to 0.1 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 4 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; cough, dyspnea (breathing difficulty), wheezing, cyanosis; dermatitis, sensitization skin; lymphocytosis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0195

NIOSH Pocket Guide to Chemical Hazards

Rhodium (soluble compounds, as Rh)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific soluble rhodium compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.001 mg/m^3
	OSHA PEL: TWA 0.001 mg/m^3
IDLH 2 mg/m^3 (as Rh) See: IDLH INDEX	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific soluble rhodium compound.

Properties vary depending upon the specific soluble rhodium compound.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH S189 (II-3)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.01 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter*/(APF = 10) Any supplied-air respirator*

Up to 0.025 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter*

Up to 0.05 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 2 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes; central nervous system damage

Target Organs Eyes, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Rosin core solder, pyrolysis products (as formaldehyde)	**CAS**
	RTECS
Synonyms & Trade Names Rosin flux pyrolysis products, Rosin core soldering flux pyrolysis products	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 0.1 mg/m^3 [*Note: "Ca" in the presence of formaldehyde, acetaldehyde, or malonaldehyde. See Appendices A & C (Aldehydes).]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Pyrolysis products of rosin core solder include acetone, aliphatic aldehydes, methyl alcohol, methane, ethane, various abietic acids (the major components of rosin), CO & CO_2.

Properties vary depending upon the specific rosin core solder being used.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 2541, 3500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Respiratory support

Respirator Recommendations To be added later
In the presence of Formaldeyde, Acetaldehyde, or Malonaldehyde:
NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms Irritation eyes, nose, throat, upper respiratory system

Target Organs Eyes, respiratory system

Cancer Site [nasal cancer; thyroid gland tumors in animals (in presence of Formaldehyde, Acetaldehyde, or Malonaldehyde)]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Soapstone (containing less than 1% quartz)	**CAS**
$3MgO\text{-}4SiO_2\text{-}H_2O$	**RTECS** VV8780000
Synonyms & Trade Names Massive talc, Soapstone silicate, Steatite	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 6 mg/m^3 (total) TWA 3 mg/m^3 (resp)
	OSHA PEL†: TWA 20 mppcf
IDLH 3000 mg/m^3 See: soapston	**Conversion**

Physical Description
Odorless, white-gray powder.

MW: 379.3	BP: ?	MLT: ?	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.7-2.8
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Respiratory support

Respirator Recommendations NIOSH

Up to 30 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 60 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 150 mg/m^3: (APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 300 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 3000 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Pneumoconiosis: cough, dyspnea (breathing difficulty); digital clubbing; cyanosis; basal crackles, cor pulmonale

Target Organs respiratory system, cardiovascular system

See also: INTRODUCTION See MEDICAL TESTS: 0206

NIOSH Pocket Guide to Chemical Hazards

Thallium (soluble compounds, as Tl)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific soluble thallium compound.	**DOT ID & Guide** 1707 151 (compounds, n.o.s.)

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 [skin]
	OSHA PEL: TWA 0.1 mg/m^3 [skin]
IDLH 15 mg/m^3 (as Tl) See: thallium	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific soluble thallium compound.

Properties vary depending upon the specific soluble thallium compound.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 7300; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.5 mg/m^3: (APF = 5) Any dust and mist respirator^

Up to 1 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators^/(APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter^

Up to 5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 15 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs

Target Organs Eyes, respiratory system, central nervous system, liver, kidneys, gastrointestinal tract, body hair

See also: INTRODUCTION See MEDICAL TESTS: 0228

NIOSH Pocket Guide to Chemical Hazards

Tin (organic compounds, as Sn)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific organic tin compound. [Note: Also see specific listing for Cyhexatin.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 0.1 mg/m^3 [skin] [*Note: The REL applies to all organic tin compounds except Cyhexatin.]
	OSHA PEL*: TWA 0.1 mg/m^3 [*Note: The PEL applies to all organic tin compounds.]
IDLH 25 mg/m^3 (as Sn) See: tin-org	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific organic tin compound.

Properties vary depending upon the specific organic tin compound.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 5504
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Recommendations regarding personal protective clothing vary depending upon the specific compound. Recommendations regarding eye protection vary depending upon the specific compound. Recommendations regarding washing the skin vary depending upon the specific compound. Recommendations regarding the removal of personal protective clothing that becomes wet or contaminated vary depending upon the specific compound. Recommendations regarding the daily changing of personal protective clothing vary depending upon the specific compound. Recommendations regarding the need for eyewash or quick drench facilities vary depending upon the specific compound.	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 1 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter/(APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter

Up to 5 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 25 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-

pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, respiratory system; headache, dizziness; psycho-neurologic disturbance; sore throat, cough; abdominal pain, vomiting; urine retention; paresis, focal anesthesia; skin burns, pruritus; in animals: hemolysis; hepatic necrosis; kidney damage
Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys, urinary tract, blood

See also: INTRODUCTION See MEDICAL TESTS: 0230

NIOSH Pocket Guide to Chemical Hazards

Tungsten (soluble compounds, as W)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific soluble tungsten compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 mg/m^3 ST 3 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific soluble tungsten compound.

Properties vary depending upon the specific soluble tungsten compound.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 7074; 7300; OSHA ID213
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Recommendations regarding personal protective clothing vary depending upon the specific compound. Recommendations regarding eye protection vary depending upon the specific compound. Recommendations regarding washing the skin vary depending upon the specific compound. Recommendations regarding the removal of personal protective clothing that becomes wet or contaminated vary depending upon the specific compound. Recommendations regarding the daily changing of personal protective clothing vary depending upon the specific compound. Recommendations regarding the need for eyewash or quick drench facilities vary depending upon the specific compound.	Eye: Irrigate immediately Skin: Water wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 10 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 50 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; in animals: central nervous system disturbances; diarrhea; respiratory failure; behavioral, body weight, blood changes

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Uranium (soluble compounds, as U)	**CAS**
	RTECS
Synonyms & Trade Names Synonyms vary depending upon the specific soluble uranium compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 0.05 mg/m^3 See Appendix A
	OSHA PEL: TWA 0.05 mg/m^3
IDLH Ca [10 mg/m^3 (as U)] See: uranium	**Conversion**

Physical Description
Appearance and odor vary depending upon the specific soluble uranium compound.

Properties vary depending upon the specific soluble uranium compound.			

Incompatibilities & Reactivities
Uranyl nitrate: combustibles Uranium hexafluoride: water

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash (UF6), Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape(Halides): (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus
Escape(Non-halides): (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Lacrimation (discharge of tears), conjunctivitis; shortness breath, cough, chest rales; nausea, vomiting; skin burns; red blood cell, casts in urine; proteinuria; high blood urea nitrogen; [potential occupational carcinogen] [Potential for cancer is a result of alpha-emitting properties & radioactive decay products (e.g., radon).]

Target Organs respiratory system, blood, liver, kidneys, lymphatic system, skin, bone marrow

Cancer Site [lung cancer]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Welding fumes	**CAS**
	RTECS ZC2550000
Synonyms & Trade Names Synonyms vary depending upon the specific component of the welding fumes.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Fumes generated by the process of joining or cutting pieces of metal by heat, pressure, or both.

Properties vary depending upon the specific component of the welding fumes.			

Incompatibilities & Reactivities
Varies

Measurement Methods
NIOSH 7300
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Symptoms vary depending upon the specific component of the welding fumes; metal fume fever: flu-like symptoms, dyspnea (breathing difficulty), cough, muscle pain, fever, chills; interstitial pneumonitis; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system

Cancer Site [lung cancer]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Wood dust	**CAS**
	RTECS ZC9850000
Synonyms & Trade Names Hard wood dust, Soft wood dust, Western red cedar dust	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca 1 mg/m^3 See Appendix A
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Dust from various types of wood.

MW: varies	BP: NA	MLT: NA	Sol: ?
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes; epistaxis (nosebleed); dermatitis; respiratory hypersensitivity; granulomatous pneumonitis; asthma, cough, wheezing, sinusitis; prolonged colds; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system

Cancer Site [nasal cancer]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Formaldehyde	**CAS** 50-00-0
HCHO	**RTECS** LP8925000
Synonyms & Trade Names Methanal, Methyl aldehyde, Methylene oxide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 0.016 ppm C 0.1 ppm [15-minute] See Appendix A
	OSHA PEL: [1910.1048] TWA 0.75 ppm ST 2 ppm
IDLH Ca [20 ppm] See: 50000	**Conversion** 1 ppm = 1.23 mg/m^3

Physical Description
Nearly colorless gas with a pungent, suffocating odor. [Note: Often used in an aqueous solution (see specific listing for Formalin).]

MW: 30.0	BP: -6°F	FRZ: -134°F	Sol: Miscible
VP: >1 atm	IP: 10.88 eV	RGasD: 1.04	
Fl.P: NA (Gas)	UEL: 73%	LEL: 7.0%	

Flammable Gas

Incompatibilities & Reactivities
Strong oxidizers, alkalis & acids; phenols; urea [Note: Pure formaldehyde has a tendency to polymerize. Reacts with HCl to form bis-Chloromethyl ether.]

Measurement Methods
NIOSH 2016, 2541, 3500, 3800; OSHA ID205, 52
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Respiratory support

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, nose, throat, respiratory system; lacrimation (discharge of tears); cough; wheezing; [potential occupational carcinogen]

Target Organs Eyes, respiratory system

Cancer Site [nasal cancer]

See also: INTRODUCTION See ICSC CARD: 0275 See MEDICAL TESTS: 0110

NIOSH Pocket Guide to Chemical Hazards

DDT	**CAS** 50-29-3
$(C_6H_4Cl)_2CHCCl_3$	**RTECS** KJ3325000
Synonyms & Trade Names p,p'-DDT; Dichlorodiphenyltrichloroethane; 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane	**DOT ID & Guide** 2761 151

Exposure Limits	NIOSH REL: Ca TWA 0.5 mg/m^3 See Appendix A
	OSHA PEL: TWA 1 mg/m^3 [skin]
IDLH Ca [500 mg/m^3] See: 50293	**Conversion**

Physical Description
Colorless crystals or off-white powder with a slight, aromatic odor. [pesticide]

MW: 354.5	BP: 230°F (Decomposes)	MLT: 227°F	Sol: Insoluble
VP: 0.0000002 mmHg	IP: ?		Sp.Gr: 0.99
Fl.P: 162-171°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, alkalis

Measurement Methods
NIOSH S274 (II-3)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]

Target Organs Eyes, skin, central nervous system, kidneys, liver, peripheral nervous system

Cancer Site [in animals: liver, lung & lymphatic tumors]

See also: INTRODUCTION See ICSC CARD: 0034 See MEDICAL TESTS: 0065

NIOSH Pocket Guide to Chemical Hazards

Acetylsalicyclic acid	**CAS** 50-78-2
$CH_3COOC_6H_4COOH$	**RTECS** VO0700000
Synonyms & Trade Names Acetal, o-Acetoxybenzoic acid, 2-Acetoxybenzoic acid, Aspirin	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Odorless, colorless to white, crystal-line powder. [aspirin] [Note: Develops the vinegar-like odor of acetic acid on contact with moisture.]

MW: 180.2	BP: 284°F (Decomposes)	MLT: 275°F	Sol(77°F): 0.3%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.35
Fl.P: NA	UEL: NA	LEL: NA	MEC: 40 g/m^3

Combustible Powder; explosion hazard if dispersed in air.

Incompatibilities & Reactivities
Solutions of alkali hydroxides or carbonates, strong oxidizers, moisture [Note: Slowly hydrolyzes in moist air to salicyclic & acetic acids.]

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: No recommendation Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; increased blood clotting time; nausea, vomiting; liver, kidney injury

Target Organs

Cancer Site Eyes, skin, respiratory system, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0822

NIOSH Pocket Guide to Chemical Hazards

2-Acetylaminofluorene	**CAS** 53-96-3
$C_{15}H_{13}NO$	**RTECS** AB9450000
Synonyms & Trade Names AAF, 2-AAF, 2-Acetaminofluorene, N-Acetyl-2-aminofluorene, FAA, 2-FAA, 2-Fluorenylacetamide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1014] See Appendix B
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Tan, crystalline powder.

MW: 223.3	BP: ?	MLT: 381°F	Sol: Insoluble
VP: ?	IP:?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Reduced function of liver, kidneys, bladder, pancreas; [potential occupational carcinogen]

Target Organs Liver, bladder, kidneys, pancreas, skin

Cancer Site [in animals: tumors of the liver, bladder, lungs, skin & pancreas]

See also: INTRODUCTION See MEDICAL TESTS: 0004

NIOSH Pocket Guide to Chemical Hazards

Nicotine	**CAS** 54-11-5
$C_5H_4NC_4H_7NCH_3$	**RTECS** QS5250000
Synonyms & Trade Names 3-(1-Methyl-2-pyrrolidyl)pyridine	**DOT ID & Guide** 1654 151

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 [skin]
	OSHA PEL: TWA 0.5 mg/m^3 [skin]
IDLH 5 mg/m^3 See: 54115	**Conversion**

Physical Description
Pale-yellow to dark-brown liquid with a fish-like odor when warm. [insecticide]

MW: 162.2	BP: 482°F (Decomposes)	FRZ: -110°F	Sol: Miscible
VP: 0.08 mmHg	IP: 8.01 eV		Sp.Gr: 1.01
Fl.P: 203°F	UEL: 4.0%	LEL: 0.7%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 2544, 2551
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Nausea, salivation, abdominal pain, vomiting, diarrhea; headache, dizziness, hearing, visual disturbance; confusion, lassitude (weakness, exhaustion), incoordination; cardiac arrhythmias; convulsions, dyspnea (breathing difficulty); in animals: teratogenic effects

Target Organs central nervous system, cardiovascular system, lungs, gastrointestinal tract, reproductive system

See also: INTRODUCTION See ICSC CARD: 0519 See MEDICAL TESTS: 0157

NIOSH Pocket Guide to Chemical Hazards

Fenthion	**CAS** 55-38-9
$C_{10}H_{15}O_3PS$	**RTECS** TF9625000
Synonyms & Trade Names Baytex; Entex; O,O-Dimethyl O-3-methyl-4-methylthiophenyl phosphorothioate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless to brown liquid with a slight, garlic-like odor. [insecticide]

MW: 278.3	BP: ?	FRZ: 43°F	Sol: 0.006%
VP: 0.0003 mmHg	IP: ?		Sp.Gr: 1.25
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Nausea, vomiting, abdominal cramps, diarrhea, salivation; headache, dizziness, lassitude (weakness, exhaustion); rhinorrhea (discharge of thin mucus), chest tightness; blurred vision, miosis; cardiac irregularities; muscle fasciculation; dyspnea (breathing difficulty)
Target Organs respiratory system, central nervous system, cardiovascular system, plasma cholinesterase

See also: INTRODUCTION See ICSC CARD: 0655

NIOSH Pocket Guide to Chemical Hazards

Nitroglycerine	**CAS** 55-63-0
$CH_2NO_3CHNO_3CH_2NO_3$	**RTECS** QX2100000
Synonyms & Trade Names Glyceryl trinitrate; NG; 1,2,3-Propanetriol trinitrate; Trinitroglycerine	**DOT ID & Guide** 1204 127 (</= 1% solution in alcohol) 3064 127 (1-5% solution in alcohol)

Exposure Limits	NIOSH REL: ST 0.1 mg/m^3 [skin]
	OSHA PEL†: C 0.2 ppm (2 mg/m^3) [skin]
IDLH 75 mg/m^3 See: 55630	**Conversion** 1 ppm = 9.29 mg/m^3

Physical Description
Colorless to pale-yellow, viscous liquid or solid (below 56°F). [Note: An explosive ingredient in dynamite (20-40%) with ethylene glycol dinitrate (80-60%).]

MW: 227.1	BP: Begins to decompose at 122-140°F	FRZ: 56°F	Sol: 0.1%
VP: 0.0003 mmHg	IP: ?		Sp.Gr: 1.60
Fl.P: Explodes	UEL: ?	LEL: ?	

Explosive Liquid

Incompatibilities & Reactivities
Heat, ozone, shock, acids [Note: An OSHA Class A Explosive (1910.109).]

Measurement Methods
NIOSH 2507; OSHA 43
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: Daily Provide: Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 1 mg/m^3: (APF = 10) Any supplied-air respirator*

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

Up to 5 mg/m^3: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 75 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Throbbing headache; dizziness; nausea, vomiting, abdominal pain; hypotension; flush; palpitations; methemoglobinemia; delirium, central nervous system depression; angina; skin irritation

Target Organs cardiovascular system, blood, skin, central nervous system

See also: INTRODUCTION See ICSC CARD: 0186

NIOSH Pocket Guide to Chemical Hazards

Carbon tetrachloride	**CAS** 56-23-5
CCl_4	**RTECS** FG4900000
Synonyms & Trade Names Carbon chloride, Carbon tet, Freon® 10, Halon® 104, Tetrachloromethane	**DOT ID & Guide** 1846 151

Exposure Limits	NIOSH REL: Ca ST 2 ppm (12.6 mg/m^3) [60-minute] See Appendix A
	OSHA PEL†: TWA 10 ppm C 25 ppm 200 ppm (5-minute maximum peak in any 4 hours)
IDLH Ca [200 ppm] See: 56235	**Conversion** 1 ppm = 6.29 mg/m^3

Physical Description
Colorless liquid with a characteristic ether-like odor.

MW: 153.8	BP: 170°F	FRZ: -9°F	Sol: 0.05%
VP: 91 mmHg	IP: 11.47 eV		Sp.Gr: 1.59
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Chemically-active metals such as sodium, potassium & magnesium; fluorine; aluminum [Note: Forms highly toxic phosgene gas when exposed to flames or welding arcs.]

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; central nervous system depression; nausea, vomiting; liver, kidney injury; drowsiness, dizziness, incoordination; [potential occupational carcinogen]

Target Organs central nervous system, eyes, lungs, liver, kidneys, skin

Cancer Site [in animals: liver cancer]

See also: INTRODUCTION See ICSC CARD: 0024 See MEDICAL TESTS: 0041

NIOSH Pocket Guide to Chemical Hazards

Parathion	**CAS** 56-38-2
$(C_2H_5O)_2P(S)OC_6H_4NO_2$	**RTECS** TF4550000
Synonyms & Trade Names O,O-Diethyl-O(p-nitrophenyl) phosphorothioate; Diethyl parathion; Ethyl parathion; Parathion-ethyl	**DOT ID & Guide** 2783 152

Exposure Limits	NIOSH REL: TWA 0.05 mg/m^3 [skin]
	OSHA PEL: TWA 0.1 mg/m^3 [skin]
IDLH 10 mg/m^3 See: 56382	**Conversion**

Physical Description
Pale-yellow to dark-brown liquid with a garlic-like odor. [Note: A solid below 43°F. Pesticide that may be absorbed on a dry carrier.]

MW: 291.3	BP: 707°F	FRZ: 43°F	Sol: 0.001%
VP: 0.00004 mmHg	IP: ?		Sp.Gr: 1.27
Fl.P(oc): 392°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, alkaline materials

Measurement Methods
NIOSH 5600; OSHA 62
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 0.5 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter

Up to 2.5 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 10 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; miosis; rhinorrhea (discharge of thin mucus); headache; chest tightness, wheezing, laryngeal spasm, salivation, cyanosis; anorexia, nausea, vomiting, abdominal cramps, diarrhea; sweating; muscle fasciculation, lassitude (weakness, exhaustion), paralysis; dizziness, confusion, ataxia; convulsions, coma; low blood pressure; cardiac irregularities

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0006 See MEDICAL TESTS: 0174

NIOSH Pocket Guide to Chemical Hazards

Glycerin (mist)	**CAS** 56-81-5
$HOCH_2CH(OH)CH_2OH$	**RTECS** MA8050000
Synonyms & Trade Names Glycerin (anhydrous); Glycerol; Glycyl alcohol; 1,2,3-Propanetriol; Trihydroxypropane	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Clear, colorless, odorless, syrupy liquid or solid (below 64°F). [Note: The solid form melts above 64°F but the liquid form freezes at a much lower temperature.]

MW: 92.1	BP: 554°F (Decomposes)	MLT: 64°F	Sol: Miscible
VP(122°F): 0.003 mmHg	IP: ?		Sp.Gr: 1.26
Fl.P: 320°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers (e.g., chromium trioxide, potassium chlorate, potassium permanganate) [Note: Hygroscopic (i.e., absorbs moisture from the air).]

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Water wash Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; headache, nausea, vomiting; kidney injury	
Target Organs Eyes, skin, respiratory system, kidneys	

See also: INTRODUCTION See ICSC CARD: 0624

NIOSH Pocket Guide to Chemical Hazards

1,1-Dimethylhydrazine	**CAS** 57-14-7
$(CH_3)_2NNH_2$	**RTECS** MV2450000
Synonyms & Trade Names Dimazine, DMH, UDMH, Unsymmetrical dimethylhydrazine	**DOT ID & Guide** 1163 131

Exposure Limits	NIOSH REL: Ca C 0.06 ppm (0.15 mg/m^3) [2-hr] See Appendix A
	OSHA PEL: TWA 0.5 ppm (1 mg/m^3) [skin]
IDLH Ca [15 ppm] See: 57147	**Conversion** 1 ppm = 2.46 mg/m^3

Physical Description
Colorless liquid with an ammonia- or fish-like odor.

MW: 60.1	BP: 147°F	FRZ: -72°F	Sol: Miscible
VP: 103 mmHg	IP: 8.05 eV		Sp.Gr: 0.79
Fl.P: 5°F	UEL: 95%	LEL: 2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers, halogens, metallic mercury, fuming nitric acid, hydrogen peroxide [Note: May ignite SPONTANEOUSLY in contact with oxidizers.]

Measurement Methods
NIOSH 3515
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; choking, chest pain, dyspnea (breathing difficulty); drowsiness; nausea; anoxia; convulsions; liver injury; [potential occupational carcinogen]

Target Organs central nervous system, liver, gastrointestinal tract, blood, respiratory system, eyes, skin

Cancer Site [in animals: tumors of the lungs, liver, blood vessels & intestines]

See also: INTRODUCTION See ICSC CARD: 0147 See MEDICAL TESTS: 0083

NIOSH Pocket Guide to Chemical Hazards

Strychnine	**CAS** 57-24-9
$C_{21}H_{22}N_2O_2$	**RTECS** WL2275000
Synonyms & Trade Names Nux vomica, Strynchnos	**DOT ID & Guide** 1692 151

Exposure Limits	NIOSH REL: TWA 0.15 mg/m^3
	OSHA PEL: TWA 0.15 mg/m^3
IDLH 3 mg/m^3 See: 57249	**Conversion**

Physical Description
Colorless to white, odorless, crystalline solid. [pesticide]

MW: 334.4	BP: Decomposes	MLT: 514°F	Sol: 0.02%
VP: Low	IP: ?		Sp.Gr: 1.36
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid, but difficult to ignite.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5016
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: No recommendation
Wash skin: When contaminated
Remove: No recommendation
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 0.75 mg/m^3: (APF = 5) Any dust and mist respirator
Up to 1.5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator
Up to 3 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter/(APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Stiff neck, facial muscle; restlessness, anxiety, increased acuity of perception; increased reflex excitability; cyanosis; tetanic convulsions with opisthotonos

Target Organs central nervous system

See also: INTRODUCTION See ICSC CARD: 0197 See MEDICAL TESTS: 0213

NIOSH Pocket Guide to Chemical Hazards

Sucrose	**CAS** 57-50-1
$C_{12}H_{22}O_{11}$	**RTECS** WN6500000
Synonyms & Trade Names Beet sugar, Cane sugar, Confectioner's sugar, Granulated sugar, Rock candy, Saccarose, Sugar, Table sugar	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Hard, white, odorless crystals, lumps, or powder. [Note: May have a characteristic, caramel odor when heated.]

MW: 342.3	BP: Decomposes	MLT: 320-367°F (Decomposes)	Sol: 200%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.59
Fl.P: NA	UEL: NA	LEL: NA	MEC: 45 g/m^3

Noncombustible Solid, but fine airborne dust may explode.

Incompatibilities & Reactivities
Oxidizers, sulfuric acid, nitric acid

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; cough	
Target Organs Eyes, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

beta-Propiolactone	**CAS** 57-57-8
$C_3H_4O_2$	**RTECS** RQ7350000
Synonyms & Trade Names BPL; Hydroacrylic acid, beta-lactone; 3-Hydroxy-beta-lactone; 3-Hydroxy-propionic acid; beta-Lactone; 2-Oxetanone; 3-Propiolacetone	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1013] See Appendix B
IDLH Ca [N.D] See: IDLH INDEX	**Conversion**

Physical Description
Colorless liquid with a slightly sweet odor.

MW: 72.1	BP: 323°F (Decomposes)	FRZ: -28°F	Sol: 37%
VP(77°F): 3 mmHg	IP: ?		Sp.Gr: 1.15
Fl.P: 165°F	UEL: ?	LEL: 2.9%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Acetates, halogens, thiocyanates, thiosulfates [Note: May polymerize upon storage.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Skin irritation, blistering, burns; corneal opacity; frequent urination; dysuria; hematuria (blood in the urine); [potential occupational carcinogen]

Target Organs Kidneys, skin, lungs, eyes

Cancer Site [in animals: tumors of the liver, skin & stomach]

See also: INTRODUCTION See ICSC CARD: 0555 See MEDICAL TESTS: 0197

NIOSH Pocket Guide to Chemical Hazards

Chlordane	**CAS** 57-74-9
$C_{10}H_6Cl_8$	**RTECS** PB9800000
Synonyms & Trade Names Chlordan; Chlordano; 1,2,4,5,6,7,8,8-Octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindane	**DOT ID & Guide** 2762 131

Exposure Limits	NIOSH REL: Ca TWA 0.5 mg/m^3 [skin] See Appendix A
	OSHA PEL: TWA 0.5 mg/m^3 [skin]
IDLH Ca [100 mg/m^3] See: 57749	**Conversion**

Physical Description
Amber-colored, viscous liquid with a pungent, chlorine-like odor. [insecticide]

MW: 409.8	BP: Decomposes	FRZ: 217-228°F	Sol: 0.0001%
VP: 0.00001 mmHg	IP: ?		Sp.Gr(77°F): 1.6
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but may be utilized in flammable solutions.

Incompatibilities & Reactivities
Strong oxidizers, alkaline reagents

Measurement Methods
NIOSH 5510; OSHA 67
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Blurred vision; confusion; ataxia, delirium; cough; abdominal pain, nausea, vomiting, diarrhea; irritability, tremor, convulsions; anuria; in animals: lung, liver, kidney damage; [potential occupational carcinogen]

Target Organs central nervous system, eyes, lungs, liver, kidneys

Cancer Site [in animals: liver cancer]

See also: INTRODUCTION See ICSC CARD: 0740 See MEDICAL TESTS: 0042

NIOSH Pocket Guide to Chemical Hazards

Lindane	**CAS** 58-89-9
$C_6H_6Cl_6$	**RTECS** GV4900000
Synonyms & Trade Names BHC; HCH; gamma-Hexachlorocyclohexane; gamma isomer of 1,2,3,4,5,6-Hexachlorocyclohexane	**DOT ID & Guide** 2761 151

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 [skin]
	OSHA PEL: TWA 0.5 mg/m^3 [skin]
IDLH 50 mg/m^3 See: 58899	**Conversion**

Physical Description
White to yellow, crystalline powder with a slight, musty odor. [pesticide]

MW: 290.8	BP: 614°F	MLT: 235°F	Sol: 0.001%
VP: 0.00001 mmHg	IP: ?		Sp.Gr: 1.85
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Corrosive to metals

Measurement Methods
NIOSH 5502
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 10) Any supplied-air respirator

Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter*

Up to 25 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache; nausea; clonic convulsions; respiratory difficulty; cyanosis; aplastic anemia; muscle spasm; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0053 See MEDICAL TESTS: 0128

NIOSH Pocket Guide to Chemical Hazards

4-Dimethylaminoazobenzene	**CAS** 60-11-7
$C_6H_5NNC_6H_4N(CH_3)_2$	**RTECS** BX7350000
Synonyms & Trade Names Butter yellow; DAB; p-Dimethylaminoazobenzene; N,N-Dimethyl-4-aminoazobenzene; Methyl yellow	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1015] See Appendix B
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Yellow, leaf-shaped crystals.

MW: 225.3	BP: Sublimes	MLT: 237°F	Sol: 0.001%
VP: 0.0000003 mmHg (est.)	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH P&CAM284 (II-4)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration. (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Enlarged liver; liver, kidney disturbance; contact dermatitis; cough, wheezing, dyspnea (breathing difficulty); bloody sputum; bronchial secretions; frequent urination, hematuria (blood in the urine), dysuria; [potential occupational carcinogen]

Target Organs Skin, respiratory system, liver, kidneys, bladder

Cancer Site [in animals: liver & bladder tumors]

See also: INTRODUCTION See MEDICAL TESTS: 0081

NIOSH Pocket Guide to Chemical Hazards

Ethyl ether	**CAS** 60-29-7
$C_2H_5OC_2H_5$	**RTECS** KI5775000
Synonyms & Trade Names Diethyl ether, Diethyl oxide, Ethyl oxide, Ether, Solvent ether	**DOT ID & Guide** 1155 127

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 400 ppm (1200 mg/m^3)
IDLH 1900 ppm [10%LEL] See: 60297	**Conversion** 1 ppm = 3.03 mg/m^3

Physical Description
Colorless liquid with a pungent, sweetish odor. [Note: A gas above 94°F.]

MW: 74.1	BP: 94°F	FRZ: -177°F	Sol: 8%
VP: 440 mmHg	IP: 9.53 eV		Sp.Gr: 0.71
Fl.P: -49°F	UEL: 36.0%	LEL: 1.9%	

Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, halogens, sulfur, sulfur compounds [Note: Tends to form explosive peroxides under influence of air and light.]

Measurement Methods
NIOSH 1610; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations OSHA
Up to 1900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; dizziness, drowsiness, headache, excited, narcosis; nausea, vomiting

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0355 See MEDICAL TESTS: 0095

NIOSH Pocket Guide to Chemical Hazards

Methyl hydrazine	**CAS** 60-34-4
CH_3NHNH_2	**RTECS** MV5600000
Synonyms & Trade Names MMH, Monomethylhydrazine	**DOT ID & Guide** 1244 131

Exposure Limits	NIOSH REL: Ca C 0.04 ppm (0.08 mg/m^3) [2-hr] See Appendix A
	OSHA PEL: C 0.2 ppm (0.35 mg/m^3) [skin]
IDLH Ca [20 ppm] See: 60344	**Conversion** 1 ppm = 1.89 mg/m^3

Physical Description
Fuming, colorless liquid with an ammonia-like odor.

MW: 46.1	BP: 190°F	FRZ: -62°F	Sol: Miscible
VP: 38 mmHg	IP: 8.00 eV		Sp.Gr(77°F): 0.87
Fl.P: 17°F	UEL: 92%	LEL: 2.5%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxides of iron; copper; manganese; lead; copper alloys; porous materials such as earth, asbestos, wood & cloth; strong oxidizers such as fluorine & chlorine; nitric acid; hydrogen peroxide

Measurement Methods
NIOSH 3510
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; vomiting, diarrhea, tremor, ataxia; anoxia, cyanosis; convulsions; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, liver, blood, cardiovascular system

Cancer Site [in animals: lung, liver, blood vessel & intestine tumors]

See also: INTRODUCTION See ICSC CARD: 0180 See MEDICAL TESTS: 0142

NIOSH Pocket Guide to Chemical Hazards

Dieldrin	**CAS** 60-57-1
$C_{12}H_8Cl_6O$	**RTECS** IO1750000
Synonyms & Trade Names HEOD; 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo,exo-5,8-dimethanonaphthalene	**DOT ID & Guide** 2761 151

Exposure Limits	NIOSH REL: Ca TWA 0.25 mg/m^3 [skin] See Appendix A
	OSHA PEL: TWA 0.25 mg/m^3 [skin]
IDLH Ca [50 mg/m^3] See: 60571	**Conversion**

Physical Description
Colorless to light-tan crystals with a mild, chemical odor. [insecticide]

MW: 380.9	BP: Decomposes	MLT: 349°F	Sol: 0.02%
VP(77°F): 8 x 10-7 mmHg	IP: ?		Sp.Gr: 1.75
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers, active metals such as sodium, strong acids, phenols

Measurement Methods
NIOSH S283 (II-3)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic, tonic convulsions; coma; [potential occupational carcinogen]; in animals: liver, kidney damage

Target Organs central nervous system, liver, kidneys, skin

Cancer Site [in animals: lung, liver, thyroid & adrenal gland tumors]

See also: INTRODUCTION See ICSC CARD: 0787 See MEDICAL TESTS: 0077

NIOSH Pocket Guide to Chemical Hazards

Amitrole	**CAS** 61-82-5
$C_2H_4N_4$	**RTECS** XZ3850000
Synonyms & Trade Names Aminotriazole; 3-Aminotriazole; 2-Amino-1,3,4-triazole; 3-Amino-1,2,4-triazole	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 0.2 mg/m^3 See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Colorless to white, crystalline powder. [herbicide] [Note: Odorless when pure.]

MW: 84.1	BP: ?	MLT: 318°F	Sol(77°F): 28%
VP: <0.000008 mmHg	IP: ?		Sp.Gr: 1.14
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Light (decomposes), strong oxidizers [Note: Corrosive to iron, aluminum & copper.]

Measurement Methods
NIOSH 0500; OSHA PV2006
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; dyspnea (breathing difficulty), muscle spasms, ataxia, anorexia, salivation, increased body temperature; lassitude (weakness, exhaustion), skin dryness, depression (thyroid function suppression)

Target Organs Eyes, skin, thyroid

Cancer Site [in animals: liver, thyroid & pituitary gland tumors]

See also: INTRODUCTION See ICSC CARD: 0631

NIOSH Pocket Guide to Chemical Hazards

Aniline (and homologs)	**CAS** 62-53-3
$C_6H_5NH_2$	**RTECS** BW6650000
Synonyms & Trade Names Aminobenzene, Aniline oil, Benzenamine, Phenylamine	**DOT ID & Guide** 1547 153

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: TWA 5 ppm (19 mg/m^3) [skin]
IDLH Ca [100 ppm] See: 62533	**Conversion** 1 ppm = 3.81 mg/m^3

Physical Description
Colorless to brown, oily liquid with an aromatic amine-like odor. [Note: A solid below 21°F.]

MW: 93.1	BP: 363°F	FRZ: 21°F	Sol: 4%
VP: 0.6 mmHg	IP: 7.70 eV		Sp.Gr: 1.02
Fl.P: 158°F	UEL: 11%	LEL: 1.3%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids, toluene diisocyanate, alkalis

Measurement Methods
NIOSH 2002, 2017
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Headache, lassitude (weakness, exhaustion), dizziness; cyanosis; ataxia; dyspnea (breathing difficulty) on effort; tachycardia; irritation eyes; methemoglobinemia; cirrhosis; [potential occupational carcinogen]

Target Organs Blood, cardiovascular system, eyes, liver, kidneys, respiratory system

Cancer Site [bladder cancer]

See also: INTRODUCTION See ICSC CARD: 0011 See MEDICAL TESTS: 0014

NIOSH Pocket Guide to Chemical Hazards

Dichlorvos	**CAS** 62-73-7
$(CH_3O)_2P(O)OCH=CCl_2$	**RTECS** TC0350000
Synonyms & Trade Names DDVP; 2,2-Dichlorovinyl dimethyl phosphate	**DOT ID & Guide** 2783 152

Exposure Limits	NIOSH REL: TWA 1 mg/m^3 [skin]
	OSHA PEL: TWA 1 mg/m^3 [skin]
IDLH 100 mg/m^3 See: 62737	**Conversion** 1 ppm = 9.04 mg/m^3

Physical Description
Colorless to amber liquid with a mild, chemical odor. [Note: Insecticide that may be absorbed on a dry carrier.]

MW: 221.0	BP: Decomposes	FRZ: ?	Sol: 0.5%
VP: 0.01 mmHg	IP: ?		Sp.Gr(77°F): 1.42
Fl.P: >175°F	UEL: ?	LEL: ?	

Class III Combustible Liquid

Incompatibilities & Reactivities
Strong acids, strong alkalis [Note: Corrosive to iron & mild steel.]

Measurement Methods
NIOSH P&CAM295 (II-5); OSHA 62
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 10 mg/m^3: (APF = 10) Any supplied-air respirator
Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 50 mg/m^3: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 100 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; miosis, ache eyes; rhinorrhea (discharge of thin mucus); headache; chest tightness, wheezing, laryngeal spasm, salivation; cyanosis; anorexia, nausea, vomiting, diarrhea; sweating; muscle fasciculation, paralysis, dizziness, ataxia; convulsions; low blood pressure, cardiac irregularities

Target Organs Eyes, skin, respiratory system, cardiovascular system, central nervous system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0690 See MEDICAL TESTS: 0076

NIOSH Pocket Guide to Chemical Hazards

Sodium fluoroacetate	**CAS** 62-74-8
FCH_2COONa	**RTECS** AH9100000
Synonyms & Trade Names SFA, Sodium monofluoroacetate	**DOT ID & Guide** 2629 151

Exposure Limits	NIOSH REL: TWA 0.05 mg/m^3 ST 0.15 mg/m^3 [skin]
	OSHA PEL†: TWA 0.05 mg/m^3 [skin]
IDLH 2.5 mg/m^3 See: 62748	**Conversion**

Physical Description
Fluffy, colorless to white (sometimes dyed black), odorless powder. [Note: A liquid above 95°F.] [rodenticide]

MW: 100.0	BP: Decomposes	MLT: 392°F	Sol: Miscible
VP: Low	IP: ?		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH S301 (II-5)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 0.25 mg/m^3: (APF = 5) Any dust and mist respirator
Up to 0.5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator
Up to 1.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter
Up to 2.5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Vomiting; anxiety, auditory hallucinations; facial paresthesia; twitching face muscle; pulsus altenans, ectopic heartbeat, tachycardia, cardiac arrhythmias; pulmonary edema; nystagmus; convulsions; liver, kidney damage

Target Organs respiratory system, cardiovascular system, liver, kidneys, central nervous system

See also: INTRODUCTION See ICSC CARD: 0484 See MEDICAL TESTS: 0209

NIOSH Pocket Guide to Chemical Hazards

N-Nitrosodimethylamine	**CAS** 62-75-9
$(CH_3)_2N_2O$	**RTECS** IQ0525000
Synonyms & Trade Names Dimethylnitrosamine; N,N-Dimethylnitrosamine; DMNA; N-Methyl-N-nitroso-methanamine; NDMA; N-Nitroso-N,N-dimethylamine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1016] See Appendix B
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Yellow, oily liquid with a faint, characteristic odor.

MW: 74.1	BP: 306°F	FRZ: ?	Sol: Soluble
VP: 3 mmHg	IP: 8.69 eV		Sp.Gr: 1.005
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Strong oxidizers [Note: Should be stored in dark bottles.]

Measurement Methods
NIOSH 2522; OSHA 38
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Nausea, vomiting, diarrhea, abdominal cramps; headache; fever; enlarged liver, jaundice; decreased liver, kidney, pulmonary function; [potential occupational carcinogen]

Target Organs Liver, kidneys,lungs

Cancer Site [in animals; lung, kidney, liver & nasal cavity tumors]

See also: INTRODUCTION See ICSC CARD: 0525 See MEDICAL TESTS: 0167

NIOSH Pocket Guide to Chemical Hazards

Carbaryl	**CAS** 63-25-2
$CH_3NHCOOC_{10}H_7$	**RTECS** FC5950000
Synonyms & Trade Names alpha-Naphthyl N-methyl-carbamate, 1-Naphthyl N-Methyl-carbamate, Sevin®	**DOT ID & Guide** 2757 151

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL: TWA 5 mg/m^3
IDLH 100 mg/m^3 See: 63252	**Conversion**

Physical Description
White or gray, odorless solid. [pesticide]

MW: 201.2	BP: Decomposes	MLT: 293°F	Sol: 0.01%
VP(77°F): <0.00004 mmHg	IP: ?		Sp.Gr: 1.23
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Strong oxidizers, strongly alkaline pesticides

Measurement Methods
NIOSH 5006, 5601; OSHA 63
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m^3: (APF = 10) Any supplied-air respirator*

Up to 100 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Miosis, blurred vision, tear; rhinorrhea (discharge of thin mucus), salivation; sweating; abdominal cramps, nausea, vomiting, diarrhea; tremor; cyanosis; convulsions; irritation skin; possible reproductive effects

Target Organs respiratory system, central nervous system, cardiovascular system, skin, blood cholinesterase, reproductive system

See also: INTRODUCTION See ICSC CARD: 0121 See MEDICAL TESTS: 0037

NIOSH Pocket Guide to Chemical Hazards

Ethyl alcohol	**CAS** 64-17-5
CH_3CH_2OH	**RTECS** KQ6300000
Synonyms & Trade Names Alcohol, Cologne spirit, Ethanol, EtOH, Grain alcohol	**DOT ID & Guide** 1170 127

Exposure Limits	NIOSH REL: TWA 1000 ppm (1900 mg/m^3)
	OSHA PEL: TWA 1000 ppm (1900 mg/m^3)
IDLH 3300 ppm [10%LEL] See: 64175	**Conversion** 1 ppm = 1.89 mg/m^3

Physical Description
Clear, colorless liquid with a weak, ethereal, vinous odor.

MW: 46.1	BP: 173°F	FRZ: -173°F	Sol: Miscible
VP: 44 mmHg	IP: 10.47 eV		Sp.Gr: 0.79
Fl.P: 55°F	UEL: 19%	LEL: 3.3%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, potassium dioxide, bromine pentafluoride, acetyl bromide, acetyl chloride, platinum, sodium

Measurement Methods
NIOSH 1400; OSHA 100
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 3300 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; headache, drowsiness, lassitude (weakness, exhaustion), narcosis; cough; liver damage; anemia; reproductive, teratogenic effects

Target Organs Eyes, skin, respiratory system, central nervous system, liver, blood, reproductive system

See also: INTRODUCTION See ICSC CARD: 0044 See MEDICAL TESTS: 0097

NIOSH Pocket Guide to Chemical Hazards

Formic acid	**CAS** 64-18-6
HCOOH	**RTECS** LQ4900000
Synonyms & Trade Names Formic acid (85-95% in aqueous solution); Hydrogen carboxylic acid; Methanoic acid	**DOT ID & Guide** 1779 153

Exposure Limits	NIOSH REL: TWA 5 ppm (9 mg/m^3)
	OSHA PEL: TWA 5 ppm (9 mg/m^3)
IDLH 30 ppm See: 64186	**Conversion** 1 ppm = 1.88 mg/m^3

Physical Description
Colorless liquid with a pungent, penetrating odor. [Note: Often used in an aqueous solution.]

MW: 46.0	BP: 224°F (90% solution)	FRZ: 20°F (90% solution)	Sol: Miscible
VP: 35 mmHg	IP: 11.05 eV		Sp.Gr: 1.22 (90% solution)
Fl.P(oc): 122°F (90% solution)	UEL: 57% (90% solution)	LEL: 18% (90% solution)	

Class II Combustible Liquid (90% solution)

Incompatibilities & Reactivities
Strong oxidizers, strong caustics, concentrated sulfuric acid [Note: Corrosive to metals.]

Measurement Methods
NIOSH 2011; OSHA ID186SG
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 30 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes; skin, throat; skin burns, dermatitis; lacrimation (discharge of tears); rhinorrhea (discharge of thin mucus); cough, dyspnea (breathing difficulty); nausea

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0485

NIOSH Pocket Guide to Chemical Hazards

Acetic acid	**CAS** 64-19-7
CH_3COOH	**RTECS** AF1225000
Synonyms & Trade Names Acetic acid (aqueous), Ethanoic acid, Glacial acetic acid (pure compound), Methanecarboxylic acid [Note: Can be found in concentrations of 5-8% in vinegar.]	**DOT ID & Guide** 2790 153 (10-80% acid) 2789 132 (>80% acid)

Exposure Limits	NIOSH REL: TWA 10 ppm (25 mg/m^3) ST 15 ppm (37 mg/m^3)
	OSHA PEL: TWA 10 ppm (25 mg/m^3)
IDLH 50 ppm See: 64197	**Conversion** 1 ppm = 2.46 mg/m^3

Physical Description
Colorless liquid or crystals with a sour, vinegar-like odor. [Note: Pure compound is a solid below 62°F. Often used in an aqueous solution.]

MW: 60.1	BP: 244°F	FRZ: 62°F	Sol: Miscible
VP: 11 mmHg	IP: 10.66 eV		Sp.Gr: 1.05
Fl.P: 103°F	UEL(200°F): 19.9%	LEL: 4.0%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers (especially chromic acid, sodium peroxide & nitric acid), strong caustics [Note: Corrosive to metals.]

Measurement Methods
NIOSH 1603; OSHA ID186SG
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact (>10%) Eyes: Prevent eye contact Wash skin: When contaminated (>10%) Remove: When wet or contaminated (>10%) Change: No recommendation Provide: Eyewash (>5%), Quick drench (>50%)	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 50 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; eye, skin burns; skin sensitization; dental erosion; black skin, hyperkeratosis; conjunctivitis, lacrimation (discharge of tears); pharyngeal edema, chronic bronchitis

Target Organs Eyes, skin, respiratory system, teeth

See also: INTRODUCTION See ICSC CARD: 0363

NIOSH Pocket Guide to Chemical Hazards

Methyl alcohol	**CAS** 67-56-1
CH_3OH	**RTECS** PC1400000
Synonyms & Trade Names Carbinol, Columbian spirits, Methanol, Pyroligneous spirit, Wood alcohol, Wood naphtha, Wood spirit	**DOT ID & Guide** 1230 131

Exposure Limits	NIOSH REL: TWA 200 ppm (260 mg/m^3) ST 250 ppm (325 mg/m^3) [skin]
	OSHA PEL†: TWA 200 ppm (260 mg/m^3)
IDLH 6000 ppm See: 67561	**Conversion** 1 ppm = 1.31 mg/m^3

Physical Description
Colorless liquid with a characteristic pungent odor.

MW: 32.1	BP: 147°F	FRZ: -144°F	Sol: Miscible
VP: 96 mmHg	IP: 10.84 eV		Sp.Gr: 0.79
Fl.P: 52°F	UEL: 36%	LEL: 6.0%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 2000, 3800; OSHA 91
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 10) Any supplied-air respirator
Up to 5000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 6000 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; headache, drowsiness, dizziness, nausea, vomiting; visual disturbance, optic nerve damage (blindness); dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 0057 See MEDICAL TESTS: 0137

NIOSH Pocket Guide to Chemical Hazards

Isopropyl alcohol	**CAS** 67-63-0
$(CH_3)_2CHOH$	**RTECS** NT8050000
Synonyms & Trade Names Dimethyl carbinol, IPA, Isopropanol, 2-Propanol, sec-Propyl alcohol, Rubbing alcohol	**DOT ID & Guide** 1219 129

Exposure Limits	NIOSH REL: TWA 400 ppm (980 mg/m^3) ST 500 ppm (1225 mg/m^3)
	OSHA PEL†: TWA 400 ppm (980 mg/m^3)
IDLH 2000 ppm [10%LEL] See: 67630	**Conversion** 1 ppm = 2.46 mg/m^3

Physical Description
Colorless liquid with the odor of rubbing alcohol.

MW: 60.1	BP: 181°F	FRZ: -127°F	Sol: Miscible
VP: 33 mmHg	IP: 10.10 eV		Sp.Gr: 0.79
Fl.P: 53°F	UEL(200°F): 12.7%	LEL: 2.0%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, acetaldehyde, chlorine, ethylene oxide, acids, isocyanates

Measurement Methods
NIOSH 1400; OSHA 109
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; drowsiness, dizziness, headache; dry cracking skin; in animals: narcosis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0554 See MEDICAL TESTS: 0124

NIOSH Pocket Guide to Chemical Hazards

Acetone	**CAS** 67-64-1
$(CH_3)_2CO$	**RTECS** AL3150000
Synonyms & Trade Names Dimethyl ketone, Ketone propane, 2-Propanone	**DOT ID & Guide** 1090 127

Exposure Limits	NIOSH REL: TWA 250 ppm (590 mg/m^3)
	OSHA PEL†: TWA 1000 ppm (2400 mg/m^3)
IDLH 2500 ppm [10%LEL] See: 67641	**Conversion** 1 ppm = 2.38 mg/m^3

Physical Description
Colorless liquid with a fragrant, mint-like odor.

MW: 58.1	BP: 133°F	FRZ: -140°F	Sol: Miscible
VP: 180 mmHg	IP: 9.69 eV		Sp.Gr: 0.79
Fl.P: 0°F	UEL: 12.8%	LEL: 2.5%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers, acids

Measurement Methods
NIOSH 1300, 3800; OSHA 69
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 2500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0087 See MEDICAL TESTS: 0002

NIOSH Pocket Guide to Chemical Hazards

Chloroform	**CAS** 67-66-3
$CHCl_3$	**RTECS** FS9100000
Synonyms & Trade Names Methane trichloride, Trichloromethane	**DOT ID & Guide** 1888 151

Exposure Limits	NIOSH REL: Ca ST 2 ppm (9.78 mg/m^3) [60-minute] See Appendix A
	OSHA PEL†: C 50 ppm (240 mg/m^3)
IDLH Ca [500 ppm] See: 67663	**Conversion** 1 ppm = 4.88 mg/m^3

Physical Description
Colorless liquid with a pleasant odor.

MW: 119.4	BP: 143°F	FRZ: -82°F	Sol(77°F): 0.5%
VP: 160 mmHg	IP: 11.42 eV		Sp.Gr: 1.48
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Strong caustics; chemically-active metals such as aluminum or magnesium powder, sodium & potassium; strong oxidizers [Note: When heated to decomposition, forms phosgene gas.]

Measurement Methods
NIOSH 1003
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]

Target Organs Liver, kidneys, heart, eyes, skin, central nervous system

Cancer Site [in animals: liver & kidney cancer]

See also: INTRODUCTION See ICSC CARD: 0027 See MEDICAL TESTS: 0047

NIOSH Pocket Guide to Chemical Hazards

Hexachloroethane	**CAS** 67-72-1
Cl_3CCCl_3	**RTECS** KI4025000
Synonyms & Trade Names Carbon hexachloride, Ethane hexachloride, Perchloroethane	**DOT ID & Guide** 9037 151

Exposure Limits	NIOSH REL: Ca TWA 1 ppm (10 mg/m^3) [skin] See Appendix A See Appendix C (Chloroethanes)
	OSHA PEL: TWA 1 ppm (10 mg/m^3) [skin]
IDLH Ca [300 ppm] See: 67721	**Conversion** 1 ppm = 9.68 mg/m^3

Physical Description
Colorless crystals with a camphor-like odor.

MW: 236.7	BP: Sublimes	MLT: 368°F (Sublimes)	Sol(72°F): 0.005%
VP: 0.2 mmHg	IP: 11.22 eV		Sp.Gr: 2.09
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Alkalis; metals such as zinc, cadmium, aluminum, hot iron & mercury

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; in animals: kidney damage; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, kidneys

Cancer Site [in animals: liver cancer]

See also: INTRODUCTION See ICSC CARD: 0051

NIOSH Pocket Guide to Chemical Hazards

Thioglycolic acid	**CAS** 68-11-1
$HSCH_2COOH$	**RTECS** AI5950000
Synonyms & Trade Names Acetyl mercaptan, Mercaptoacetate, Mercaptoacetic acid, 2-Mercaptoacetic acid, 2-Thioglycolic acid, Thiovanic acid	**DOT ID & Guide** 1940 153

Exposure Limits	NIOSH REL: TWA 1 ppm (4 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.77 mg/m^3

Physical Description
Colorless liquid with a strong, disagreeable odor characteristic of mercaptans. [Note: Olfactory fatigue may occur after short exposures.]

MW: 92.1	BP: ?	FRZ: 2°F	Sol: Miscible
VP(64°F): 10 mmHg	IP: ?		Sp.Gr: 1.32
Fl.P: >230°F	UEL: ?	LEL: 5.9%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Air, strong oxidizers, bases, active metals (e.g., sodium potassium, magnesium, calcium) [Note: Readily oxidized by air.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; lacrimation (discharge of tears), corneal damage; skin burns, blisters; in animals: lassitude (weakness, exhaustion); gasping respirations; convulsions

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0915

NIOSH Pocket Guide to Chemical Hazards

Dimethylformamide	**CAS** 68-12-2
$HCON(CH_3)_2$	**RTECS** LQ2100000
Synonyms & Trade Names Dimethyl formamide; N,N-Dimethylformamide; DMF	**DOT ID & Guide** 2265 129

Exposure Limits	NIOSH REL: TWA 10 ppm (30 mg/m^3) [skin]
	OSHA PEL: TWA 10 ppm (30 mg/m^3) [skin]
IDLH 500 ppm See: 68122	**Conversion** 1 ppm = 2.99 mg/m^3

Physical Description
Colorless to pale-yellow liquid with a faint, amine-like odor.

MW: 73.1	BP: 307°F	FRZ: -78°F	Sol: Miscible
VP: 3 mmHg	IP: 9.12 eV		Sp.Gr: 0.95
Fl.P: 136°F	UEL: 15.2%	LEL(212°F): 2.2%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Carbon tetrachloride; other halogenated compounds when in contact with iron; strong oxidizers; alkyl aluminums; inorganic nitrates

Measurement Methods
NIOSH 2004; OSHA 66
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 100 ppm: (APF = 10) Any supplied-air respirator*
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 500 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; nausea, vomiting, colic; liver damage, enlarged liver; high blood pressure; face flush; dermatitis; in animals: kidney, heart damage

Target Organs Eyes, skin, respiratory system, liver, kidneys, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0457 See MEDICAL TESTS: 0091

NIOSH Pocket Guide to Chemical Hazards

n-Propyl alcohol	**CAS** 71-23-8
$CH_3CH_2CH_2OH$	**RTECS** UH8225000
Synonyms & Trade Names Ethyl carbinol, 1-Propanol, n-Propanol, Propyl alcohol	**DOT ID & Guide** 1274 129

Exposure Limits	NIOSH REL: TWA 200 ppm (500 mg/m^3) ST 250 ppm (625 mg/m^3) [skin]
	OSHA PEL†: TWA 200 ppm (500 mg/m^3)
IDLH 800 ppm See: 71238	**Conversion** 1 ppm = 2.46 mg/m^3

Physical Description
Colorless liquid with a mild, alcohol-like odor.

MW: 60.1	BP: 207°F	FRZ: -196°F	Sol: Miscible
VP: 15 mmHg	IP: 10.15 eV		Sp.Gr: 0.81
Fl.P: 72°F	UEL: 13.7%	LEL: 2.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1401; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 800 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; dry cracking skin; drowsiness, headache; ataxia, gastrointestinal pain; abdominal cramps, nausea, vomiting, diarrhea; in animals: narcosis

Target Organs Eyes, skin, respiratory system, gastrointestinal tract, central nervous system

See also: INTRODUCTION See ICSC CARD: 0553

NIOSH Pocket Guide to Chemical Hazards

n-Butyl alcohol	**CAS** 71-36-3
$CH_3CH_2CH_2CH_2OH$	**RTECS** EO1400000
Synonyms & Trade Names 1-Butanol, n-Butanol, Butyl alcohol, 1-Hydroxybutane, n-Propyl carbinol	**DOT ID & Guide** 1120 129

Exposure Limits	NIOSH REL: C 50 ppm (150 mg/m^3) [skin]
	OSHA PEL†: TWA 100 ppm (300 mg/m^3)
IDLH 1400 ppm [10%LEL] See: 71363	**Conversion** 1 ppm = 3.03 mg/m^3

Physical Description
Colorless liquid with a strong, characteristic, mildly alcoholic odor.

MW: 74.1	BP: 243°F	FRZ: -129°F	Sol: 9%
VP: 6 mmHg	IP: 10.04 eV		Sp.Gr: 0.81
Fl.P: 84°F	UEL: 11.2%	LEL: 1.4%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong mineral acids, alkali metals, halogens

Measurement Methods
NIOSH 1450; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 1250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£
Up to 1400 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; headache, dizziness, drowsiness; corneal inflammation, blurred vision, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light); dermatitis; possible auditory nerve damage, hearing loss; central nervous system depression

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0111 See MEDICAL TESTS: 0030

NIOSH Pocket Guide to Chemical Hazards

Benzene	**CAS** 71-43-2
C_6H_6	**RTECS** CY1400000
Synonyms & Trade Names Benzol, Phenyl hydride	**DOT ID & Guide** 1114 130

Exposure Limits	NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A
	OSHA PEL: [1910.1028] TWA 1 ppm ST 5 ppm See Appendix F
IDLH Ca [500 ppm] See: 71432	**Conversion** 1 ppm = 3.19 mg/m^3

Physical Description
Colorless to light-yellow liquid with an aromatic odor. [Note: A solid below 42°F.]

MW: 78.1	BP: 176°F	FRZ: 42°F	Sol: 0.07%
VP: 75 mmHg	IP: 9.24 eV		Sp.Gr: 0.88
Fl.P: 12°F	UEL: 7.8%	LEL: 1.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, many fluorides & perchlorates, nitric acid

Measurement Methods
NIOSH 1500, 1501, 3700, 3800; OSHA 12
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, blood, central nervous system, bone marrow

Cancer Site [leukemia]

See also: INTRODUCTION See ICSC CARD: 0015 See MEDICAL TESTS: 0022

NIOSH Pocket Guide to Chemical Hazards

Methyl chloroform	**CAS** 71-55-6
CH_3CCl_3	**RTECS** KJ2975000
Synonyms & Trade Names Chlorothene; 1,1,1-Trichloroethane; 1,1,1-Trichloroethane (stabilized)	**DOT ID & Guide** 2831 160

Exposure Limits	NIOSH REL: C 350 ppm (1900 mg/m^3) [15-minute] See Appendix C (Chloroethanes)
	OSHA PEL†: TWA 350 ppm (1900 mg/m^3)
IDLH 700 ppm See: 71556	**Conversion** 1 ppm = 5.46 mg/m^3

Physical Description
Colorless liquid with a mild, chloroform-like odor.

MW: 133.4	BP: 165°F	FRZ: -23°F	Sol: 0.4%
VP: 100 mmHg	IP: 11.00 eV		Sp.Gr: 1.34
Fl.P: ?	UEL: 12.5%	LEL: 7.5%	

Combustible Liquid, but burns with difficulty.

Incompatibilities & Reactivities
Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.]

Measurement Methods
NIOSH 1003
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 700 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage

Target Organs Eyes, skin, central nervous system, cardiovascular system, liver

See also: INTRODUCTION See ICSC CARD: 0079 See MEDICAL TESTS: 0141

NIOSH Pocket Guide to Chemical Hazards

Endrin	**CAS** 72-20-8
$C_{12}H_8Cl_6O$	**RTECS** I01575000
Synonyms & Trade Names 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo,endo-5,8-dimethanonaphthalene; Hexadrin®	**DOT ID & Guide** 2761 151 (mixture)

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 [skin]
	OSHA PEL: TWA 0.1 mg/m^3 [skin]
IDLH 2 mg/m^3 See: 72208	**Conversion**

Physical Description
Colorless to tan, crystalline solid with a mild, chemical odor. [insecticide]

MW: 380.9	BP: Decomposes	MLT: 392°F (Decomposes)	Sol: Insoluble
VP: Low	IP: ?		Sp.Gr: 1.70
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Strong oxidizers, strong acids, parathion [Note: May emit hydrogen chloride & phosgene when heated or burned.]

Measurement Methods
NIOSH 5519
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 1 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 10) Any supplied-air respirator

Up to 2 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Epileptiform convulsions; stupor, headache, dizziness; abdominal discomfort, nausea, vomiting; insomnia; aggressiveness, confusion; drowsiness, lassitude (weakness, exhaustion); anorexia; in animals: liver damage

Target Organs central nervous system, liver

See also: INTRODUCTION See ICSC CARD: 1023 See MEDICAL TESTS: 0092

NIOSH Pocket Guide to Chemical Hazards

Methoxychlor	**CAS** 72-43-5
$(C_6H_4OCH_3)_2CHCCl_3$	**RTECS** KJ3675000
Synonyms & Trade Names p,p'-Dimethoxydiphenylftrichloroethane; DMDT; Methoxy-DDT; 2,2-bis(p-Methoxyphenyl)-1,1,1-trichloroethane; 1,1,1-Trichloro-2,2-bis-(p-methoxyphenyl)ethane	**DOT ID & Guide** 2761 151 (organochlorine pesticide, solid, n.o.s.)

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: TWA 15 mg/m^3
IDLH Ca [5000 mg/m^3] See: 72435	**Conversion**

Physical Description
Colorless to light-yellow crystals with a slight, fruity odor. [insecticide]

MW: 345.7	BP: Decomposes	MLT: 171°F	Sol: 0.00001%
VP: Very low	IP: ?		Sp.Gr: 1.41
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid, but difficult to burn.

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
NIOSH S371 (II-4); OSHA PV2038
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily	Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion

Symptoms In animals: fasciculation, trembling, convulsions; kidney, liver damage; [potential occupational carcinogen]

Target Organs central nervous system, liver, kidneys

Cancer Site [in animals: liver & ovarian cancer]

See also: INTRODUCTION See ICSC CARD: 1306

NIOSH Pocket Guide to Chemical Hazards

Methyl bromide	**CAS** 74-83-9
CH_3Br	**RTECS** PA4900000
Synonyms & Trade Names Bromomethane, Monobromomethane	**DOT ID & Guide** 1062 123

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: C 20 ppm (80 mg/m^3) [skin]
IDLH Ca [250 ppm] See: 74839	**Conversion** 1 ppm = 3.89 mg/m^3

Physical Description
Colorless gas with a chloroform-like odor at high concentrations. [Note: A liquid below 38°F. Shipped as a liquefied compressed gas.]

MW: 95.0	BP: 38°F	FRZ: -137°F	Sol: 2%
VP: 1.9 atm	IP: 10.54 eV	RGasD: 3.36	Sp.Gr: 1.73 (Liquid at 32°F)
Fl.P: NA (Gas)	UEL: 16.0%	LEL: 10%	

Flammable Gas, but only in presence of a high energy ignition source.

Incompatibilities & Reactivities
Aluminum, magnesium, strong oxidizers [Note: Attacks aluminum to form aluminum trimethyl, which is SPONTANEOUSLY flammable.]

Measurement Methods
NIOSH 2520; OSHA PV2040
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact (liquid) Eyes: Prevent eye contact (liquid) Wash skin: When contaminated (liquid) Remove: When wet (flammable) Change: No recommendation Provide: Quick drench (liquid)	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption (liquid), skin and/or eye contact (liquid)

Symptoms Irritation eyes, skin, respiratory system; muscle weakness, incoordination, visual disturbance, dizziness; nausea, vomiting, headache; malaise (vague feeling of discomfort); hand tremor; convulsions; dyspnea (breathing difficulty); skin vesiculation; liquid: frostbite; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system

Cancer Site [in animals: lung, kidney & forestomach tumors]

See also: INTRODUCTION See ICSC CARD: 0109 See MEDICAL TESTS: 0138

NIOSH Pocket Guide to Chemical Hazards

Acetylene	**CAS** 74-86-2
C_2H_2	**RTECS** AO9600000
Synonyms & Trade Names Ethine, Ethyne [Note: A compressed gas used in the welding & cutting of metals.]	**DOT ID & Guide** 1001 116

Exposure Limits	NIOSH REL: C 2500 ppm (2662 mg/m^3)
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 1.06 mg/m^3

Physical Description
Colorless gas with a faint, ethereal odor. [Note: Commercial grade has a garlic-like odor. Shipped under pressure dissolved in acetone.]

MW: 26.0	BP: Sublimes	FRZ: -119°F (Sublimes)	Sol: 2%
VP: 44.2 atm	IP: 11.40 eV	RGasD: 0.91	
Fl.P: NA (Gas)	UEL: 100%	LEL: 2.5%	

Flammable Gas

Incompatibilities & Reactivities
Zinc; oxygen & other oxidizing agents such as halogens [Note: Forms explosive acetylide compounds with copper, mercury, silver & brasses (containing more than 66% copper).]

Measurement Methods
NIOSH Acetylene Crit. Doc.
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact (liquid)	
Symptoms Headache, dizziness; asphyxia; liquid: frostbite	
Target Organs central nervous system, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0089

NIOSH Pocket Guide to Chemical Hazards

Methyl chloride	**CAS** 74-87-3
CH_3Cl	**RTECS** PA6300000
Synonyms & Trade Names Chloromethane, Monochloromethane	**DOT ID & Guide** 1063 115

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3 hours)
IDLH Ca [2000 ppm] See: 74873	**Conversion** 1 ppm = 2.07 mg/m^3

Physical Description
Colorless gas with a faint, sweet odor which is not noticeable at dangerous concentrations. [Note: Shipped as a liquefied compressed gas.]

MW: 50.5	BP: -12°F	FRZ: -144°F	Sol: 0.5%
VP: 5.0 atm	IP: 11.28 eV	RGasD: 1.78	
Fl.P: NA (Gas)	UEL: 17.4%	LEL: 8.1%	

Flammable Gas

Incompatibilities & Reactivities
Chemically-active metals such as potassium, powdered aluminum, zinc & magnesium; water [Note: Reacts with water (hydrolyzes) to form hydrochloric acid.]

Measurement Methods
NIOSH 1001
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Dizziness, nausea, vomiting; visual disturbance, stagger, slurred speech, convulsions, coma; liver, kidney damage; liquid: frostbite; reproductive, teratogenic effects; [potential occupational carcinogen]

Target Organs central nervous system, liver, kidneys, reproductive system

Cancer Site [in animals: lung, kidney & forestomach tumors]

See also: INTRODUCTION See ICSC CARD: 0419 See MEDICAL TESTS: 0140

NIOSH Pocket Guide to Chemical Hazards

Methyl iodide	**CAS** 74-88-4
CH_3I	**RTECS** PA9450000
Synonyms & Trade Names Iodomethane, Monoiodomethane	**DOT ID & Guide** 2644 151

Exposure Limits	NIOSH REL: Ca TWA 2 ppm (10 mg/m^3) [skin] See Appendix A
	OSHA PEL: TWA 5 ppm (28 mg/m^3) [skin]
IDLH Ca [100 ppm] See: 74884	**Conversion** 1 ppm = 5.80 mg/m^3

Physical Description
Colorless liquid with a pungent, ether-like odor. [Note: Turns yellow, red, or brown on exposure to light & moisture.]

MW: 141.9	BP: 109°F	FRZ: -88°F	Sol: 1%
VP: 400 mmHg	IP: 9.54 eV		Sp.Gr: 2.28
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Strong oxidizers [Note: Decomposes at 518°F.]

Measurement Methods
NIOSH 1014
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; nausea, vomiting; dizziness, ataxia; slurred speech, drowsiness; dermatitis; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system

Cancer Site [in animals: lung, kidney & forestomach tumors]

See also: INTRODUCTION See ICSC CARD: 0509

NIOSH Pocket Guide to Chemical Hazards

Methylamine	**CAS** 74-89-5
CH_3NH_2	**RTECS** PF6300000
Synonyms & Trade Names Aminomethane, Methylamine (anhydrous), Methylamine (aqueous), Monomethylamine	**DOT ID & Guide** 1061 118 (anhydrous) 1235 132 (aqueous)

Exposure Limits	NIOSH REL: TWA 10 ppm (12 mg/m^3)
	OSHA PEL: TWA 10 ppm (12 mg/m^3)
IDLH 100 ppm See: 74895	**Conversion** 1 ppm = 1.27 mg/m^3

Physical Description
Colorless gas with a fish- or ammonia-like odor. [Note: A liquid below 21°F. Shipped as a liquefied compressed gas.]

MW: 31.1	BP: 21°F	FRZ: -136°F	Sol: Soluble
VP: 3.0 atm	IP: 8.97 eV	RGasD: 1.08	Sp.Gr: 0.70 (Liquid at 13°F)
Fl.P: NA (Gas) 14°F (Liquid)	UEL: 20.7%	LEL: 4.9%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Mercury, strong oxidizers, nitromethane [Note: Corrosive to copper & zinc alloys, aluminum & galvanized surfaces.]

Measurement Methods
OSHA 40
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (solution)/Frostbite Eyes: Prevent eye contact (solution)/Frostbite Wash skin: When contaminated (solution) Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Irrigate immediately (solution)/Frostbite Skin: Water flush immediately (solution)/Frostbite Breathing: Respiratory support Swallow: Medical attention immediately (solution)

Respirator Recommendations NIOSH/OSHA

Up to 100 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern[£]/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption (solution), ingestion (solution), skin and/or eye contact (solution/liquid)

Symptoms Irritation eyes, skin, respiratory system; cough; skin, mucous membrane burns; dermatitis; conjunctivitis; liquid: frostbite

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0178

NIOSH Pocket Guide to Chemical Hazards

Hydrogen cyanide	**CAS** 74-90-8
HCN	**RTECS** MW6825000
Synonyms & Trade Names Formonitrile, Hydrocyanic acid, Prussic acid	**DOT ID & Guide** 1051 117 (>20% solution) 1051 117 (anhydrous) 1613 154 (</=20% solution)

Exposure Limits	NIOSH REL: ST 4.7 ppm (5 mg/m^3) [skin]
	OSHA PEL†: TWA 10 ppm (11 mg/m^3) [skin]
IDLH 50 ppm See: 74908	**Conversion** 1 ppm = 1.10 mg/m^3

Physical Description
Colorless or pale-blue liquid or gas (above 78°F) with a bitter, almond-like odor. [Note: Often used as a 96% solution in water.]

MW: 27.0	BP: 78°F (96%)	FRZ: 7°F (96%)	Sol: Miscible
VP: 630 mmHg	IP: 13.60 eV		Sp.Gr: 0.69
Fl.P: 0°F (96%)	UEL: 40.0%	LEL: 5.6%	

Class IA Flammable Liquid Flammable Gas

Incompatibilities & Reactivities
Amines, oxidizers, acids, sodium hydroxide, calcium hydroxide, sodium carbonate, caustics, ammonia [Note: Can polymerize at 122-140°F.]

Measurement Methods
NIOSH 6010
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 47 ppm: (APF = 10) Any supplied-air respirator

Up to 50 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Asphyxia; lassitude (weakness, exhaustion), headache, confusion; nausea, vomiting; increased rate and depth of respiration or respiration slow and gasping; thyroid, blood changes

Target Organs central nervous system, cardiovascular system, thyroid, blood

See also: INTRODUCTION See ICSC CARD: 0492 See MEDICAL TESTS: 0117

NIOSH Pocket Guide to Chemical Hazards

Methyl mercaptan	**CAS** 74-93-1
CH_3SH	**RTECS** PB4375000
Synonyms & Trade Names Mercaptomethane, Methanethiol, Methyl sulfhydrate	**DOT ID & Guide** 1064 117

Exposure Limits	NIOSH REL: C 0.5 ppm (1 mg/m^3) [15-minute]
	OSHA PEL†: C 10 ppm (20 mg/m^3)
IDLH 150 ppm See: 74931	**Conversion** 1 ppm = 1.97 mg/m^3

Physical Description
Colorless gas with a disagreeable odor like garlic or rotten cabbage. [Note: A liquid below 43°F. Shipped as a liquefied compressed gas.]

MW: 48.1	BP: 43°F	FRZ: -186°F	Sol: 2%
VP: 1.7 atm	IP: 9.44 eV	RGasD: 1.66	Sp.Gr: 0.90 (Liquid at 32°F)
Fl.P: NA (Gas) (oc) 0°F (Liquid)	UEL: 21.8%	LEL: 3.9%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Strong oxidizers, bleaches, copper, aluminum, nickel-copper alloys

Measurement Methods
NIOSH 2542; OSHA 26
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact (liquid)/Frostbite Eyes: Prevent eye contact (liquid)/Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Eyewash (liquid), Quick drench (liquid), Frostbite	Eye: Irrigate immediately (liquid)/Frostbite Skin: Water flush immediately (liquid)/Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH

Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator

Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)

Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 150 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Irritation eyes, skin, respiratory system; narcosis; cyanosis; convulsions; liquid: frostbite

Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION See ICSC CARD: 0299 See MEDICAL TESTS: 0144

NIOSH Pocket Guide to Chemical Hazards

Ethyl bromide	**CAS** 74-96-4
CH_3CH_2Br	**RTECS** KH6475000
Synonyms & Trade Names Bromoethane, Monobromoethane	**DOT ID & Guide** 1891 131

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 200 ppm (890 mg/m^3)
IDLH 2000 ppm See: 74964	**Conversion** 1 ppm = 4.46 mg/m^3

Physical Description
Colorless to yellow liquid with an ether-like odor. [Note: A gas above 101°F.]

MW: 109.0	BP: 101°F	FRZ: -182°F	Sol: 0.9%
VP: 375 mmHg	IP: 10.29 eV		Sp.Gr: 1.46
Fl.P: <4°F	UEL: 8.0%	LEL: 6.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium

Measurement Methods
NIOSH 1011; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations OSHA
Up to 2000 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; central nervous system depression; pulmonary edema; liver, kidney disease; cardiac arrhythmias, cardiac arrest

Target Organs Eyes, skin, respiratory system, liver, kidneys, cardiovascular system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Chlorobromomethane	**CAS** 74-97-5
CH_2BrCl	**RTECS** PA5250000
Synonyms & Trade Names Bromochloromethane, CB, CBM, Fluorocarbon 1011, Halon® 1011, Methyl chlorobromide	**DOT ID & Guide** 1887 160

Exposure Limits	NIOSH REL: TWA 200 ppm (1050 mg/m^3)
	OSHA PEL: TWA 200 ppm (1050 mg/m^3)
IDLH 2000 ppm See: 74975	**Conversion** 1 ppm = 5.29 mg/m^3

Physical Description
Colorless to pale-yellow liquid with a chloroform-like odor. [Note: May be used as a fire extinguishing agent.]

MW: 129.4	BP: 155°F	FRZ: -124°F	Sol: Insoluble
VP: 115 mmHg	IP: 10.77 eV		Sp.Gr: 1.93
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Chemically-active metals such as calcium, powdered aluminum, zinc & magnesium

Measurement Methods
NIOSH 1003
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, throat; confusion, dizziness, central nervous system depression; pulmonary edema

Target Organs Eyes, skin, respiratory system, liver, kidneys, central nervous system

See also: INTRODUCTION See ICSC CARD: 0392

NIOSH Pocket Guide to Chemical Hazards

Propane	**CAS** 74-98-6
$CH_3CH_2CH_3$	**RTECS** TX2275000
Synonyms & Trade Names Bottled gas, Dimethyl methane, n-Propane, Propyl hydride	**DOT ID & Guide** 1075 115 1978 115

Exposure Limits	NIOSH REL: TWA 1000 ppm (1800 mg/m^3)
	OSHA PEL: TWA 1000 ppm (1800 mg/m^3)
IDLH 2100 ppm [10%LEL] See: 74986	**Conversion** 1 ppm = 1.80 mg/m^3

Physical Description
Colorless, odorless gas. [Note: A foul-smelling odorant is often added when used for fuel purposes. Shipped as a liquefied compressed gas.]

MW: 44.1	BP: -44°F	FRZ: -306°F	Sol: 0.01%
VP(70°F): 8.4 atm	IP: 11.07 eV	RGasD: 1.55	
Fl.P: NA (Gas)	UEL: 9.5%	LEL: 2.1%	

Flammable Gas

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH S87 (II-2)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 2100 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Dizziness, confusion, excitation, asphyxia; liquid: frostbite

Target Organs central nervous system

See also: INTRODUCTION See ICSC CARD: 0319

NIOSH Pocket Guide to Chemical Hazards

Methyl acetylene	**CAS** 74-99-7
C_3H_4	**RTECS** UK4250000
Synonyms & Trade Names Allylene, Propine, Propyne, 1-Propyne	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1000 ppm (1650 mg/m^3)
	OSHA PEL: TWA 1000 ppm (1650 mg/m^3)
IDLH 1700 ppm [10%LEL] See: 74997	**Conversion** 1 ppm = 1.64 mg/m^3

Physical Description
Colorless gas with a sweet odor. [Note: A fuel that is shipped as a liquefied compressed gas.]

MW: 40.1	BP: -10°F	FRZ: -153°F	Sol: Insoluble
VP: 5.2 atm	IP: 10.36 eV	RGasD: 1.41	
Fl.P: NA (Gas)	UEL: ?	LEL: 1.7%	

Flammable Gas

Incompatibilities & Reactivities
Strong oxidizers (such as chlorine), copper alloys [Note: Can decompose explosively at 4.5 to 5.6 atmospheres of pressure.]

Measurement Methods
NIOSH S84 (II-5)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 1700 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Irritation respiratory system; tremor, hyperexcitability, anesthesia; liquid: frostbite

Target Organs respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0560

NIOSH Pocket Guide to Chemical Hazards

Ethyl chloride	**CAS** 75-00-3
CH_3CH_2Cl	**RTECS** KH7525000
Synonyms & Trade Names Chloroethane, Hydrochloric ether, Monochloroethane, Muriatic ether	**DOT ID & Guide** 1037 115

Exposure Limits	NIOSH REL: Handle with caution in the workplace. See Appendix C (Chloroethanes)
	OSHA PEL: TWA 1000 ppm (2600 mg/m^3)
IDLH 3800 ppm [10%LEL] See: 75003	**Conversion** 1 ppm = 2.64 mg/m^3

Physical Description
Colorless gas or liquid (below 54°F) with a pungent, ether-like odor. [Note: Shipped as a liquefied compressed gas.]

MW: 64.5	BP: 54°F	FRZ: -218°F	Sol: 0.6%
VP: 1000 mmHg	IP: 10.97 eV	RGasD: 2.23	Sp.Gr: 0.92 (Liquid at 32°F)
Fl.P: NA (Gas) -58°F (Liquid)	UEL: 15.4%	LEL: 3.8%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium; oxidizers; water or steam [Note: Reacts with water to form hydrochloric acid.]

Measurement Methods
NIOSH 2519
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (liquid) Eyes: Prevent eye contact (liquid) Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation	Eye: Irrigate immediately (liquid) Skin: Water flush promptly (liquid) Breathing: Respiratory support Swallow: Medical attention immediately (liquid)

Respirator Recommendations OSHA

Up to 3800 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption (liquid), ingestion (liquid), skin and/or eye contact

Symptoms Incoordination, inebriation; abdominal cramps; cardiac arrhythmias, cardiac arrest; liver, kidney damage

Target Organs Liver, kidneys, respiratory system, cardiovascular system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0132

NIOSH Pocket Guide to Chemical Hazards

Vinyl chloride	**CAS** 75-01-4
CH_2=CHCl	**RTECS** KU9625000
Synonyms & Trade Names Chloroethene, Chloroethylene, Ethylene monochloride, Monochloroethene, Monochloroethylene, VC, Vinyl chloride monomer (VCM)	**DOT ID & Guide** 1086 116P

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1017] TWA 1 ppm C 5 ppm [15-minute]
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion** 1 ppm = 2.56 mg/m^3

Physical Description
Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations. [Note: Shipped as a liquefied compressed gas.]

MW: 62.5	BP: 7°F	FRZ: -256°F	Sol(77°F): 0.1%
VP: 3.3 atm	IP: 9.99 eV	RGasD: 2.21	
Fl.P: NA (Gas)	UEL: 33.0%	LEL: 3.6%	

Flammable Gas

Incompatibilities & Reactivities
Copper, oxidizers, aluminum, peroxides, iron, steel [Note: Polymerizes in air, sunlight, or heat unless stabilized by inhibitors such as phenol. Attacks iron & steel in presence of moisture.]

Measurement Methods
NIOSH 1007; OSHA 4, 75
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin, and/or eye contact (liquid)

Symptoms Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]

Target Organs Liver, central nervous system, blood, respiratory system, lymphatic system

Cancer Site [liver cancer]

See also: INTRODUCTION See ICSC CARD: 0082 See MEDICAL TESTS: 0241

NIOSH Pocket Guide to Chemical Hazards

Vinyl fluoride	**CAS** 75-02-5
CH_2=CHF	**RTECS** YZ7351000
Synonyms & Trade Names Fluoroethene, Fluoroethylene, Monofluoroethylene, Vinyl fluoride monomer	**DOT ID & Guide** 1860 116P (inhibited)

Exposure Limits	NIOSH REL: TWA 1 ppm C 5 ppm [use 1910.1017]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 1.89 mg/m^3

Physical Description
Colorless gas with a faint, ethereal odor. [Note: Shipped as a liquefied compressed gas.]

MW: 46.1	BP: -98°F	FRZ: -257°F	Sol: Insoluble
VP: 25.2 atm	IP: 10.37 eV	RGasD: 1.60	
Fl.P: NA (Gas)	UEL: 21.7%	LEL: 2.6%	

Flammable Gas

Incompatibilities & Reactivities
None reported [Note: Inhibited with 0.2% terpenes to prevent polymerization.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	**First Aid** (See procedures) Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH
Up to 10 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 50 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 200 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Headache, dizziness, confusion, incoordination, narcosis, nausea, vomiting; liquid: frostbite

Target Organs central nervous system

See also: INTRODUCTION See ICSC CARD: 0598

NIOSH Pocket Guide to Chemical Hazards

Ethylamine	**CAS** 75-04-7
$CH_3CH_2NH_2$	**RTECS** KH2100000
Synonyms & Trade Names Aminoethane, Ethylamine (anhydrous), Monoethylamine	**DOT ID & Guide** 1036 118

Exposure Limits	NIOSH REL: TWA 10 ppm (18 mg/m^3)
	OSHA PEL: TWA 10 ppm (18 mg/m^3)
IDLH 600 ppm See: 75047	**Conversion** 1 ppm = 1.85 mg/m^3

Physical Description
Colorless gas or water-white liquid (below 62°F) with an ammonia-like odor. [Note: Shipped as a liquefied compressed gas.]

MW: 45.1	BP: 62°F	FRZ: -114°F	Sol: Miscible
VP: 874 mmHg	IP: 8.86 eV	RGasD: 1.61	Sp.Gr: 0.69 (Liquid)
Fl.P: 1°F	UEL: 14.0%	LEL: 3.5%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Strong acids; strong oxidizers; copper, tin & zinc in presence of moisture; cellulose nitrate; chlorine; hypochlorites

Measurement Methods
NIOSH S144 (II-3); OSHA 36
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (liquid) Eyes: Prevent eye contact (liquid) Wash skin: When contaminated (liquid) Remove: When wet or contaminated (liquid) Change: No recommendation Provide: Eyewash (liquid), Quick drench (liquid)	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support Swallow: Medical attention immediately (liquid)

Respirator Recommendations NIOSH/OSHA

Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern£

Up to 500 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 600 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption (liquid), ingestion (liquid), skin and/or eye contact (liquid)

Symptoms Irritation eyes, skin, respiratory system; skin burns, dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0153

NIOSH Pocket Guide to Chemical Hazards

Acetonitrile	**CAS** 75-05-8
CH_3CN	**RTECS** AL7700000
Synonyms & Trade Names Cyanomethane, Ethyl nitrile, Methyl cyanide [Note: Forms cyanide in the body.]	**DOT ID & Guide** 1648 131

Exposure Limits	NIOSH REL: TWA 20 ppm (34 mg/m^3)
	OSHA PEL†: TWA 40 ppm (70 mg/m^3)
IDLH 500 ppm See: 75058	**Conversion** 1 ppm = 1.68 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 41.1	BP: 179°F	FRZ: -49°F	Sol: Miscible
VP: 73 mmHg	IP: 12.20 eV		Sp.Gr: 0.78
Fl.P(oc): 42°F	UEL: 16.0%	LEL: 3.0%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1606
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 200 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation nose, throat; asphyxia; nausea, vomiting; chest pain; lassitude (weakness, exhaustion); stupor, convulsions; in animals: liver, kidney damage

Target Organs respiratory system, cardiovascular system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0088 See MEDICAL TESTS: 0003

NIOSH Pocket Guide to Chemical Hazards

Acetaldehyde	**CAS** 75-07-0
CH_3CHO	**RTECS** AB1925000
Synonyms & Trade Names Acetic aldehyde, Ethanal, Ethyl aldehyde	**DOT ID & Guide** 1089 129

Exposure Limits	NIOSH REL: Ca See Appendix A See Appendix C (Aldehydes)
	OSHA PEL†: TWA 200 ppm (360 mg/m^3)
IDLH Ca [2000 ppm] See: 75070	**Conversion** 1 ppm = 1.80 mg/m^3

Physical Description
Colorless liquid or gas (above 69°F) with a pungent, fruity odor.

MW: 44.1	BP: 69°F	FRZ: -190°F	Sol: Miscible
VP: 740 mmHg	IP: 10.22 eV		Sp.Gr: 0.79
Fl.P: -36°F	UEL: 60%	LEL: 4.0%	

Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, acids, bases, alcohols, ammonia & amines, phenols, ketones, HCN, H_2S
[Note: Prolonged contact with air may cause formation of peroxides that may explode and burst containers; easily undergoes polymerization.]

Measurement Methods
NIOSH 2538; OSHA 68
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; eye, skin burns; dermatitis; conjunctivitis; cough; central nervous system depression; delayed pulmonary edema; in animals: kidney, reproductive, teratogenic effects; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, kidneys, central nervous system, reproductive system

Cancer Site [in animals: nasal cancer]

See also: INTRODUCTION See ICSC CARD: 0009 See MEDICAL TESTS: 0001

NIOSH Pocket Guide to Chemical Hazards

Ethyl mercaptan	**CAS** 75-08-1
CH_3CH_2SH	**RTECS** K19625000
Synonyms & Trade Names Ethanethiol, Ethyl sulfhydrate, Mercaptoethane	**DOT ID & Guide** 2363 130

Exposure Limits	NIOSH REL: C 0.5 ppm (1.3 mg/m^3) [15-minute]
	OSHA PEL†: C 10 ppm (25 mg/m^3)
IDLH 500 ppm See: 75081	**Conversion** 1 ppm = 2.54 mg/m^3

Physical Description
Colorless liquid with a strong, skunk-like odor. [Note: A gas above 95°F.]

MW: 62.1	BP: 95°F	FRZ: -228°F	Sol: 0.7%
VP: 442 mmHg	IP: 9.29 eV		Sp.Gr: 0.84
Fl.P: -55°F	UEL: 18.0%	LEL: 2.8%	

Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F.

Incompatibilities & Reactivities
Strong oxidizers [Note: Reacts violently with calcium hypochlorite.]

Measurement Methods
NIOSH 2542
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 500 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation mucous membrane; headache, nausea; in animals: incoordination, lassitude (weakness, exhaustion); liver, kidney damage; cyanosis; narcosis

Target Organs Eyes, respiratory system, liver, kidneys, blood

See also: INTRODUCTION See ICSC CARD: 0470 See MEDICAL TESTS: 0099

NIOSH Pocket Guide to Chemical Hazards

Methylene chloride	**CAS** 75-09-2
CH_2Cl_2	**RTECS** PA8050000
Synonyms & Trade Names Dichloromethane, Methylene dichloride	**DOT ID & Guide** 1593 160

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1052] TWA 25 ppm ST 125 ppm
IDLH Ca [2300 ppm] See: 75092	**Conversion** 1 ppm = 3.47 mg/m^3

Physical Description
Colorless liquid with a chloroform-like odor. [Note: A gas above 104°F.]

MW: 84.9	BP: 104°F	FRZ: -139°F	Sol: 2%
VP: 350 mmHg	IP: 11.32 eV		Sp.Gr: 1.33
Fl.P: ?	UEL: 23%	LEL: 13%	

Combustible Liquid

Incompatibilities & Reactivities
Strong oxidizers; caustics; chemically-active metals such as aluminum, magnesium powders, potassium & sodium; concentrated nitric acid

Measurement Methods
NIOSH 1005, 3800; OSHA 59, 80
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numbness, tingle limbs; nausea; [potential occupational carcinogen]

Target Organs Eyes, skin, cardiovascular system, central nervous system

Cancer Site [in animals: lung, liver, salivary & mammary gland tumors]

See also: INTRODUCTION See ICSC CARD: 0058 See MEDICAL TESTS: 0148

NIOSH Pocket Guide to Chemical Hazards

Formamide	**CAS** 75-12-7
$HCONH_2$	**RTECS** LQ0525000
Synonyms & Trade Names Carbamaldehyde, Methanamide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 ppm (15 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 1.85 mg/m^3

Physical Description
Colorless, oily liquid. [Note: A solid below 37°F.]

MW: 45.1	BP: 411°F (Decomposes)	FRZ: 37°F	Sol: Miscible
VP(86°F): 0.1 mmHg	IP: 10.20 eV		Sp.Gr: 1.13
Fl.P(oc): 310°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Oxidizers, iodine, pyridine, sulfur trioxide, copper, brass, lead [Note: Hygroscopic (i.e., absorbs moisture from the air).]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Water wash Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, mucous membrane; drowsiness, lassitude (weakness, exhaustion); nausea; acidosis; skin eruptions; in animals: reproductive effects	
Target Organs Eyes, skin, respiratory system, central nervous system, reproductive system	

See also: INTRODUCTION See ICSC CARD: 0891

NIOSH Pocket Guide to Chemical Hazards

Carbon disulfide	**CAS** 75-15-0
CS_2	**RTECS** FF6650000
Synonyms & Trade Names Carbon bisulfide	**DOT ID & Guide** 1131 131

Exposure Limits	NIOSH REL: TWA 1 ppm (3 mg/m^3) ST 10 ppm (30 mg/m^3) [skin]
	OSHA PEL†: TWA 20 ppm C 30 ppm 100 ppm (30-minute maximum peak)
IDLH 500 ppm See: 75150	**Conversion** 1 ppm = 3.11 mg/m^3

Physical Description
Colorless to faint-yellow liquid with a sweet ether-like odor. [Note: Reagent grades are foul smelling.]

MW: 76.1	BP: 116°F	FRZ: -169°F	Sol: 0.3%
VP: 297 mmHg	IP: 10.08 eV		Sp.Gr: 1.26
Fl.P: -22°F	UEL: 50.0%	LEL: 1.3%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers; chemically-active metals such as sodium, potassium & zinc; azides; rust; halogens; amines [Note: Vapors may be ignited by contact with ordinary light bulb.]

Measurement Methods
NIOSH 1600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 10 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator

Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)

Up to 50 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 500 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Dizziness, headache, poor sleep, lassitude (weakness, exhaustion), anxiety, anorexia, weight loss; psychosis; polyneuropathy; Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; kidney, liver injury; eye, skin burns; dermatitis; reproductive effects

Target Organs central nervous system, peripheral nervous system, cardiovascular system, eyes, kidneys, liver, skin, reproductive system

See also: INTRODUCTION See ICSC CARD: 0022 See MEDICAL TESTS: 0039

NIOSH Pocket Guide to Chemical Hazards

Ethylene oxide	**CAS** 75-21-8
C_2H_4O	**RTECS** KX2450000
Synonyms & Trade Names Dimethylene oxide; 1,2-Epoxy ethane; Oxirane	**DOT ID & Guide** 1040 119

Exposure Limits	NIOSH REL: Ca TWA <0.1 ppm (0.18 mg/m^3) C 5 ppm (9 mg/m^3) [10-min/day] See Appendix A
	OSHA PEL: [1910.1047] TWA 1 ppm 5 ppm [15-minute Excursion]
IDLH Ca [800 ppm] See: 75218	**Conversion** 1 ppm = 1.80 mg/m^3

Physical Description
Colorless gas or liquid (below 51°F) with an ether-like odor.

MW: 44.1	BP: 51°F	FRZ: -171°F	Sol: Miscible
VP: 1.46 atm	IP: 10.56 eV	RGasD: 1.49	Sp.Gr: 0.82 (Liquid at 50°F)
Fl.P: NA (Gas) -20°F (Liquid)	UEL: 100%	LEL: 3.0%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Strong acids, alkalis & oxidizers; chlorides of iron, aluminum & tin; oxides of iron & aluminum; water

Measurement Methods
NIOSH 1614, 3800; OSHA 30, 49, 50
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (liquid) Eyes: Prevent eye contact (liquid) Wash skin: When contaminated (liquid) Remove: When wet (flammable) Change: No recommendation Provide: Quick drench (liquid)	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately (liquid)

Respirator Recommendations NIOSH

Up to 5 ppm: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion (liquid), skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; peculiar taste; headache; nausea, vomiting, diarrhea; dyspnea (breathing difficulty), cyanosis, pulmonary edema; drowsiness, lassitude (weakness, exhaustion), incoordination; EKG abnormalities; eye, skin burns (liquid or high vapor concentration); liquid: frostbite; reproductive effects; [potential occupational carcinogen]; in animals: convulsions; liver, kidney damage

Target Organs Eyes, skin, respiratory system, liver, central nervous system, blood, kidneys, reproductive system

Cancer Site [peritoneal cancer, leukemia]

See also: INTRODUCTION See ICSC CARD: 0155 See MEDICAL TESTS: 0106

NIOSH Pocket Guide to Chemical Hazards

Bromoform	**CAS** 75-25-2
$CHBr_3$	**RTECS** PB5600000
Synonyms & Trade Names Methyl tribromide, Tribromomethane	**DOT ID & Guide** 2515 159

Exposure Limits	NIOSH REL: TWA 0.5 ppm (5 mg/m^3) [skin]
	OSHA PEL: TWA 0.5 ppm (5 mg/m^3) [skin]
IDLH 850 ppm See: 75252	**Conversion** 1 ppm = 10.34 mg/m^3

Physical Description
Colorless to yellow liquid with a chloroform-like odor. [Note: A solid below 47°F.]

MW: 252.8	BP: 301°F	FRZ: 47°F	Sol: 0.1%
VP: 5 mmHg	IP: 10.48 eV		Sp.Gr: 2.89
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Lithium, sodium, potassium, calcium, aluminum, zinc, magnesium, strong caustics, acetone [Note: Gradually decomposes, acquiring yellow color; air & light accelerate decomposition.]

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 850 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; central nervous system depression; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0108

NIOSH Pocket Guide to Chemical Hazards

Isobutane	**CAS** 75-28-5
$CH_3CH(CH_3)_2$	**RTECS** TZ4300000
Synonyms & Trade Names 2-Methylpropane [Note: Also see specific listing for n-Butane.]	**DOT ID & Guide** 1075 115 1969 115

Exposure Limits	NIOSH REL: TWA 800 ppm (1900 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.38 mg/m^3

Physical Description
Colorless gas with a gasoline-like or natural gas odor. [Note: Shipped as a liquefied compressed gas. A liquid below 11°F.]

MW: 58.1	BP: 11°F	FRZ: -255°F	Sol: Slight
VP(70°F): 3.1 atm	IP: 10.74 eV	RGasD: 2.06	
Fl.P: NA (Gas)	UEL: 8.4%	LEL: 1.6%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Strong oxidizers (e.g., nitrates & perchlorates), chlorine, fluorine, (nickel carbonyl + oxygen)

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact (liquid)	
Symptoms Drowsiness, narcosis, asphyxia; liquid: frostbite	
Target Organs central nervous system	

See also: INTRODUCTION See ICSC CARD: 0901

NIOSH Pocket Guide to Chemical Hazards

Isopropylamine	**CAS** 75-31-0
$(CH_3)_2CHNH_2$	**RTECS** NT8400000
Synonyms & Trade Names 2-Aminopropane, Monoisopropylamine, 2-Propylamine, sec-Propylamine	**DOT ID & Guide** 1221 132

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 5 ppm (12 mg/m^3)
IDLH 750 ppm See: 75310	**Conversion** 1 ppm = 2.42 mg/m^3

Physical Description
Colorless liquid with an ammonia-like odor. [Note: A gas above 91°F.]

MW: 59.1	BP: 91°F	FRZ: -150°F	Sol: Miscible
VP: 460 mmHg	IP: 8.72 eV		Sp.Gr: 0.69
Fl.P(oc): -35°F	UEL: ?	LEL: ?	

Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F.

Incompatibilities & Reactivities
Strong acids, strong oxidizers, aldehydes, ketones, epoxides

Measurement Methods
NIOSH S147 (II-3)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations OSHA
Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern£
Up to 250 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 750 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; pulmonary edema; visual disturbance; eye, skin burns; dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0908

NIOSH Pocket Guide to Chemical Hazards

1,1-Dichloroethane	**CAS** 75-34-3
$CHCl_2CH_3$	**RTECS** KI0175000
Synonyms & Trade Names Asymmetrical dichloroethane; Ethylidene chloride; 1,1-Ethylidene dichloride	**DOT ID & Guide** 2362 130

Exposure Limits	NIOSH REL: TWA 100 ppm (400 mg/m^3) See Appendix C (Chloroethanes)
	OSHA PEL: TWA 100 ppm (400 mg/m^3)
IDLH 3000 ppm See: 75343	**Conversion** 1 ppm = 4.05 mg/m^3

Physical Description
Colorless, oily liquid with a chloroform-like odor.

MW: 99.0	BP: 135°F	FRZ: -143°F	Sol: 0.6%
VP: 182 mmHg	IP: 11.06 eV		Sp.Gr: 1.18
Fl.P: 2°F	UEL: 11.4%	LEL: 5.4%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong caustics

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1000 ppm: (APF = 10) Any supplied-air respirator
Up to 2500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 3000 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation skin; central nervous system depression; liver, kidney, lung damage

Target Organs Skin, liver, kidneys, lungs, central nervous system

See also: INTRODUCTION See ICSC CARD: 0249

NIOSH Pocket Guide to Chemical Hazards

Vinylidene chloride	**CAS** 75-35-4
CH_2=CCl_2	**RTECS** KV9275000
Synonyms & Trade Names 1,1-DCE; 1,1-Dichloroethene; 1,1-Dichloroethylene; VDC; Vinylidene chloride monomer; Vinylidene dichloride	**DOT ID & Guide** 1303 129P (inhibited)

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor.

MW: 96.9	BP: 89°F	FRZ: -189°F	Sol: 0.04%
VP: 500 mmHg	IP: 10.00 eV		Sp.Gr: 1.21
Fl.P: -2°F	UEL: 15.5%	LEL: 6.5%	

Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F.

Incompatibilities & Reactivities
Aluminum, sunlight, air, copper, heat [Note: Polymerization may occur if exposed to oxidizers, chlorosulfonic acid, nitric acid, or oleum. Inhibitors such as the monomethyl ether of hydroquinone are added to prevent polymerization.]

Measurement Methods
NIOSH 1015; OSHA 19
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

Cancer Site [in animals: liver & kidney tumors]

See also: INTRODUCTION See ICSC CARD: 0083

NIOSH Pocket Guide to Chemical Hazards

Vinylidene fluoride	**CAS** 75-38-7
CH_2=CF_2	**RTECS** KW0560000
Synonyms & Trade Names Difluoro-1,1-ethylene; 1,1-Difluoroethene; 1,1-Difluoroethylene; Halocarbon 1132A; VDF; Vinylidene difluoride	**DOT ID & Guide** 1959 116P

Exposure Limits	NIOSH REL: TWA 1 ppm C 5 ppm [use 1910.1017]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.62 mg/m^3

Physical Description
Colorless gas with a faint, ethereal odor. [Note: Shipped as a liquefied compressed gas.]

MW: 64.0	BP: -122°F	FRZ: -227°F	Sol: Insoluble
VP: 35.2 atm	IP: 10.29 eV	RGasD: 2.21	
Fl.P: NA (Gas)	UEL: 21.3%	LEL: 5.5%	

Flammable Gas

Incompatibilities & Reactivities
Oxidizers, aluminum chloride [Note: Violent reaction with hydrogen chloride when heated under pressure.]

Measurement Methods
NIOSH 3800
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH

Up to 10 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator

Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)

Up to 50 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 200 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Dizziness, headache, nausea; liquid: frostbite

Target Organs central nervous system

See also: INTRODUCTION See ICSC CARD: 0687

NIOSH Pocket Guide to Chemical Hazards

Dichloromonofluoromethane	**CAS** 75-43-4
$CHCl_2F$	**RTECS** PA8400000
Synonyms & Trade Names Dichlorofluoromethane, Fluorodichloromethane, Freon® 21, Genetron® 21, Halon® 112, Refrigerant 21	**DOT ID & Guide** 1029 126

Exposure Limits	NIOSH REL: TWA 10 ppm (40 mg/m^3)
	OSHA PEL†: TWA 1000 ppm (4200 mg/m^3)
IDLH 5000 ppm See: 75434	**Conversion** 1 ppm = 4.21 mg/m^3

Physical Description
Colorless gas with a slight, ether-like odor. [Note: A liquid below 48°F. Shipped as a liquefied compressed gas.]

MW: 102.9	BP: 48°F	FRZ: -211°F	Sol(86°F): 0.7%
VP(70°F): 1.6 atm	IP: 12.39 eV	RGasD: 3.57	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium; acid; acid fumes

Measurement Methods
NIOSH 2516
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH
Up to 100 ppm: (APF = 10) Any supplied-air respirator
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 500 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 5000 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Asphyxia, cardiac arrhythmias, cardiac arrest; liquid: frostbite

Target Organs respiratory system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 1106

NIOSH Pocket Guide to Chemical Hazards

Phosgene	**CAS** 75-44-5
$COCl_2$	**RTECS** SY5600000
Synonyms & Trade Names Carbon oxychloride, Carbonyl chloride, Carbonyl dichloride, Chloroformyl chloride	**DOT ID & Guide** 1076 125

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.4 mg/m^3) C 0.2 ppm (0.8 mg/m^3) [15-minute]
	OSHA PEL: TWA 0.1 ppm (0.4 mg/m^3)
IDLH 2 ppm See: 75445	**Conversion** 1 ppm = 4.05 mg/m^3

Physical Description
Colorless gas with a suffocating odor like musty hay. [Note: A fuming liquid below 47°F. Shipped as a liquefied compressed gas.]

MW: 98.9	BP: 47°F	FRZ: -198°F	Sol: Slight
VP: 1.6 atm	IP: 11.55 eV	RGasD: 3.48	Sp.Gr: 1.43 (Liquid at 32°F)
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Moisture, alkalis, ammonia, alcohols, copper [Note: Reacts slowly in water to form hydrochloric acid & carbon dioxide.]

Measurement Methods
OSHA 61
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (liquid) Eyes: Prevent eye contact (liquid) Wash skin: When contaminated (liquid) Remove: When wet or contaminated (liquid) Change: No recommendation Provide: Quick drench (liquid)	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 1 ppm: (APF = 10) Any supplied-air respirator*
Up to 2 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Irritation eyes; dry burning throat; vomiting; cough, foamy sputum, dyspnea (breathing difficulty), chest pain, cyanosis; liquid: frostbite

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0007 See MEDICAL TESTS: 0186

NIOSH Pocket Guide to Chemical Hazards

Chlorodifluoromethane	**CAS** 75-45-6
$CHClF_2$	**RTECS** PA6390000
Synonyms & Trade Names Difluorochloromethane, Fluorocarbon-22, Freon® 22, Genetron® 22, Monochlorodifluoromethane, Refrigerant 22	**DOT ID & Guide** 1018 126

Exposure Limits	NIOSH REL: TWA 1000 ppm (3500 mg/m^3) ST 1250 ppm (4375 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.54 mg/m^3

Physical Description
Colorless gas with a faint, sweetish odor. [Note: Shipped as a liquefied compressed gas.]

MW: 86.5	BP: -41°F	FRZ: -231°F	Sol(77°F): 0.3%
VP: 9.4 atm	IP: 12.45 eV	RGasD: 3.11	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Alkalis, alkaline earth metals (e.g., powdered aluminum, sodium, potassium, zinc)

Measurement Methods
NIOSH 1018
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	**First Aid** (See procedures) Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations To be added later
Exposure Routes inhalation, skin and/or eye contact (liquid)
Symptoms Irritation respiratory system; confusion, drowsiness, ringing in ears; heart palpitations, cardiac arrhythmias; asphyxia; liver, kidney, spleen injury; liquid: frostbite
Target Organs respiratory system, cardiovascular system, central nervous system, liver, kidneys, spleen

See also: INTRODUCTION See ICSC CARD: 0049

NIOSH Pocket Guide to Chemical Hazards

Iodoform	**CAS** 75-47-8
CHI_3	**RTECS** PB7000000
Synonyms & Trade Names Triiodomethane	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.6 ppm (10 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 16.10 mg/m^3

Physical Description
Yellow to greenish-yellow powder or crystalline solid with a pungent, disagreeable odor. [antiseptic for external use]

MW: 393.7	BP: 410°F (Decomposes)	MLT: 246°F	Sol: 0.01%
VP: ?	IP: ?		Sp.Gr: 4.01
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers, lithium, metallic salts (e.g., mercuric oxide, silver nitrate), strong bases, calomel, tannin

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin; lassitude (weakness, exhaustion), dizziness, nausea, incoordination, central nervous system depression; dyspnea (breathing difficulty); liver, kidney, heart damage; visual disturbance	
Target Organs Eyes, skin, respiratory system, liver, kidneys, heart	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Trimethylamine	**CAS** 75-50-3
$(CH_3)_3N$	**RTECS** PA0350000
Synonyms & Trade Names N,N-Dimethylmethanamine; TMA [Note: May be used in an aqueous solution (typically 25%, 30%, or 40% TMA.]	**DOT ID & Guide** 1083 118 (anhydrous) 1297 132 (aqueous solution)

Exposure Limits	NIOSH REL: TWA 10 ppm (24 mg/m^3) ST 15 ppm (36 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.42 mg/m^3

Physical Description
Colorless gas with a fishy, amine odor. [Note: A liquid below 37°F. Shipped as a liquefied compressed gas.]

MW: 59.1	BP: 37°F	FRZ: -179°F	Sol(86°F): 48%
VP(70°F): 1454 mmHg	IP: 7.82 eV	RGasD: 2.09	
Fl.P: NA (Gas) 20°F (Liquid)	UEL: 11.6%	LEL: 2.0%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Strong oxidizers (including bromine), ethylene oxide, nitrosating agents (e.g., sodium nitrite), mercury, strong acids [Note: Corrosive to many metals (e.g., zinc, brass, aluminum, copper).]

Measurement Methods
OSHA PV2060
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (liquid/solution)/Frostbite Eyes: Prevent eye contact (liquid/solution)/Frostbite Wash skin: When contaminated (solution) Remove: When wet (flammable) Change: No recommendation Provide: Eyewash (liquid/solution), Quick drench (liquid/solution), Frostbite	Eye: Irrigate immediately (liquid/solution)/Frostbite Skin: Water flush immediately (liquid/solution)/Frostbite Breathing: Respiratory support Swallow: Medical attention immediately (solution)

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion (solution), skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; cough, dyspnea (breathing difficulty), delayed pulmonary edema; blurred vision, corneal necrosis; skin burns; liquid: frostbite

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0206

NIOSH Pocket Guide to Chemical Hazards

Nitromethane	**CAS** 75-52-5
CH_3NO_2	**RTECS** PA9800000
Synonyms & Trade Names Nitrocarbol	**DOT ID & Guide** 1261 129

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL: TWA 100 ppm (250 mg/m^3)
IDLH 750 ppm See: 75525	**Conversion** 1 ppm = 2.50 mg/m^3

Physical Description
Colorless, oily liquid with a disagreeable odor.

MW: 61.0	BP: 214°F	FRZ: -20°F	Sol: 10%
VP: 28 mmHg	IP: 11.08 eV		Sp.Gr: 1.14
Fl.P: 95°F	UEL: ?	LEL: 7.3%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Amines; strong acids, alkalis & oxidizers; hydrocarbons & other combustible materials; metallic oxides [Note: Slowly corrodes steel & copper when wet.]

Measurement Methods
NIOSH 2527
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations OSHA
Up to 750 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Dermatitis; in animals: irritation eyes, respiratory system; convulsions, narcosis; liver damage

Target Organs Eyes, skin, central nervous system, liver

See also: INTRODUCTION See ICSC CARD: 0522

NIOSH Pocket Guide to Chemical Hazards

Propylene imine	**CAS** 75-55-8
C_3H_7N	**RTECS** CM8050000
Synonyms & Trade Names 2-Methylaziridine, 2-Methylethyleneimine, Propyleneimine, Propylene imine (inhibited), Propylenimine	**DOT ID & Guide** 1921 131P (inhibited)

Exposure Limits	NIOSH REL: Ca TWA 2 ppm (5 mg/m^3) [skin] See Appendix A
	OSHA PEL: TWA 2 ppm (5 mg/m^3) [skin]
IDLH Ca [100 ppm] See: 75558	**Conversion** 1 ppm = 2.34 mg/m^3

Physical Description
Colorless, oily liquid with an ammonia-like odor.

MW: 57.1	BP: 152°F	FRZ: -85°F	Sol: Miscible
VP: 112 mmHg	IP: 9.00 eV		Sp.Gr: 0.80
Fl.P: 25°F	UEL: ?	LEL: ?	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Acids, strong oxidizers, water, carbonyl compounds, quinones, sulfonyl halides [Note: Subject to violent polymerization in contact with acids. Hydrolyzes in water to form methylethanolamine.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Eye, skin burns; [potential occupational carcinogen]

Target Organs Eyes, skin

Cancer Site [in animals: nasal tumors]

See also: INTRODUCTION See ICSC CARD: 0322 See MEDICAL TESTS: 0199

NIOSH Pocket Guide to Chemical Hazards

Propylene oxide	**CAS** 75-56-9
C_3H_6O	**RTECS** TZ2975000
Synonyms & Trade Names 1,2-Epoxy propane; Methyl ethylene oxide; Methyloxirane; Propene oxide; 1,2-Propylene oxide	**DOT ID & Guide** 1280 127P

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: TWA 100 ppm (240 mg/m^3)
IDLH Ca [400 ppm] See: 75569	**Conversion** 1 ppm = 2.38 mg/m^3

Physical Description
Colorless liquid with a benzene-like odor. [Note: A gas above 94°F.]

MW: 58.1	BP: 94°F	FRZ: -170°F	Sol: 41%
VP: 445 mmHg	IP: 9.81 eV		Sp.Gr: 0.83
Fl.P: -35°F	UEL: 36%	LEL: 2.3%	

Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F.

Incompatibilities & Reactivities
Anhydrous metal chlorides; iron; strong acids, caustics & peroxides [Note: Polymerization may occur due to high temperatures or contamination with alkalis, aqueous acids, amines & acidic alcohols.]

Measurement Methods
NIOSH 1612; OSHA 88
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; skin blisters, burns; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system

Cancer Site [in animals: nasal tumors]

See also: INTRODUCTION See ICSC CARD: 0192

NIOSH Pocket Guide to Chemical Hazards

Difluorodibromomethane	**CAS** 75-61-6
CBr_2F_2	**RTECS** PA7525000
Synonyms & Trade Names Dibromodifluoromethane, Freon® 12B2, Halon® 1202	**DOT ID & Guide** 1941 171

Exposure Limits	NIOSH REL: TWA 100 ppm (860 mg/m^3)
	OSHA PEL: TWA 100 ppm (860 mg/m^3)
IDLH 2000 ppm See: 75616	**Conversion** 1 ppm = 8.58 mg/m^3

Physical Description
Colorless, heavy liquid or gas (above 76°F) with a characteristic odor.

MW: 209.8	BP: 76°F	FRZ: -231°F	Sol: Insoluble
VP: 620 mmHg	IP: 11.07 eV		Sp.Gr(59°F): 2.29
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid
Nonflammable Gas

Incompatibilities & Reactivities
Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium

Measurement Methods
NIOSH 1012; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: No recommendation Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1000 ppm: (APF = 10) Any supplied-air respirator
Up to 2000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation respiratory system; central nervous system symptoms; liver damage

Target Organs respiratory system, central nervous system, liver

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Trifluorobromomethane	**CAS** 75-63-8
$CBrF_3$	**RTECS** PA5425000
Synonyms & Trade Names Bromotrifluoromethane, Fluorocarbon 1301, Freon® 13B1, Halocarbon 13B1, Halon® 1301, Monobromotrifluoromethane, Refrigerant 13B1, Trifluoromonobromomethane	**DOT ID & Guide** 1009 126

Exposure Limits	NIOSH REL: TWA 1000 ppm (6100 mg/m^3)
	OSHA PEL: TWA 1000 ppm (6100 mg/m^3)
IDLH 40,000 ppm See: 75638	**Conversion** 1 ppm = 6.09 mg/m^3

Physical Description
Colorless, odorless gas. [Note: Shipped as a liquefied compressed gas.]

MW: 148.9	BP: -72°F	FRZ: -267°F	Sol: 0.03%
VP: >1 atm	IP: 11.78 eV	RGasD: 5.14	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Chemically-active metals (such as calcium, powdered aluminum, zinc & magnesium)

Measurement Methods
NIOSH 1017
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 10,000 ppm: (APF = 10) Any supplied-air respirator
Up to 25,000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 40,000 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Dizziness; cardiac arrhythmias; liquid: frostbite

Target Organs central nervous system, heart

See also: INTRODUCTION See ICSC CARD: 0837

NIOSH Pocket Guide to Chemical Hazards

tert-Butyl alcohol	**CAS** 75-65-0
$(CH_3)_3COH$	**RTECS** EO1925000
Synonyms & Trade Names 2-Methyl-2-propanol, Trimethyl carbinol	**DOT ID & Guide** 1120 129

Exposure Limits	NIOSH REL: TWA 100 ppm (300 mg/m^3) ST 150 ppm (450 mg/m^3)
	OSHA PEL†: TWA 100 ppm (300 mg/m^3)
IDLH 1600 ppm See: 75650	**Conversion** 1 ppm = 3.03 mg/m^3

Physical Description
Colorless solid or liquid (above 77°F) with a camphor-like odor. [Note: Often used in aqueous solutions.]

MW: 74.1	BP: 180°F	FRZ: 78°F	Sol: Miscible
VP(77°F): 42 mmHg	IP: 9.70 eV		Sp.Gr: 0.79 (Solid)
Fl.P: 52°F	UEL: 8.0%	LEL: 2.4%	

Combustible Solid Class IB Flammable Liquid

Incompatibilities & Reactivities
Strong mineral acids, strong hydrochloric acid, oxidizers

Measurement Methods
NIOSH 1450; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1600 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; drowsiness, narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0114

NIOSH Pocket Guide to Chemical Hazards

Fluorotrichloromethane	**CAS** 75-69-4
CCl_3F	**RTECS** PB6125000
Synonyms & Trade Names Freon® 11, Monofluorotrichloromethane, Refrigerant 11, Trichlorofluoromethane, Trichloromonofluoromethane	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 1000 ppm (5600 mg/m^3)
	OSHA PEL†: TWA 1000 ppm (5600 mg/m^3)
IDLH 2000 ppm See: 75694	**Conversion** 1 ppm = 5.62 mg/m^3

Physical Description
Colorless to water-white, nearly odorless liquid or gas (above 75°F).

MW: 137.4	BP: 75°F	FRZ: -168°F	Sol(75°F): 0.1%
VP: 690 mmHg	IP: 11.77 eV	RGasD: 4.74	Sp.Gr: 1.47 (Liquid at 75°F)
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid Nonflammable Gas

Incompatibilities & Reactivities
Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc, magnesium & lithium shavings; granular barium

Measurement Methods
NIOSH 1006
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: No recommendation Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2000 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Incoordination, tremor; dermatitis; cardiac arrhythmias, cardiac arrest; asphyxia; liquid: frostbite

Target Organs Skin, respiratory system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0047

NIOSH Pocket Guide to Chemical Hazards

Dichlorodifluoromethane	**CAS** 75-71-8
CCl_2F_2	**RTECS** PA8200000
Synonyms & Trade Names Difluorodichloromethane, Fluorocarbon 12, Freon® 12, Genetron® 12, Halon® 122, Propellant 12, Refrigerant 12	**DOT ID & Guide** 1028 126

Exposure Limits	NIOSH REL: TWA 1000 ppm (4950 mg/m^3)
	OSHA PEL: TWA 1000 ppm (4950 mg/m^3)
IDLH 15,000 ppm See: 75718	**Conversion** 1 ppm = 4.95 mg/m^3

Physical Description
Colorless gas with an ether-like odor at extremely high concentrations. [Note: Shipped as a liquefied compressed gas.]

MW: 120.9	BP: -22°F	FRZ: -252°F	Sol(77°F): 0.03%
VP: 5.7 atm	IP: 11.75 eV	RGasD: 4.2	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium

Measurement Methods
NIOSH 1018
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 10,000 ppm: (APF = 10) Any supplied-air respirator
Up to 15,000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Dizziness, tremor, asphyxia, unconsciousness, cardiac arrhythmias, cardiac arrest; liquid: frostbite

Target Organs cardiovascular system, peripheral nervous system

See also: INTRODUCTION See ICSC CARD: 0048

NIOSH Pocket Guide to Chemical Hazards

Tetramethyl lead (as Pb)	**CAS** 75-74-1
$Pb(CH_3)_4$	**RTECS** TP4725000
Synonyms & Trade Names Lead tetramethyl, Tetramethylplumbane, TML	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.075 mg/m^3 [skin]
	OSHA PEL: TWA 0.075 mg/m^3 [skin]
IDLH 40 mg/m^3 (as Pb) See: 75741	**Conversion**

Physical Description
Colorless liquid (unless dyed red, orange, or blue) with a fruity odor. [Note: Main usage is in anti-knock additives for gasoline.]

MW: 267.3	BP: 212°F (Decomposes)	FRZ: -15°F	Sol: 0.002%
VP: 23 mmHg	IP: 8.50 eV		Sp.Gr: 2.00
Fl.P: 100°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers such as sulfuryl chloride or potassium permanganate

Measurement Methods
NIOSH 2534
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (>0.1%) Eyes: Prevent eye contact Wash skin: When contaminated (>0.1%) Remove: When wet or contaminated (>0.1%) Change: Daily Provide: Quick drench (>0.1%)	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.75 mg/m^3: (APF = 10) Any supplied-air respirator

Up to 1.875 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 3.75 mg/m^3: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 40 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Insomnia, bad dreams, restlessness, anxious; hypotension; nausea, anorexia; delirium, mania, convulsions; coma

Target Organs central nervous system, cardiovascular system, kidneys

See also: INTRODUCTION See ICSC CARD: 0200 See MEDICAL TESTS: 0225

NIOSH Pocket Guide to Chemical Hazards

Acetone cyanohydrin	**CAS** 75-86-5
$CH_3C(OH)CNCH_3$	**RTECS** OD9275000
Synonyms & Trade Names Cyanohydrin-2-propanone, 2-Cyano-2-propanol, alpha-Hydroxyisobutyronitrile, 2-Hydroxy-2-methyl-propionitrile, 2-Methyllactonitrile	**DOT ID & Guide** 1541 155 (stabilized)

Exposure Limits	NIOSH REL: C 1 ppm (4 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.48 mg/m^3

Physical Description
Colorless liquid with a faint odor of bitter almond. [Note: Forms cyanide in the body.]

MW: 85.1	BP: 203°F	FRZ: -4°F	Sol: Miscible
VP: 0.8 mmHg	IP: ?		Sp.Gr(77°F): 0.93
Fl.P: 165°F	UEL: 12.0%	LEL: 2.2%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Sulfuric acid, caustics [Note: Slowly decomposes to acetone & HCN at room temperatures; rate is accelerated by an increase in pH, water content, or temperature.]

Measurement Methods
NIOSH 2506
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 10 ppm: (APF = 10) Any supplied-air respirator
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 50 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 250 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; dizziness, lassitude (weakness, exhaustion), headache, confusion, convulsions; liver, kidney injury; pulmonary edema, asphyxia

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, liver, kidneys, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 0611

NIOSH Pocket Guide to Chemical Hazards

2,2-Dichloropropionic acid	**CAS** 75-99-0
CH_3CCl_2COOH	**RTECS** UF0690000
Synonyms & Trade Names Dalapon; 2,2-Dichloropropanoic acid; alpha,alpha-Dichloropropionic acid	**DOT ID & Guide** 1760 154

Exposure Limits	NIOSH REL: TWA 1 ppm (6 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.85 mg/m^3

Physical Description
Colorless liquid with an acrid odor. [herbicide] [Note: A white to tan powder below 46°F. The sodium salt, a white powder, is often used.]

MW: 143.0	BP: 374°F	FRZ: 46°F	Sol: 50%
VP: ?	IP: ?		Sp.Gr: 1.40
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Metals [Note: Very corrosive to aluminum & copper alloys. Reacts slowly in water to form hydrochloric & pyruvic acids.]

Measurement Methods
OSHA PV2017
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; skin burns; lassitude (weakness, exhaustion), loss of appetite, diarrhea, vomiting, slowing of pulse; central nervous system depression

Target Organs Eyes, skin, respiratory system, gastrointestinal tract, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Pentachloroethane	**CAS** 76-01-7
$CHCl_2CCl_3$	**RTECS** KI6300000
Synonyms & Trade Names Ethane pentachloride, Pentalin	**DOT ID & Guide** 1669 151

Exposure Limits	NIOSH REL: Handle with care in the workplace. See Appendix C (Chloroethanes)
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless liquid with a sweetish, chloroform-like odor.

MW: 202.3	BP: 322°F	FRZ: -20°F	Sol: 0.05%
VP: 3 mmHg	IP: 11.28 eV		Sp.Gr: 1.68
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
(Sodium-potassium alloy + bromoform), alkalis, metals, water [Note: Hydrolysis produces dichloroacetic acid. Reaction with alkalis & metals produces spontaneously explosive chloroacetylenes.]

Measurement Methods
NIOSH 2517
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms In animals: irritation eyes, skin; lassitude (weakness, exhaustion), restlessness, irregular respiration, muscle incoordination; liver, kidney, lung changes	
Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Trichloroacetic acid	**CAS** 76-03-9
CCl_3COOH	**RTECS** AJ7875000
Synonyms & Trade Names TCA, Trichloroethanoic acid	**DOT ID & Guide** 1839 153 (solid) 2564 153 (solution)

Exposure Limits	NIOSH REL: TWA 1 ppm (7 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.68 mg/m^3

Physical Description
Colorless to white, crystalline solid with a sharp, pungent odor.

MW: 163.4	BP: 388°F	MLT: 136°F	Sol: Miscible
VP(124°F): 1 mmHg	IP: ?		Sp.Gr: 1.62
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Moisture, iron, zinc, aluminum, strong oxidizers [Note: Decomposes on heating to form phosgene & hydrogen chloride. Corrosive to metals.]

Measurement Methods
OSHA PV2017
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; cough, dyspnea (breathing difficulty), delayed pulmonary edema; eye, skin burns; dermatitis; salivation, vomiting, diarrhea

Target Organs Eyes, skin, respiratory system, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 0586

NIOSH Pocket Guide to Chemical Hazards

Chloropicrin	**CAS** 76-06-2
CCl_3NO_2	**RTECS** PB6300000
Synonyms & Trade Names Nitrochloroform, Nitrotrichloromethane, Trichloronitromethane	**DOT ID & Guide** 1580 154 1583 154 (mixture, n.o.s.) 2929 131 (flammable mixture)

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.7 mg/m^3)
	OSHA PEL: TWA 0.1 ppm (0.7 mg/m^3)
IDLH 2 ppm See: 76062	**Conversion** 1 ppm = 6.72 mg/m^3

Physical Description
Colorless to faint-yellow, oily liquid with an intensely irritating odor. [pesticide]

MW: 164.4	BP: 234°F	FRZ: -93°F	Sol: 0.2%
VP: 18 mmHg	IP: ?		Sp.Gr: 1.66
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Strong oxidizers [Note: The material may explode when heated under confinement.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; lacrimation (discharge of tears); cough, pulmonary edema; nausea, vomiting

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0750 See MEDICAL TESTS: 0049

NIOSH Pocket Guide to Chemical Hazards

1,1,1,2-Tetrachloro-2,2-difluoroethane	**CAS** 76-11-9
CCl_3CClF_2	**RTECS** KI1425000
Synonyms & Trade Names 2,2-Difluoro-1,1,1,2-tetrachloroethane; Freon® 112a; Halocarbon 112a; Refrigerant 112a	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 500 ppm (4170 mg/m^3)
	OSHA PEL: TWA 500 ppm (4170 mg/m^3)
IDLH 2000 ppm See: 76119	**Conversion** 1 ppm = 8.34 mg/m^3

Physical Description
Colorless solid with a slight, ether-like odor. [Note: A liquid above 105°F.]

MW: 203.8	BP: 197°F	MLT: 105°F	Sol: 0.01%
VP: 40 mmHg	IP: ?		Sp.Gr: 1.65
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Chemically-active metals such as potassium, beryllium, powdered aluminum, zinc, calcium, magnesium & sodium; acids

Measurement Methods
NIOSH 1016; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; central nervous system depression; pulmonary edema; drowsiness; dyspnea (breathing difficulty)

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

1,1,2,2-Tetrachloro-1,2-difluoroethane	**CAS** 76-12-0
CCl_2FCCl_2F	**RTECS** KI1420000
Synonyms & Trade Names 1,2-Difluoro-1,1,2,2-tetrachloroethane; Freon® 112; Halocarbon 112; Refrigerant 112	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 500 ppm (4170 mg/m^3)
	OSHA PEL: TWA 500 ppm (4170 mg/m^3)
IDLH 2000 ppm See: 76120	**Conversion** 1 ppm = 8.34 mg/m^3

Physical Description
Colorless solid or liquid (above 77°F) with a slight, ether-like odor.

MW: 203.8	BP: 199°F	MLT: 77°F	Sol(77°F): 0.01%
VP: 40 mmHg	IP: 11.30 eV		Sp.Gr: 1.65
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Chemically-active metals such as potassium, beryllium, powdered aluminum, zinc, magnesium, calcium & sodium; acids

Measurement Methods
NIOSH 1016; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, skin; conjunctivitis; pulmonary edema; narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

1,1,2-Trichloro-1,2,2-trifluoroethane	**CAS** 76-13-1
CCl_2FCClF_2	**RTECS** KJ4000000
Synonyms & Trade Names Chlorofluorocarbon-113, CFC-113, Freon® 113, Genetron® 113, Halocarbon 113, Refrigerant 113, TTE	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1000 ppm (7600 mg/m^3) ST 1250 ppm (9500 mg/m^3)
	OSHA PEL†: TWA 1000 ppm (7600 mg/m^3)
IDLH 2000 ppm See: 76131	**Conversion** 1 ppm = 7.67 mg/m^3

Physical Description
Colorless to water-white liquid with an odor like carbon tetrachloride at high concentrations. [Note: A gas above 118°F.]

MW: 187.4	BP: 118°F	FRZ: -31°F	Sol(77°F): 0.02%
VP: 285 mmHg	IP: 11.99 eV		Sp.Gr(77°F): 1.56
Fl.P: ?	UEL: ?	LEL: ?	

Noncombustible Liquid at ordinary temperatures, but the gas will ignite and burn weakly at 1256°F.

Incompatibilities & Reactivities
Chemically-active metals such as calcium, powdered aluminum, zinc, magnesium & beryllium [Note: Decomposes if in contact with alloys containing >2% magnesium.]

Measurement Methods
NIOSH 1020; OSHA 113
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation skin, throat, drowsiness, dermatitis; central nervous system depression; in animals: cardiac arrhythmias, narcosis

Target Organs Skin, heart, central nervous system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0050

NIOSH Pocket Guide to Chemical Hazards

Dichlorotetrafluoroethane	**CAS** 76-14-2
$CClF_2CClF_2$	**RTECS** KI1101000
Synonyms & Trade Names 1,2-Dichlorotetrafluoroethane; Freon® 114; Genetron® 114; Halon® 242; Refrigerant 114	**DOT ID & Guide** 1958 126

Exposure Limits	NIOSH REL: TWA 1000 ppm (7000 mg/m^3)
	OSHA PEL: TWA 1000 ppm (7000 mg/m^3)
IDLH 15,000 ppm See: 76142	**Conversion** 1 ppm = 6.99 mg/m^3

Physical Description
Colorless gas with a faint, ether-like odor at high concentrations. [Note: A liquid below 38°F. Shipped as a liquefied compressed gas.]

MW: 170.9	BP: 38°F	FRZ: -137°F	Sol: 0.01%
VP(70°F): 1.9 atm	IP: 12.20 eV	RGasD: 5.93	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium; acids; acid fumes

Measurement Methods
NIOSH 1018
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 10,000 ppm: (APF = 10) Any supplied-air respirator
Up to 15,000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Irritation respiratory system; asphyxia; cardiac arrhythmias, cardiac arrest; liquid: frostbite

Target Organs respiratory system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0649

NIOSH Pocket Guide to Chemical Hazards

Chloropentafluoroethane	**CAS** 76-15-3
$CClF_2CF_3$	**RTECS** KH7877500
Synonyms & Trade Names Fluorocarbon-115, Freon® 115, Genetron® 115, Halocarbon 115, Monochloropentafluoroethane	**DOT ID & Guide** 1020 126

Exposure Limits	NIOSH REL: TWA 1000 ppm (6320 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.32 mg/m^3

Physical Description
Colorless gas with a slight, ethereal odor. [Note: Shipped as a liquefied compressed gas.]

MW: 154.5	BP: -38°F	FRZ: -223°F	Sol(77°F): 0.006%
VP(70°F): 7.9 atm	IP: 12.96 eV	RGasD: 5.55	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Alkalis, alkaline earth metals (e.g., aluminum powder, sodium, potassium, zinc)

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	**First Aid** (See procedures) Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations To be added later
Exposure Routes inhalation, skin and/or eye contact (liquid)
Symptoms Dyspnea (breathing difficulty); dizziness, incoordination, narcosis; nausea, vomiting; heart palpitations, cardiac arrhythmias, asphyxia; liquid: frostbite, dermatitis
Target Organs Skin, central nervous system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0848

NIOSH Pocket Guide to Chemical Hazards

Camphor (synthetic)	**CAS** 76-22-2
$C_{10}H_{16}O$	**RTECS** EX1225000
Synonyms & Trade Names 2-Camphonone, Gum camphor, Laurel camphor, Synthetic camphor	**DOT ID & Guide** 2717 133

Exposure Limits	NIOSH REL: TWA 2 mg/m^3
	OSHA PEL: TWA 2 mg/m^3
IDLH 200 mg/m^3 See: 76222	**Conversion**

Physical Description
Colorless or white crystals with a penetrating, aromatic odor.

MW: 152.3	BP: 399°F	MLT: 345°F	Sol: Insoluble
VP: 0.2 mmHg	IP: 8.76 eV		Sp.Gr: 0.99
Fl.P: 150°F	UEL: 3.5%	LEL: 0.6%	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers (especially chromic anhydride & potassium permanganate)

Measurement Methods
NIOSH 1301; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter£

Up to 100 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 200 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; nausea, vomiting, diarrhea; headache, dizziness, excitement, epileptiform convulsions

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See MEDICAL TESTS: 0036

NIOSH Pocket Guide to Chemical Hazards

Methoxyflurane	**CAS** 76-38-0
$CHCl_2CF_2OCH_3$	**RTECS** KN7820000
Synonyms & Trade Names 2,2-Dichloro-1,1-difluoroethyl methyl ether; 2,2-Dichloro-1,1-difluoro-1-methoxyethane; Methoflurane; Methoxyfluorane; Penthrane	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: C 2 ppm (13.5 mg/m^3) [60-minute] [*Note: REL for exposure to waste anesthetic gas.]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.75 mg/m^3

Physical Description
Colorless liquid with a fruity odor. [inhalation anesthetic]

MW: 165.0	BP: 220°F	FRZ: -31°F	Sol: Slight
VP: 23 mmHg	IP: ?		Sp.Gr(77°F): 1.42
Fl.P: ?	UEL: ?	LEL(176°F): 7%	

Combustible Liquid

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes; central nervous system depression, analgesia, anesthesia, convulsions, respiratory depression; liver, kidney injury; in animals: reproductive, teratogenic effects

Target Organs Eyes, central nervous system, liver, kidneys, reproductive system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Heptachlor	**CAS** 76-44-8
$C_{10}H_5Cl_7$	**RTECS** PC0700000
Synonyms & Trade Names 1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene	**DOT ID & Guide** 2761 151 (organochlorine pesticide, solid)

Exposure Limits	NIOSH REL: Ca TWA 0.5 mg/m^3 [skin] See Appendix A
	OSHA PEL: TWA 0.5 mg/m^3 [skin]
IDLH Ca [35 mg/m^3] See: 76448	**Conversion**

Physical Description
White to light-tan crystals with a camphor-like odor. [insecticide]

MW: 373.4	BP: 293°F (Decomposes)	MLT: 203°F	Sol: 0.0006%
VP(77°F): 0.0003 mmHg	IP: ?		Sp.Gr: 1.66
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Iron, rust

Measurement Methods
NIOSH S287 (II-5); OSHA PV2029
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms In animals: tremor, convulsions; liver damage; [potential occupational carcinogen]

Target Organs central nervous system, liver

Cancer Site [in animals: liver cancer]

See also: INTRODUCTION See ICSC CARD: 0743

NIOSH Pocket Guide to Chemical Hazards

Hexachlorocyclopentadiene	**CAS** 77-47-4
C_5Cl_6	**RTECS** GY1225000
Synonyms & Trade Names HCCPD; Hexachloro-1,3-cyclopentadiene; 1,2,3,4,5,5-Hexachloro-1,3-cyclopentadiene; Perchlorocyclopentadiene	**DOT ID & Guide** 2646 151

Exposure Limits	NIOSH REL: TWA 0.01 ppm (0.1 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 11.16 mg/m^3

Physical Description
Pale-yellow to amber-colored liquid with a pungent, unpleasant odor. [Note: A solid below 16°F.]

MW: 272.8	BP: 462°F	FRZ: 16°F	Sol(77°F): 0.0002% (Reacts)
VP(77°F): 0.08 mmHg	IP: ?		Sp.Gr: 1.71
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Water, light [Note: Reacts slowly with water to form hydrochloric acid; will corrode iron & most metals in presence of moisture. Explosive hydrogen gas may collect in enclosed spaces in the presence of moisture.]

Measurement Methods
NIOSH 2518
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; eye, skin burns; lacrimation (discharge of tears); sneezing, cough, dyspnea (breathing difficulty), salivation, pulmonary edema; nausea, vomiting, diarrhea; in animals: liver, kidney injury

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Dicyclopentadiene	**CAS** 77-73-6
$C_{10}H_{12}$	**RTECS** PC1050000
Synonyms & Trade Names Bicyclopentadiene; DCPD; 1,3-Dicyclopentadiene dimer; 3a,4,7,7a-Tetrahydro-4,7-methanoindene [Note: Exists in two stereoisomeric forms.]	**DOT ID & Guide** 2048 129

Exposure Limits	NIOSH REL: TWA 5 ppm (30 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.41 mg/m^3

Physical Description
Colorless, crystalline solid with a disagreeable, camphor-like odor. [Note: A liquid above 90°F.]

MW: 132.2	BP: 342°F	FRZ: 90°F	Sol: 0.02%
VP: 1.4 mmHg	IP: ?		Sp.Gr: 0.98 (Liquid at 95°F)
Fl.P(oc): 90°F	UEL: 6.3%	LEL: 0.8%	

Class IC Flammable Liquid
Combustible Solid

Incompatibilities & Reactivities
Oxidizers [Note: Depolymerizes at boiling point and forms two molecules of cyclopentadiene. Must be inhibited and maintained under an inert atmosphere to prevent polymerization.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, nose, throat; incoordination, headache; sneezing, cough; skin blisters; in animals: kidney, lung damage	
Target Organs Eyes, skin, respiratory system, central nervous system, kidneys	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Dimethyl sulfate	**CAS** 77-78-1
$(CH_3)_2SO_4$	**RTECS** WS8225000
Synonyms & Trade Names Dimethyl ester of sulfuric acid, Dimethylsulfate, Methyl sulfate	**DOT ID & Guide** 1595 156

Exposure Limits	NIOSH REL: Ca TWA 0.1 ppm (0.5 mg/m^3) [skin] See Appendix A
	OSHA PEL†: TWA 1 ppm (5 mg/m^3) [skin]
IDLH Ca [7 ppm] See: 77781	**Conversion** 1 ppm = 5.16 mg/m^3

Physical Description
Colorless, oily liquid with a faint, onion-like odor.

MW: 126.1	BP: 370°F (Decomposes)	FRZ: -25°F	Sol(64°F): 3%
VP: 0.1 mmHg	IP: ?		Sp.Gr: 1.33
Fl.P: 182°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, ammonia solutions [Note: Decomposes in water to sulfuric acid; corrosive to metals.]

Measurement Methods
NIOSH 2524
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; headache; dizziness; conjunctivitis; photophobia (abnormal visual intolerance to light); periorbital (situated around the eye) edema; dysphonia, aphonia, dysphagia, productive cough; chest pain; dyspnea (breathing difficulty), cyanosis; vomiting, diarrhea; dysuria; analgesia; fever; proteinuria, hematuria (blood in the urine); eye, skin burns; delirium; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys, central nervous system

Cancer Site [in animals: nasal & lung cancer]

See also: INTRODUCTION See ICSC CARD: 0148 See MEDICAL TESTS: 0084

NIOSH Pocket Guide to Chemical Hazards

Tetraethyl lead (as Pb)	**CAS** 78-00-2
$Pb(C_2H_5)_4$	**RTECS** TP4550000
Synonyms & Trade Names Lead tetraethyl, TEL, Tetraethylplumbane	**DOT ID & Guide** 1649 131

Exposure Limits	NIOSH REL: TWA 0.075 mg/m^3 [skin]
	OSHA PEL: TWA 0.075 mg/m^3 [skin]
IDLH 40 mg/m^3 (as Pb) See: 78002	**Conversion**

Physical Description
Colorless liquid (unless dyed red, orange, or blue) with a pleasant, sweet odor. [Note: Main usage is in anti-knock additives for gasoline.]

MW: 323.5	BP: 228°F (Decomposes)	FRZ: -202°F	Sol: 0.00002%
VP: 0.2 mmHg	IP: 11.10 eV		Sp.Gr: 1.65
Fl.P: 200°F	UEL: ?	LEL: 1.8%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, sulfuryl chloride, rust, potassium permanganate [Note: Decomposes slowly at room temperature and more rapidly at higher temperatures.]

Measurement Methods
NIOSH 2533
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact (>0.1%) Eyes: Prevent eye contact Wash skin: When contaminated (>0.1%) Remove: When wet or contaminated (>0.1%) Change: Daily Provide: Quick drench (>0.1%)	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.75 mg/m^3: (APF = 10) Any supplied-air respirator

Up to 1.875 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 3.75 mg/m^3: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 40 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Insomnia, lassitude (weakness, exhaustion), anxiety; tremor, hyper-reflexia, spasticity; bradycardia, hypotension, hypothermia, pallor, nausea, anorexia, weight loss; confusion, hallucinations, psychosis, mania, convulsions, coma; eye irritation

Target Organs central nervous system, cardiovascular system, kidneys, eyes

See also: INTRODUCTION See ICSC CARD: 0008 See MEDICAL TESTS: 0224

NIOSH Pocket Guide to Chemical Hazards

Ethyl silicate	**CAS** 78-10-4
$(C_2H_5)_4SiO_4$	**RTECS** VV9450000
Synonyms & Trade Names Ethyl orthosilicate, Ethyl silicate (condensed), Tetraethoxysilane, Tetraethyl orthosilicate, Tetraethyl silicate	**DOT ID & Guide** 1292 132

Exposure Limits	NIOSH REL: TWA 10 ppm (85 mg/m^3)
	OSHA PEL†: TWA 100 ppm (850 mg/m^3)
IDLH 700 ppm See: 78104	**Conversion** 1 ppm = 8.52 mg/m^3

Physical Description
Colorless liquid with a sharp, alcohol-like odor.

MW: 208.3	BP: 336°F	FRZ: -117°F	Sol: Reacts
VP: 1 mmHg	IP: 9.77 eV		Sp.Gr: 0.93
Fl.P: 99°F	UEL: ?	LEL: ?	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, water [Note: Reacts with water to form a silicone adhesive (a milky-white mass).]

Measurement Methods
NIOSH S264 (II-3)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 100 ppm: (APF = 10) Any supplied-air respirator*
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 500 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 700 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion skin, and/or eye contact

Symptoms Irritation eyes, nose; in animals: lacrimation (discharge of tears); dyspnea (breathing difficulty), pulmonary edema; tremor, narcosis; liver, kidney damage; anemia

Target Organs Eyes, respiratory system, liver, kidneys, blood, skin

See also: INTRODUCTION See ICSC CARD: 0333 See MEDICAL TESTS: 0100

NIOSH Pocket Guide to Chemical Hazards

Triorthocresyl phosphate	**CAS** 78-30-8
$(CH_3C_6H_{40})_3PO$	**RTECS** TD0350000
Synonyms & Trade Names TCP, TOCP, Tri-o-cresyl ester of phosphoric acid, Tri-o-cresyl phosphate	**DOT ID & Guide** 2574 151

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 [skin]
	OSHA PEL†: TWA 0.1 mg/m^3
IDLH 40 mg/m^3 See: 78308	**Conversion**

Physical Description
Colorless to pale-yellow, odorless liquid or solid (below 52°F).

MW: 368.4	BP: 770°F (Decomposes)	FRZ: 52°F	Sol: Slight
VP(77°F): 0.00002	IP: ?		Sp.Gr: 1.20
Fl.P: 437°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
NIOSH 5037
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 1 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 40 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Gastrointestinal disturbance; peripheral neuropathy; cramps in calves, paresthesia in feet or hands; weak feet, wrist drop, paralysis

Target Organs peripheral nervous system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0961

NIOSH Pocket Guide to Chemical Hazards

Dioxathion	**CAS** 78-34-2
$C_4H_6O_2[SPS(OC_2H_5)_2]_2$	**RTECS** TE3350000
Synonyms & Trade Names Delnav®; p-Dioxane-2,3-diyl ethyl phosphorodithioate; Dioxane phosphate; 2,3-p-Dioxanethiol S,S-bis(O,O-diethyl phosphoro-dithioate); Navadel®	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.2 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Viscous, brown, tan, or dark-amber liquid. [insecticide] [Note: Technical product is a mixture of cis- & trans-isomers.]

MW: 456.6	BP: ?	FRZ: -4°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr(79°F): 1.26
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Alkalis, iron or tin surfaces, heat

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; headache, dizziness, lassitude (weakness, exhaustion); rhinorrhea (discharge of thin mucus), chest tightness; miosis; nausea, vomiting, abdominal cramps, diarrhea, salivation; muscle fasciculation; confusion, drowsiness

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0883

NIOSH Pocket Guide to Chemical Hazards

Isophorone	**CAS** 78-59-1
$C_9H_{14}O$	**RTECS** GW7700000
Synonyms & Trade Names Isoacetophorone; 3,5,5-Trimethyl-2-cyclohexenone; 3,5,5-Trimethyl-2-cyclo-hexen-1-one	**DOT ID & Guide** 1993 128 (combustible liquid, n.o.s.)

Exposure Limits	NIOSH REL: TWA 4 ppm (23 mg/m^3)
	OSHA PEL†: TWA 25 ppm (140 mg/m^3)
IDLH 200 ppm See: 78591	**Conversion** 1 ppm = 5.65 mg/m^3

Physical Description
Colorless to white liquid with a peppermint-like odor.

MW: 138.2	BP: 419°F	FRZ: 17°F	Sol: 1%
VP: 0.3 mmHg	IP: 9.07 eV		Sp.Gr: 0.92
Fl.P: 184°F	UEL: 3.8%	LEL: 0.8%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Oxidizers, strong alkalis, amines

Measurement Methods
NIOSH 2508; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 40 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 200 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; headache, nausea, dizziness, lassitude (weakness, exhaustion), malaise (vague feeling of discomfort), narcosis; dermatitis; in animals: kidney, liver damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0169 See MEDICAL TESTS: 0123

NIOSH Pocket Guide to Chemical Hazards

Isobutyronitrile	**CAS** 78-82-0
$(CH_3)_2CHCN$	**RTECS** TZ4900000
Synonyms & Trade Names Isopropyl cyanide, 2-Methylpropanenitrile, 2-Methylpropionitrile	**DOT ID & Guide** 2284 131

Exposure Limits	NIOSH REL: TWA 8 ppm (22 mg/m^3)
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.83 mg/m^3

Physical Description
Colorless liquid with an almond-like odor. [Note: Forms cyanide in the body.]

MW: 69.1	BP: 219°F	FRZ: -97°F	Sol: Slight
VP(130°F): 100 mmHg	IP: ?		Sp.Gr: 0.76
Fl.P: 47°F	UEL: ?	LEL: ?	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers, reducing agents, strong acids & bases

Measurement Methods
NIOSH 1606 (adapt)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 80 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 200 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 400 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1000 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache, dizziness, lassitude (weakness, exhaustion), confusion, convulsions; dyspnea (breathing difficulty); abdominal pain, nausea, vomiting

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Isobutyl alcohol	**CAS** 78-83-1
$(CH_3)_2CHCH_2OH$	**RTECS** NP9625000
Synonyms & Trade Names IBA, Isobutanol, Isopropylcarbinol, 2-Methyl-1-propanol	**DOT ID & Guide** 1212 129

Exposure Limits	NIOSH REL: TWA 50 ppm (150 mg/m^3)
	OSHA PEL†: TWA 100 ppm (300 mg/m^3)
IDLH 1600 ppm See: 78831	**Conversion** 1 ppm = 3.03 mg/m^3

Physical Description
Colorless, oily liquid with a sweet, musty odor.

MW: 74.1	BP: 227°F	FRZ: -162°F	Sol: 10%
VP: 9 mmHg	IP: 10.12 eV		Sp.Gr: 0.80
Fl.P: 82°F	UEL(202°F): 10.6%	LEL(123°F): 1.7%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1401; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 1250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 1600 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, throat; headache, drowsiness; skin cracking; in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0113

NIOSH Pocket Guide to Chemical Hazards

Propylene dichloride	**CAS** 78-87-5
$CH_3CHClCH_2Cl$	**RTECS** TX9625000
Synonyms & Trade Names Dichloro-1,2-propane; 1,2-Dichloropropane	**DOT ID & Guide** 1279 130

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: TWA 75 ppm (350 mg/m^3)
IDLH Ca [400 ppm] See: 78875	**Conversion** 1 ppm = 4.62 mg/m^3

Physical Description
Colorless liquid with a chloroform-like odor. [pesticide]

MW: 113.0	BP: 206°F	FRZ: -149°F	Sol: 0.3%
VP: 40 mmHg	IP: 10.87 eV		Sp.Gr: 1.16
Fl.P: 60°F	UEL: 14.5%	LEL: 3.4%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids, active metals

Measurement Methods
NIOSH 1013; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; drowsiness, dizziness; liver, kidney damage; in animals: central nervous system depression; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys, central nervous system

Cancer Site [in animals: liver & mammary gland tumors]

See also: INTRODUCTION See ICSC CARD: 0441

NIOSH Pocket Guide to Chemical Hazards

sec-Butyl alcohol	**CAS** 78-92-2
$CH_3CH(OH)CH_2CH_3$	**RTECS** EO1750000
Synonyms & Trade Names 2-Butanol, Butylene hydrate, 2-Hydroxybutane, Methyl ethyl carbinol	**DOT ID & Guide** 1120 129

Exposure Limits	NIOSH REL: TWA 100 ppm (305 mg/m^3) ST 150 ppm (455 mg/m^3)
	OSHA PEL†: TWA 150 ppm (450 mg/m^3)
IDLH 2000 ppm See: 78922	**Conversion** 1 ppm = 3.03 mg/m^3

Physical Description
Colorless liquid with a strong, pleasant odor.

MW: 74.1	BP: 211°F	FRZ: -175°F	Sol: 16%
VP: 12 mmHg	IP: 10.10 eV		Sp.Gr: 0.81
Fl.P: 75°F	UEL(212°F): 9.8%	LEL(212°F): 1.7%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, organic peroxides, perchloric & permonosulfuric acids

Measurement Methods
NIOSH 1450; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 1000 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 2000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0112

NIOSH Pocket Guide to Chemical Hazards

2-Butanone	**CAS** 78-93-3
$CH_3COCH_2CH_3$	**RTECS** EL6475000
Synonyms & Trade Names Ethyl methyl ketone, MEK, Methyl acetone, Methyl ethyl ketone	**DOT ID & Guide** 1193 127 1232 127

Exposure Limits	NIOSH REL: TWA 200 ppm (590 mg/m^3) ST 300 ppm (885 mg/m^3)
	OSHA PEL†: TWA 200 ppm (590 mg/m^3)
IDLH 3000 ppm See: 78933	**Conversion** 1 ppm = 2.95 mg/m^3

Physical Description
Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor.

MW: 72.1	BP: 175°F	FRZ: -123°F	Sol: 28%
VP: 78 mmHg	IP: 9.54 eV		Sp.Gr: 0.81
Fl.P: 16°F	UEL(200°F): 11.4%	LEL(200°F): 1.4%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, amines, ammonia, inorganic acids, caustics, isocyanates, pyridines

Measurement Methods
NIOSH 2500, 3800; OSHA 16, 84
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash immediately Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 3000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0179 See MEDICAL TESTS: 0133

NIOSH Pocket Guide to Chemical Hazards

1,1,2-Trichloroethane	**CAS** 79-00-5
$CHCl_2CH_2Cl$	**RTECS** KJ3150000
Synonyms & Trade Names Ethane trichloride, beta-Trichloroethane, Vinyl trichloride	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 10 ppm (45 mg/m^3) [skin] See Appendix A See Appendix C (Chloroethanes)
	OSHA PEL: TWA 10 ppm (45 mg/m^3) [skin]
IDLH Ca [100 ppm] See: 79005	**Conversion** 1 ppm = 5.46 mg/m^3

Physical Description
Colorless liquid with a sweet, chloroform-like odor.

MW: 133.4	BP: 237°F	FRZ: -34°F	Sol: 0.4%
VP: 19 mmHg	IP: 11.00 eV		Sp.Gr: 1.44
Fl.P: ?	UEL: 15.5%	LEL: 6%	

Combustible Liquid, forms dense soot.

Incompatibilities & Reactivities
Strong oxidizers & caustics; chemically-active metals (such as aluminum, magnesium powders, sodium & potassium)

Measurement Methods
NIOSH 1003; OSHA 11
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; central nervous system depression; liver, kidney damage; dermatitis; [potential occupational carcinogen]

Target Organs Eyes, respiratory system, central nervous system, liver, kidneys

Cancer Site [in animals: liver cancer]

See also: INTRODUCTION See ICSC CARD: 0080 See MEDICAL TESTS: 0235

NIOSH Pocket Guide to Chemical Hazards

Trichloroethylene	**CAS** 79-01-6
$ClCH=CCl_2$	**RTECS** KX4550000
Synonyms & Trade Names Ethylene trichloride, TCE, Trichloroethene, Trilene	**DOT ID & Guide** 1710 160

Exposure Limits	NIOSH REL: Ca See Appendix A See Appendix C
	OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)
IDLH Ca [1000 ppm] See: 79016	**Conversion** 1 ppm = 5.37 mg/m^3

Physical Description
Colorless liquid (unless dyed blue) with a chloroform-like odor.

MW: 131.4	BP: 189°F	FRZ: -99°F	Sol(77°F): 0.1%
VP: 58 mmHg	IP: 9.45 eV		Sp.Gr: 1.46
Fl.P: ?	UEL(77°F): 10.5%	LEL(77°F): 8%	

Combustible Liquid, but burns with difficulty.

Incompatibilities & Reactivities
Strong caustics & alkalis; chemically-active metals (such as barium, lithium, sodium, magnesium, titanium & beryllium)

Measurement Methods
NIOSH 1022, 3800; OSHA 1001
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system

Cancer Site [in animals: liver & kidney cancer]

See also: INTRODUCTION See ICSC CARD: 0081 See MEDICAL TESTS: 0236

NIOSH Pocket Guide to Chemical Hazards

Chloroacetyl chloride	**CAS** 79-04-9
$ClCH_2COCl$	**RTECS** AO6475000
Synonyms & Trade Names Chloroacetic acid chloride, Chloroacetic chloride, Monochloroacetyl chloride	**DOT ID & Guide** 1752 156

Exposure Limits	NIOSH REL: TWA 0.05 ppm (0.2 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.62 mg/m^3

Physical Description
Colorless to yellowish liquid with a strong, pungent odor.

MW: 112.9	BP: 223°F	FRZ: -7°F	Sol: Decomposes
VP: 19 mmHg	IP: 10.30 eV		Sp.Gr: 1.42
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Water, alcohols, bases, metals (corrosive), amines [Note: Decomposes in water to form chloroacetic acid & hydrogen chloride gas.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; eye, skin burns; cough, wheezing, dyspnea (breathing difficulty); lacrimation (discharge of tears)	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0845

NIOSH Pocket Guide to Chemical Hazards

Acrylamide	**CAS** 79-06-1
CH_2=CHCONH$_2$	**RTECS** AS3325000
Synonyms & Trade Names Acrylamide monomer, Acrylic amide, Propenamide, 2-Propenamide	**DOT ID & Guide** 2074 153P

Exposure Limits	NIOSH REL: Ca TWA 0.03 mg/m^3 [skin] See Appendix A
	OSHA PEL†: TWA 0.3 mg/m^3 [skin]
IDLH Ca [60 mg/m^3] See: 79061	**Conversion**

Physical Description
White crystalline, odorless solid.

MW: 71.1	BP: 347-572°F (Decomposes)	MLT: 184°F	Sol(86°F): 216%
VP: 0.007 mmHg	IP: 9.50 eV		Sp.Gr: 1.12
Fl.P: 280°F	UEL: ?	LEL: ?	

Combustible Solid (may also be dissolved in flammable liquids).

Incompatibilities & Reactivities
Strong oxidizers [Note: May polymerize violently upon melting.]

Measurement Methods
OSHA 21, PV2004
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; ataxia, numb limbs, paresthesia; muscle weakness; absent deep tendon reflex; hand sweating; lassitude (weakness, exhaustion), drowsiness; reproductive effects; [potential occupational carcinogen]

Target Organs Eyes, skin, central nervous system, peripheral nervous system, reproductive system

Cancer Site [in animals: tumors of the lungs, testes, thyroid & adrenal glands]

See also: INTRODUCTION See ICSC CARD: 0091 See MEDICAL TESTS: 0007

NIOSH Pocket Guide to Chemical Hazards

Propionic acid	**CAS** 79-09-4
CH_3CH_2COOH	**RTECS** UE5950000
Synonyms & Trade Names Carboxyethane, Ethanecarboxylic acid, Ethylformic acid, Metacetonic acid, Methyl acetic acid, Propanoic acid	**DOT ID & Guide** 1848 132

Exposure Limits	NIOSH REL: TWA 10 ppm (30 mg/m^3) ST 15 ppm (45 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.03 mg/m^3

Physical Description
Colorless, oily liquid with a pungent, disagreeable, rancid odor. [Note: A solid below 5°F.]

MW: 74.1	BP: 286°F	FRZ: 5°F	Sol: Miscible
VP: 3 mmHg	IP: 10.24 eV		Sp.Gr: 0.99
Fl.P: 126°F	UEL: 12.1%	LEL: 2.9%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Alkalis, strong oxidizers (e.g., chromium trioxide) [Note: Corrosive to steel.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, nose, throat; blurred vision, corneal burns; skin burns; abdominal pain, nausea, vomiting
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0806

NIOSH Pocket Guide to Chemical Hazards

Acrylic acid	**CAS** 79-10-7
CH_2=CHCOOH	**RTECS** AS4375000
Synonyms & Trade Names Acroleic acid, Aqueous acrylic acid (technical grade is 94%), Ethylenecarboxylic acid, Glacial acrylic acid (98% in aqueous solution), 2-Propenoic acid	**DOT ID & Guide** 2218 132P (inhibited)

Exposure Limits	NIOSH REL: TWA 2 ppm (6 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.95 mg/m^3

Physical Description
Colorless liquid or solid (below 55°F) with a distinctive, acrid odor. [Note: Shipped with an inhibitor (e.g., hydroquinone) since it readily polymerizes.]

MW: 72.1	BP: 286°F	FRZ: 55°F	Sol: Miscible
VP: 3 mmHg	IP: ?		Sp.Gr: 1.05
Fl.P: 121°F	UEL: 8.02%	LEL: 2.4%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Oxidizers, amines, alkalis, ammonium hydroxide, chloro-sulfonic acid, oleum, ethylene diamine, ethyleneimine, 2-aminoethanol [Note: Corrosive to many metals.]

Measurement Methods
OSHA 28, PV2005
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; eye, skin burns; skin sensitization; in animals: lung, liver, kidney injury	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0688

NIOSH Pocket Guide to Chemical Hazards

Methyl acetate	**CAS** 79-20-9
CH_3COOCH_3	**RTECS** AI9100000
Synonyms & Trade Names Methyl ester of acetic acid, Methyl ethanoate	**DOT ID & Guide** 1231 129

Exposure Limits	NIOSH REL: TWA 200 ppm (610 mg/m^3) ST 250 ppm (760 mg/m^3)
	OSHA PEL†: TWA 200 ppm (610 mg/m^3)
IDLH 3100 ppm [10%LEL] See: 79209	**Conversion** 1 ppm = 3.03 mg/m^3

Physical Description
Colorless liquid with a fragrant, fruity odor.

MW: 74.1	BP: 135°F	FRZ: -145°F	Sol: 25%
VP: 173 mmHg	IP: 10.27 eV		Sp.Gr: 0.93
Fl.P: 14°F	UEL: 16%	LEL: 3.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids; water [Note: Reacts slowly with water to form acetic acid & methanol.]

Measurement Methods
NIOSH 1458; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 3100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache, drowsiness; optic nerve atrophy; chest tightness; in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0507

NIOSH Pocket Guide to Chemical Hazards

Nitroethane	**CAS** 79-24-3
$CH_3CH_2NO_2$	**RTECS** K15600000
Synonyms & Trade Names Nitroetan	**DOT ID & Guide** 2842 129

Exposure Limits	NIOSH REL: TWA 100 ppm (310 mg/m^3)
	OSHA PEL: TWA 100 ppm (310 mg/m^3)
IDLH 1000 ppm See: 79243	**Conversion** 1 ppm = 3.07 mg/m^3

Physical Description
Colorless, oily liquid with a mild, fruity odor.

MW: 75.1	BP: 237°F	FRZ: -130°F	Sol: 5%
VP(77°F): 21 mmHg	IP: 10.88 eV		Sp.Gr: 1.05
Fl.P: 82°F	UEL: ?	LEL: 3.4%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Amines; strong acids, alkalis & oxidizers; hydrocarbons; combustibles; metal oxides

Measurement Methods
NIOSH 2526
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1000 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Dermatitis; in animals: lacrimation (discharge of tears); dyspnea (breathing difficulty), pulmonary rales, edema; liver, kidney injury; narcosis

Target Organs Skin, respiratory system, central nervous system, kidneys, liver

See also: INTRODUCTION See ICSC CARD: 0817

NIOSH Pocket Guide to Chemical Hazards

Acetylene tetrabromide	**CAS** 79-27-6
$CHBr_2CHBr_2$	**RTECS** KI8225000
Synonyms & Trade Names Symmetrical tetrabromoethane; TBE; Tetrabromoacetylene; Tetrabromoethane; 1,1,2,2-Tetrabromoethane	**DOT ID & Guide** 2504 159

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL: TWA 1 ppm (14 mg/m^3)
IDLH 8 ppm See: 79276	**Conversion** 1 ppm = 14.14 mg/m^3

Physical Description
Pale-yellow liquid with a pungent odor similar to camphor or iodoform. [Note: A solid below 32°F.]

MW: 345.7	BP: 474°F (Decomposes)	FRZ: 32°F	Sol: 0.07%
VP: 0.02 mmHg	IP: ?		Sp.Gr: 2.97
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Strong caustics; hot iron; reducing metals such as aluminum, magnesium & zinc

Measurement Methods
NIOSH 2003
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations OSHA

Up to 8 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; anorexia, nausea; headache; abdominal pain; jaundice; leukocytosis (increased blood leukocytes); central nervous system depression

Target Organs Eyes, respiratory system, liver, central nervous system

See also: INTRODUCTION See ICSC CARD: 1235 See MEDICAL TESTS: 0005

NIOSH Pocket Guide to Chemical Hazards

1,1,2,2-Tetrachloroethane	**CAS** 79-34-5
$CHCl_2CHCl_2$	**RTECS** KI8575000
Synonyms & Trade Names Acetylene tetrachloride, Symmetrical tetrachloroethane	**DOT ID & Guide** 1702 151

Exposure Limits	NIOSH REL: Ca TWA 1 ppm (7 mg/m^3) [skin] See Appendix A See Appendix C (Chloroethanes)
	OSHA PEL†: TWA 5 ppm (35 mg/m^3) [skin]
IDLH Ca [100 ppm] See: 79345	**Conversion** 1 ppm = 6.87 mg/m^3

Physical Description
Colorless to pale-yellow liquid with a pungent, chloroform-like odor.

MW: 167.9	BP: 296°F	FRZ: -33°F	Sol: 0.3%
VP: 5 mmHg	IP: 11.10 eV		Sp.Gr(77°F): 1.59
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Chemically-active metals, strong caustics, fuming sulfuric acid [Note: Degrades slowly when exposed to air.]

Measurement Methods
NIOSH 1019; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Nausea, vomiting, abdominal pain; tremor fingers; jaundice, hepatitis, liver tenderness; dermatitis; leukocytosis (increased blood leukocytes); kidney damage; [potential occupational carcinogen]

Target Organs Skin, liver, kidneys, central nervous system, gastrointestinal tract

Cancer Site [in animals: liver tumors]

See also: INTRODUCTION See ICSC CARD: 0332 See MEDICAL TESTS: 0222

NIOSH Pocket Guide to Chemical Hazards

Methacrylic acid	**CAS** 79-41-4
CH_2=C(CH_3)COOH	**RTECS** OZ2975000
Synonyms & Trade Names Methacrylic acid (glacial), Methacrylic acid (inhibited), alpha-Methacrylic acid, 2-Methylacrylic acid, 2-Methylpropenoic acid	**DOT ID & Guide** 2531 153P (inhibited)

Exposure Limits	NIOSH REL: TWA 20 ppm (70 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.52 mg/m^3

Physical Description
Colorless liquid or solid (below 61°F) with an acrid, repulsive odor.

MW: 86.1	BP: 325°F	FRZ: 61°F	Sol(77°F): 9%
VP: 0.7 mmHg	IP: ?		Sp.Gr: 1.02 (Liquid)
Fl.P(oc): 171°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Oxidizers, elevated temperatures, hydrochloric acid [Note: Typically contains 100 ppm of the monomethyl ether of hydroquinone to prevent polymerization.]

Measurement Methods
OSHA PV2005
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, mucous membrane; eye, skin burns	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0917

NIOSH Pocket Guide to Chemical Hazards

Dimethyl carbamoyl chloride	**CAS** 79-44-7
$(CH_3)_2NCOCl$	**RTECS** FD4200000
Synonyms & Trade Names Chloroformic acid dimethylamide; Dimethylcarbamic chloride; N,N-Dimethylcarbamoyl chloride; DMCC	**DOT ID & Guide** 2262 156

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Clear, colorless liquid.

MW: 107.6	BP: 329°F	FRZ: -27°F	Sol: Reacts
VP: ?	IP: ?		Sp.Gr: 1.17
Fl.P: 155°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Acids, water [Note: Rapidly hydrolyzes in water to dimethylamine, carbon dioxide, and hydrogen chloride.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; eye, skin burns; cough, wheezing, larnygitis, dyspnea (breathing difficulty); headache, nausea, vomiting; liver injury; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver

Cancer Site [in animals: nasal cancer]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

2-Nitropropane	**CAS** 79-46-9
$(CH_3)_2CH(NO_2)$	**RTECS** TZ5250000
Synonyms & Trade Names Dimethylnitromethane, iso-Nitropropane, 2-NP	**DOT ID & Guide** 2608 129

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: TWA 25 ppm (90 mg/m^3)
IDLH Ca [100 ppm] See: 79469	**Conversion** 1 ppm = 3.64 mg/m^3

Physical Description
Colorless liquid with a pleasant, fruity odor.

MW: 89.1	BP: 249°F	FRZ: -135°F	Sol: 2%
VP: 13 mmHg	IP: 10.71 eV		Sp.Gr: 0.99
Fl.P: 75°F	UEL: 11.0%	LEL: 2.6%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Amines; strong acids, alkalis & oxidizers; metal oxides; combustible materials

Measurement Methods
NIOSH 2528; OSHA 15, 46
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, respiratory system; headache, anorexia, nausea, vomiting, diarrhea; kidney, liver damage; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, kidneys, liver

Cancer Site [in animals: liver tumors]

See also: INTRODUCTION See ICSC CARD: 0187 See MEDICAL TESTS: 0166

NIOSH Pocket Guide to Chemical Hazards

Methyl methacrylate	**CAS** 80-62-6
$CH_2=C(CH_3)COOCH_3$	**RTECS** OZ5075000
Synonyms & Trade Names Methacrylate monomer, Methyl ester of methacrylic acid, Methyl-2-methyl-2-propenoate	**DOT ID & Guide** 1247 129P (inhibited)

Exposure Limits	NIOSH REL: TWA 100 ppm (410 mg/m^3)
	OSHA PEL: TWA 100 ppm (410 mg/m^3)
IDLH 1000 ppm See: 80626	**Conversion** 1 ppm = 4.09 mg/m^3

Physical Description
Colorless liquid with an acrid, fruity odor.

MW: 100.1	BP: 214°F	FRZ: -54°F	Sol: 1.5%
VP: 29 mmHg	IP: 9.70 eV		Sp.Gr: 0.94
Fl.P(oc): 50°F	UEL: 8.2%	LEL: 1.7%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates, oxidizers, peroxides, strong alkalis, moisture [Note: May polymerize if subjected to heat, oxidizers, or ultraviolet light. Usually contains an inhibitor such as hydroquinone.]

Measurement Methods
NIOSH 2537; OSHA 94
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£]/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)[£]/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0300

NIOSH Pocket Guide to Chemical Hazards

Warfarin	**CAS** 81-81-2
$C_{19}H_{16}O_4$	**RTECS** GN4550000
Synonyms & Trade Names 3-(alpha-Acetonyl)-benzyl-4-hydroxycoumarin, 4-Hydroxy-3-(3-oxo-1-phenyl butyl)-2H-1-benzopyran-2-one, WARF	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3
	OSHA PEL: TWA 0.1 mg/m^3
IDLH 100 mg/m^3 See: 81812	**Conversion**

Physical Description
Colorless, odorless, crystalline powder. [rodenticide]

MW: 308.3	BP: Decomposes	MLT: 322°F	Sol: 0.002%
VP(71°F): 0.09 mmHg	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5002
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: No recommendation
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 1 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 100 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Hematuria (blood in the urine), back pain; hematoma arms, legs; epistaxis (nosebleed), bleeding lips, mucous membrane hemorrhage; abdominal pain, vomiting, fecal blood; petechial rash; abnormal hematologic indices

Target Organs Blood, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0821 See MEDICAL TESTS: 0242

NIOSH Pocket Guide to Chemical Hazards

Pindone	**CAS** 83-26-1
$C_9H_5O_2C(O)C(CH_3)_3$	**RTECS** NK6300000
Synonyms & Trade Names tert-Butyl valone; 1,3-Dioxo-2-pivaloy-lindane; Pival®; Pivalyl; 2-Pivalyl-1,3-indandione	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3
	OSHA PEL: TWA 0.1 mg/m^3
IDLH 100 mg/m^3 See: 83261	**Conversion**

Physical Description
Bright-yellow powder with almost no odor. [rodenticide]

MW: 230.3	BP: Decomposes	MLT: 230°F	Sol(77°F): 0.002%
VP: Very low	IP: ?		Sp.Gr: 1.06
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: No recommendation
Eyes: No recommendation
Wash skin: No recommendation
Remove: No recommendation
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately

Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 0.5 mg/m^3: (APF = 5) Any dust and mist respirator
Up to 1 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator
Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter
Up to 5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 100 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion

Symptoms Epistaxis (nosebleed), excess bleeding from minor cuts, bruises; smoky urine, black tarry stools; abdominal, back pain

Target Organs Blood prothrombin

See also: INTRODUCTION See MEDICAL TESTS: 0194

NIOSH Pocket Guide to Chemical Hazards

Rotenone	**CAS** 83-79-4
$C_{23}H_{22}O_6$	**RTECS** DJ2800000
Synonyms & Trade Names 1,2,12,12a-Tetrahydro-8,9-dimethoxy-2-(1-methyl-ethenyl)-[1]benzopyrano [3,4-b]furo[2,3-h][1] benzopyran-6(6aH)-one	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL: TWA 5 mg/m^3
IDLH 2500 mg/m^3 See: 83794	**Conversion**

Physical Description
Colorless to red, odorless, crystalline solid. [insecticide]

MW: 394.4	BP: Decomposes	MLT: 330°F	Sol: Insoluble
VP: <0.00004 mmHg	IP: ?		Sp.Gr: 1.27
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, alkalis

Measurement Methods
NIOSH 5007
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 10) Any supplied-air respirator

Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter

Up to 250 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 2500 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; numb mucous membrane; nausea, vomiting, abdominal pain; muscle tremor, incoordination, clonic convulsions, stupor

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0944

NIOSH Pocket Guide to Chemical Hazards

o-Terphenyl	**CAS** 84-15-1
$C_6H_5C_6H_4C_6H_5$	**RTECS** WZ6472000
Synonyms & Trade Names o-Diphenylbenzene; 1,2-Diphenylbenzene; 2-Phenylbiphenyl; 1,2-Terphenyl; ortho-Terphenyl; o-Triphenyl	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 5 mg/m^3 (0.5 ppm)
	OSHA PEL†: C 9 mg/m^3 (1 ppm)
IDLH 500 mg/m^3 See: IDLH INDEX	**Conversion** 1 ppm = 9.42 mg/m^3

Physical Description
Colorless or light-yellow solid.

MW: 230.3	BP: 630°F	MLT: 136°F	Sol: Insoluble
VP(200°F): 0.09 mmHg	IP: 7.99 eV		Sp.Gr: 1.1
Fl.P(oc): 325°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5021
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 25 mg/m^3: (APF = 5) Any dust and mist respirator£

Up to 50 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators£/(APF = 10) Any supplied-air respirator£

Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter£

Up to 250 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 500 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; thermal skin burns; headache; sore throat; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Diethyl phthalate	**CAS** 84-66-2
$C_6H_4(COOC_2H_5)_2$	**RTECS** TI1050000
Synonyms & Trade Names DEP, Diethyl ester of phthalic acid, Ethyl phthalate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless to water-white, oily liquid with a very slight, aromatic odor. [pesticide]

MW: 222.3	BP: 563°F	FRZ: -41°F	Sol(77°F): 0.1%
VP(77°F): 0.002 mmHg	IP: ?		Sp.Gr: 1.12
Fl.P(oc): 322°F	UEL: ?	LEL(368°F): 0.7%	

Class IIIB Combustible Liquid; however, ignition is difficult.

Incompatibilities & Reactivities
Strong oxidizers, strong acids, nitric acid, permanganates, water

Measurement Methods
OSHA 104
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Wash regularly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, nose, throat; headache, dizziness, nausea; lacrimation (discharge of tears); possible polyneuropathy, vestibular dysfunc; pain, numbness, lassitude (weakness, exhaustion), spasms in arms & legs; in animals: reproductive effects
Target Organs Eyes, skin, respiratory system, central nervous system, peripheral nervous system, reproductive system

See also: INTRODUCTION See ICSC CARD: 0258

NIOSH Pocket Guide to Chemical Hazards

Dibutyl phthalate	**CAS** 84-74-2
$C_6H_4(COOC_4H_9)_2$	**RTECS** TI0875000
Synonyms & Trade Names DBP; Dibutyl 1,2-benzene-dicarboxylate; Di-n-butyl phthalate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL: TWA 5 mg/m^3
IDLH 4000 mg/m^3 See: 84742	**Conversion** 1 ppm = 11.57 mg/m^3

Physical Description
Colorless to faint-yellow, oily liquid with a slight, aromatic odor.

MW: 278.3	BP: 644°F	FRZ: -31°F	Sol(77°F): 0.001%
VP: 0.00007 mmHg	IP: ?		Sp.Gr: 1.05
Fl.P: 315°F	UEL: ?	LEL(456°F): 0.5%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids; liquid chlorine

Measurement Methods
NIOSH 5020; OSHA 104
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: No recommendation
Eyes: Prevent eye contact
Wash skin: No recommendation
Remove: No recommendation
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Wash regularly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 50 mg/m^3: (APF = 10) Any dust and mist respirator with a full facepiece
Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter£
Up to 250 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 4000 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, upper respiratory system, stomach

Target Organs Eyes, respiratory system, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 0036 See MEDICAL TESTS: 0071

NIOSH Pocket Guide to Chemical Hazards

Diquat (Diquat dibromide)	**CAS** 85-00-7
$C_{12}H_{12}N_2Br_2$	**RTECS** JM5690000
Synonyms & Trade Names Diquat dibromide; 1,1'-Ethylene-2,2'-bipyridyllium dibromide [Note: Diquat is a cation ($C_{12}H_{12}N_2^{++}$; 1,1'-Ethylene-2,2-bipyridyllium ion). Various diquat salts are commercially available.]	**DOT ID & Guide** 2781 151 (solid) 2782 131 (liquid)

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Dibromide salt: Yellow crystals. [herbicide] [Note: Commercial product may be found in a liquid concentrate or a solution.]

MW: 344.1	BP: Decomposes	MLT: 635°F	Sol: 70%
VP: <0.00001 mmHg	IP: ?		Sp.Gr: 1.22-1.27
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid, but does not readily ignite and burns with difficulty.

Incompatibilities & Reactivities
Alkalis, UV light, basic solutions [Note: Concentrated diquat solutions corrode aluminum.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane, respiratory system; rhinorrhea (discharge of thin mucus), epistaxis (nosebleed); skin burns; nausea, vomiting, diarrhea, malaise (vague feeling of discomfort); kidney, liver injury; cough, chest pain, dyspnea (breathing difficulty), pulmonary edema; tremor, convulsions; delayed healing of wounds

Target Organs Eyes, skin, respiratory system, kidneys, liver, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Phthalic anhydride	**CAS** 85-44-9
$C_6H_4(CO)_2O$	**RTECS** TI3150000
Synonyms & Trade Names 1,2-Benzenedicarboxylic anhydride; PAN; Phthalic acid anhydride	**DOT ID & Guide** 2214 156

Exposure Limits	NIOSH REL: TWA 6 mg/m^3 (1 ppm)
	OSHA PEL†: TWA 12 mg/m^3 (2 ppm)
IDLH 60 mg/m^3 See: 85449	**Conversion** 1 ppm = 6.06 mg/m^3

Physical Description
White solid (flake) or a clear, colorless, mobile liquid (molten) with a characteristic, acrid odor.

MW: 148.1	BP: 563°F	MLT: 267°F	Sol: 0.6%
VP: 0.0015 mmHg	IP: 10.00 eV		Sp.Gr: 1.53 (Flake) 1.20 (Molten)
Fl.P: 305°F	UEL: 10.5%	LEL: 1.7%	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, water [Note: Converted to phthalic acid in hot water.]

Measurement Methods
NIOSH S179 (II-3); OSHA 90
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 30 mg/m^3: (APF = 5) Any dust and mist respirator*

Up to 60 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*/(APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; conjunctivitis; nasal ulcer bleeding; bronchitis, bronchial asthma; dermatitis; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0315 See MEDICAL TESTS: 0192

NIOSH Pocket Guide to Chemical Hazards

Azinphos-methyl	**CAS** 86-50-0
$C_{10}H_{12}O_3PS_2N_3$	**RTECS** TE1925000
Synonyms & Trade Names O,O-Dimethyl-S-4-oxo-1,2,3-benzotriazin-3(4H)-ylmethyl phosphorodithioate; Guthion®; Methyl azinphos	**DOT ID & Guide** 2783 152

Exposure Limits	NIOSH REL: TWA 0.2 mg/m^3 [skin]
	OSHA PEL: TWA 0.2 mg/m^3 [skin]
IDLH 10 mg/m^3 See: 86500	**Conversion**

Physical Description
Colorless crystals or a brown, waxy solid. [insecticide]

MW: 317.3	BP: Decomposes	MLT: 163°F	Sol: 0.003%
VP: 8 x 10^{-9} mmHg	IP: ?		Sp.Gr: 1.44
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers, acids

Measurement Methods
NIOSH 5600
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 10) Any supplied-air respirator

Up to 5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter

Up to 10 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Miosis; ache eyes; blurred vision, lacrimation (discharge of tears), rhinorrhea (discharge of thin mucus); headache; tightness chest, wheezing, laryngeal spasm; salivation; cyanosis; anorexia; nausea, vomiting, diarrhea; sweating; twitching, paralysis, convulsions; low blood pressure, cardiac irregularities

Target Organs respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0826 See MEDICAL TESTS: 0020

NIOSH Pocket Guide to Chemical Hazards

ANTU	**CAS** 86-88-4
$C_{10}H_7NHC(NH_2)S$	**RTECS** YT9275000
Synonyms & Trade Names alpha-Naphthyl thiocarbamide, 1-Naphthyl thiourea, alpha-Naphthyl thiourea	**DOT ID & Guide** 1651 153

Exposure Limits	NIOSH REL: TWA 0.3 mg/m^3
	OSHA PEL: TWA 0.3 mg/m^3
IDLH 100 mg/m^3 See: 86884	**Conversion**

Physical Description
White crystalline or gray, odorless powder. [rodenticide]

MW: 202.3	BP: Decomposes	MLT: 388°F	Sol: 0.06%
VP: Low	IP: ?		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers, silver nitrate

Measurement Methods
NIOSH S276 (II-5)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 3 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 10) Any supplied-air respirator

Up to 7.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter

Up to 15 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 100 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion

Symptoms After ingestion of large doses: vomiting, dyspnea (breathing difficulty), cyanosis, coarse pulmonary rales; liver damage

Target Organs respiratory system, blood, liver

See also: INTRODUCTION See ICSC CARD: 0973

NIOSH Pocket Guide to Chemical Hazards

Hexachlorobutadiene	**CAS** 87-68-3
$Cl_2C=CClCCl=CCl_2$	**RTECS** EJ0700000
Synonyms & Trade Names HCBD; Hexachloro-1,3-butadiene; 1,3-Hexachlorobutadiene; Perchlorobutadiene	**DOT ID & Guide** 2279 151

Exposure Limits	NIOSH REL: Ca TWA 0.02 ppm (0.24 mg/m^3) [skin] See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion** 1 ppm = 10.66 mg/m^3

Physical Description
Clear, colorless liquid with a mild, turpentine-like odor.

MW: 260.7	BP: 419°F	FRZ: -6°F	Sol: Insoluble
VP: 0.2 mmHg	IP: ?		Sp.Gr: 1.55
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
NIOSH 2543
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, skin, respiratory system; kidney damage; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, kidneys

Cancer Site [in animals: kidney tumors]

See also: INTRODUCTION See ICSC CARD: 0896

NIOSH Pocket Guide to Chemical Hazards

Pentachlorophenol	**CAS** 87-86-5
C_6Cl_5OH	**RTECS** SM6300000
Synonyms & Trade Names PCP; Penta; 2,3,4,5,6-Pentachlorophenol	**DOT ID & Guide** 3155 154

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 [skin]
	OSHA PEL: TWA 0.5 mg/m^3 [skin]
IDLH 2.5 mg/m^3 See: 87865	**Conversion**

Physical Description
Colorless to white, crystalline solid with a benzene-like odor. [fungicide]

MW: 266.4	BP: 588°F (Decomposes)	MLT: 374°F	Sol: 0.001%
VP(77°F): 0.0001 mmHg	IP: NA		Sp.Gr: 1.98
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers, acids, alkalis

Measurement Methods
NIOSH 5512
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2.5 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; sneezing, cough; lassitude (weakness, exhaustion), anorexia, weight loss; sweating; headache, dizziness; nausea, vomiting; dyspnea (breathing difficulty), chest pain; high fever; dermatitis

Target Organs Eyes, skin, respiratory system, cardiovascular system, liver, kidneys, central nervous system

See also: INTRODUCTION See ICSC CARD: 0069 See MEDICAL TESTS: 0178

NIOSH Pocket Guide to Chemical Hazards

o-Nitrotoluene	**CAS** 88-72-2
$NO_2C_6H_4CH_3$	**RTECS** XT3150000
Synonyms & Trade Names o-Methylnitrobenzene, 2-Methylnitrobenzene, ortho-Nitrotoluene, 2-Nitrotoluene	**DOT ID & Guide** 1664 152

Exposure Limits	NIOSH REL: TWA 2 ppm (11 mg/m^3) [skin]
	OSHA PEL†: TWA 5 ppm (30 mg/m^3) [skin]
IDLH 200 ppm See: 88722	**Conversion** 1 ppm = 5.61 mg/m^3

Physical Description
Yellow liquid with a weak, aromatic odor. [Note: A solid below 25°F.]

MW: 137.1	BP: 432°F	FRZ: 25°F	Sol: 0.07%
VP: 0.1 mmHg	IP: 9.43 eV		Sp.Gr: 1.16
Fl.P: 223°F	UEL: ?	LEL: 2.2%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, sulfuric acid

Measurement Methods
NIOSH 2005
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 20 ppm: (APF = 10) Any supplied-air respirator*
Up to 50 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 100 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 200 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Anoxia, cyanosis; headache, lassitude (weakness, exhaustion), dizziness; ataxia; dyspnea (breathing difficulty); tachycardia; nausea, vomiting

Target Organs Blood, central nervous system, cardiovascular system, skin, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 0931 See MEDICAL TESTS: 0168

NIOSH Pocket Guide to Chemical Hazards

Picric acid	**CAS** 88-89-1
$(NO_2)_3C_6H_2OH$	**RTECS** TJ7875000
Synonyms & Trade Names Phenol trinitrate; 2,4,6-Trinitrophenol [Note: An OSHA Class A Explosive (1910.109).]	**DOT ID & Guide** 1344 113 (>10% water)

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 ST 0.3 mg/m^3 [skin]
	OSHA PEL: TWA 0.1 mg/m^3 [skin]
IDLH 75 mg/m^3 See: 88891	**Conversion** 1 ppm = 9.37 mg/m^3

Physical Description
Yellow, odorless solid. [Note: Usually used as an aqueous solution.]

MW: 229.1	BP: Explodes above 572°F	MLT: 252°F	Sol: 1%
VP(383°F): 1 mmHg	IP: ?		Sp.Gr: 1.76
Fl.P: 302°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Copper, lead, zinc & other metals; salts; plaster; concrete; ammonia [Note: Corrosive to metals. An explosive mixture results when the aqueous solution crystallizes.]

Measurement Methods
NIOSH S228 (II-4)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 1 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 75 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; sensitization dermatitis; yellow-stained hair, skin; lassitude (weakness, exhaustion), myalgia, anuria, polyuria; bitter taste, gastrointestinal disturbance; hepatitis, hematuria (blood in the urine), albuminuria, nephritis

Target Organs Eyes, skin, kidneys, liver, blood

See also: INTRODUCTION See ICSC CARD: 0316 See MEDICAL TESTS: 0193

NIOSH Pocket Guide to Chemical Hazards

o-sec-Butylphenol	**CAS** 89-72-5
$CH_3CH_2CH(CH_3)C_6H_4OH$	**RTECS** SJ8920000
Synonyms & Trade Names 2-sec-Butylphenol, 2-(1-Methylpropyl)phenol	**DOT ID & Guide** 2228 153 (liquid) 2229 153 (solid)

Exposure Limits	NIOSH REL: TWA 5 ppm (30 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.14 mg/m^3

Physical Description
Colorless liquid or solid (below 61°F).

MW: 150.2	BP: 227°F	FRZ: 61°F	Sol: Insoluble
VP: Low	IP: ?		Sp.Gr: 0.89
Fl.P: 225°F	UEL: ?	LEL: ?	

Class IIB Combustible Liquid Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, respiratory system; skin burns
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

o-Anisidine	**CAS** 90-04-0
$NH_2C_6H_4OCH_3$	**RTECS** BZ5410000
Synonyms & Trade Names ortho-Aminoanisole, 2-Anisidine, o-Methoxyaniline [Note: o-Anisidine has been used as a basis for many dyes.]	**DOT ID & Guide** 2431 153

Exposure Limits	NIOSH REL: Ca 0.5 mg/m^3 [skin] See Appendix A
	OSHA PEL: TWA 0.5 mg/m^3 [skin]
IDLH Ca [50 mg/m^3] See: 90040	**Conversion**

Physical Description
Red or yellow, oily liquid with an amine-like odor. [Note: A solid below 41°F.]

MW: 123.2	BP: 437°F	FRZ: 41°F	Sol(77°F): 1%
VP: <0.1 mmHg	IP: 7.44 eV		Sp.Gr: 1.10
Fl.P(oc): 244°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 2514
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Headache, dizziness; cyanosis; red blood cell Heinz bodies; [potential occupational carcinogen]

Target Organs Blood, kidneys, liver, cardiovascular system, central nervous system

Cancer Site [in animals: tumors of the thyroid gland, bladder & kidneys]

See also: INTRODUCTION See ICSC CARD: 0970 See MEDICAL TESTS: 0015

NIOSH Pocket Guide to Chemical Hazards

Naphthalene	**CAS** 91-20-3
$C_{10}H_8$	**RTECS** QJ0525000
Synonyms & Trade Names Naphthalin, Tar camphor, White tar	**DOT ID & Guide** 1334 133 (crude or refined) 2304 133 (molten)

Exposure Limits	NIOSH REL: TWA 10 ppm (50 mg/m^3) ST 15 ppm (75 mg/m^3)
	OSHA PEL†: TWA 10 ppm (50 mg/m^3)
IDLH 250 ppm See: 91203	**Conversion** 1 ppm = 5.24 mg/m^3

Physical Description
Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.]

MW: 128.2	BP: 424°F	MLT: 176°F	Sol: 0.003%
VP: 0.08 mmHg	IP: 8.12 eV		Sp.Gr: 1.15
Fl.P: 174°F	UEL: 5.9%	LEL: 0.9%	

Combustible Solid, but will take some effort to ignite.

Incompatibilities & Reactivities
Strong oxidizers, chromic anhydride

Measurement Methods
NIOSH 1501; OSHA 35
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Molten flush immediately/solid-liquid soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 100 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter*/(APF = 10) Any supplied-air respirator*
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage

Target Organs Eyes, skin, blood, liver, kidneys, central nervous system

See also: INTRODUCTION See ICSC CARD: 0667 See MEDICAL TESTS: 0152

NIOSH Pocket Guide to Chemical Hazards

beta-Naphthylamine	**CAS** 91-59-8
$C_{10}H_7NH_2$	**RTECS** QM2100000
Synonyms & Trade Names 2-Aminonaphthalene, 2-Naphthylamine	**DOT ID & Guide** 1650 153

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1009] See Appendix B
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Odorless, white to red crystals with a faint, aromatic odor. [Note: Darkens in air to a reddish-purple color.]

MW: 143.2	BP: 583°F	MLT: 232°F	Sol: Miscible in hot water
VP(226°F): 1 mmHg	IP: 9.71 eV		Sp.Gr(208°F): 1.06
Fl.P: 315°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5518; OSHA 93
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Dermatitis; hemorrhagic cystitis; dyspnea (breathing difficulty); ataxia; methemoglobinemia, hematuria (blood in the urine); dysuria; [potential occupational carcinogen]

Target Organs Bladder, skin

Cancer Site [bladder cancer]

See also: INTRODUCTION See MEDICAL TESTS: 0154

NIOSH Pocket Guide to Chemical Hazards

3,3'-Dichlorobenzidine (and its salts)	**CAS** 91-94-1
$NH_2ClC_6H_3C_6H_3ClNH_2$	**RTECS** DD0525000
Synonyms & Trade Names 4,4'-Diamino-3,3'-dichlorobiphenyl; Dichlorobenzidine base; o,o'-Dichlorobenzidine; 3,3'-Dichlorobiphenyl-4,4'-diamine; 3,3'-Dichloro-4,4'-biphenyldiamine; 3,3'-Dichloro-4,4'-diaminobiphenyl	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1007] See Appendix B
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Gray to purple, crystalline solid.

MW: 253.1	BP: 788°F	MLT: 271°F	Sol(59°F): 0.07%
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5509; OSHA 65
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Skin sensitization, dermatitis; headache, dizziness; caustic burns; frequent urination, dysuria; hematuria (blood in the urine); gastrointestinal upset; upper respiratory infection; [potential occupational carcinogen]

Target Organs Bladder, liver, lung, skin, gastrointestinal tract

Cancer Site [in animals: liver & bladder cancer]

See also: INTRODUCTION See ICSC CARD: 0481 See MEDICAL TESTS: 0074

NIOSH Pocket Guide to Chemical Hazards

m-Terphenyl	**CAS** 92-06-8
$C_6H_5C_6H_4C_6H_5$	**RTECS** WZ6470000
Synonyms & Trade Names m-Diphenylbenzene; 1,3-Diphenylbenzene; Isodiphenylbenzene; 3-Phenylbiphenyl; 1,3-Terphenyl; meta-Terphenyl; m-Triphenyl	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 5 mg/m^3 (0.5 ppm)
	OSHA PEL†: C 9 mg/m^3 (1 ppm)
IDLH 500 mg/m^3 See: IDLH INDEX	**Conversion** 1 ppm = 9.57 mg/m^3

Physical Description
Yellow solid (needles).

MW: 230.3	BP: 689°F	MLT: 192°F	Sol: Insoluble
VP(200°F): 0.01 mmHg	IP: 8.01		Sp.Gr: 1.23
Fl.P(oc): 375°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5021
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 25 mg/m^3: (APF = 5) Any dust and mist respirator£

Up to 50 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators£/(APF = 10) Any supplied-air respirator£

Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter£

Up to 250 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 500 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; thermal skin burns; headache; sore throat; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Diphenyl	**CAS** 92-52-4
$C_6H_5C_6H_5$	**RTECS** DU8050000
Synonyms & Trade Names Biphenyl, Phenyl benzene	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 mg/m^3 (0.2 ppm)
	OSHA PEL: TWA 1 mg/m^3 (0.2 ppm)
IDLH 100 mg/m^3 See: 92524	**Conversion** 1 ppm = 6.31 mg/m^3

Physical Description
Colorless to pale-yellow solid with a pleasant, characteristic odor. [fungicide]

MW: 154.2	BP: 489°F	MLT: 156°F	Sol: Insoluble
VP: 0.005 mmHg	IP: 7.95 eV		Sp.Gr: 1.04
Fl.P: 235°F	UEL(311°F): 5.8%	LEL(232°F): 0.6%	

Combustible Solid

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
NIOSH 2530; OSHA PV2022
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash (molten), Quick drench (molten)

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 10 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter/(APF = 10) Any supplied-air respirator

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter*

Up to 50 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 100 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, throat; headache, nausea, lassitude (weakness, exhaustion), numb limbs; liver damage

Target Organs Eyes, respiratory system, liver, central nervous system

See also: INTRODUCTION See ICSC CARD: 0106

NIOSH Pocket Guide to Chemical Hazards

4-Aminodiphenyl	**CAS** 92-67-1
$C_6H_5C_6H_4NH_2$	**RTECS** DU8925000
Synonyms & Trade Names 4-Aminobiphenyl, p-Aminobiphenyl, p-Aminodiphenyl, 4-Phenylaniline	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1011] See Appendix B
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Colorless crystals with a floral odor. [Note: Turns purple on contact with air.]

MW: 169.2	BP: 576°F	MLT: 127°F	Sol: Slight
VP(227°F): 1 mmHg	IP: ?		Sp.Gr: 1.16
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid, but must be preheated before ignition possible.

Incompatibilities & Reactivities
Oxidized by air

Measurement Methods
NIOSH P&CAM269 (II-4); OSHA 93
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Headache, dizziness; drowsiness, dyspnea (breathing difficulty); ataxia, lassitude (weakness, exhaustion); methemoglobinemia; urinary burning; acute hemorrhagic cystitis; [potential occupational carcinogen]

Target Organs Bladder, skin

Cancer Site [bladder cancer]

See also: INTRODUCTION See ICSC CARD: 0759 See MEDICAL TESTS: 0012

NIOSH Pocket Guide to Chemical Hazards

Phenothiazine	**CAS** 92-84-2
$S(C_6H_4)_2NH$	**RTECS** SN5075000
Synonyms & Trade Names Dibenzothiazine, Fenothiazine, Thiodiphenylamine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Grayish-green to greenish-yellow solid. [insecticide]

MW: 199.3	BP: 700°F	MLT: 365°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid, but not a high fire risk.

Incompatibilities & Reactivities
None reported

Measurement Methods
OSHA PV2048
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: No recommendation
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Itching, irritation, reddening skin; hepatitis, hemolytic anemia, abdominal cramps, tachycardia; kidney damage; skin photo sensitization
Target Organs Skin, cardiovascular system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0937

NIOSH Pocket Guide to Chemical Hazards

Benzidine	**CAS** 92-87-5
$NH_2C_6H_4C_6H_4NH_2$	**RTECS** DC9625000
Synonyms & Trade Names Benzidine-based dyes; 4,4'-Bianiline; 4,4'-Biphenyldiamine; 1,1'-Biphenyl-4,4'-diamine; 4,4'-Diaminobiphenyl; p-Diaminodiphenyl [Note: Benzidine has been used as a basis for many dyes.]	**DOT ID & Guide** 1885 153

Exposure Limits	NIOSH REL: Ca See Appendix A See Appendix C
	OSHA PEL: [1910.1010] See Appendix B See Appendix C
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Grayish-yellow, reddish-gray, or white crystalline powder. [Note: Darkens on exposure to air and light.]

MW: 184.3	BP: 752°F	MLT: 239°F	Sol(54°F): 0.04%
VP: Low	IP: ?		Sp.Gr: 1.25
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid, but difficult to burn.

Incompatibilities & Reactivities
Red fuming nitric acid

Measurement Methods
NIOSH 5509; OSHA 65
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Hematuria (blood in the urine); secondary anemia from hemolysis; acute cystitis; acute liver disorders; dermatitis; painful, irregular urination; [potential occupational carcinogen]

Target Organs Bladder, skin, kidneys, liver, blood

Cancer Site [liver, kidney & bladder cancer]

See also: INTRODUCTION See ICSC CARD: 0224 See MEDICAL TESTS: 0023

NIOSH Pocket Guide to Chemical Hazards

4-Nitrobiphenyl	**CAS** 92-93-3
$C_6H_5C_6H_4NO_2$	**RTECS** DV5600000
Synonyms & Trade Names p-Nitrobipheny, p-Nitrodiphenyl, 4-Nitrodiphenyl, p-Phenylnitrobenzene, 4-Phenylnitrobenzene, PNB	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1003] See Appendix B
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
White to yellow, needle-like, crystalline solid with a sweetish odor.

MW: 199.2	BP: 644°F	MLT: 237°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: 290°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong reducers

Measurement Methods
NIOSH P&CAM273 (II-4)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Headache, drowsiness, dizziness; dyspnea (breathing difficulty); ataxia, lassitude (weakness, exhaustion); methemoglobinemia; urinary burning; acute hemorrhagic cystitis; [potential occupational carcinogen]

Target Organs Bladder, blood

Cancer Site [in animals: bladder tumors]

See also: INTRODUCTION See MEDICAL TESTS: 0162

NIOSH Pocket Guide to Chemical Hazards

p-Terphenyl	**CAS** 92-94-4
$C_6H_5C_6H_4C_6H_5$	**RTECS** WZ6475000
Synonyms & Trade Names p-Diphenylbenzene; 1,4-Diphenylbenzene; 4-Phenylbiphenyl; 1,4-Terphenyl; para-Terphenyl; p-Triphenyl	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 5 mg/m^3 (0.5 ppm)
	OSHA PEL†: C 9 mg/m^3 (1 ppm)
IDLH 500 mg/m^3 See: IDLH INDEX	**Conversion** 1 ppm = 9.57 mg/m^3

Physical Description
White or light-yellow solid.

MW: 230.3	BP: 761°F	MLT: 415°F	Sol: Insoluble
VP: Very low	IP: 7.78		Sp.Gr: 1.23
Fl.P: 405°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5021
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 25 mg/m^3: (APF = 5) Any dust and mist respirator£

Up to 50 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators£/(APF = 10) Any supplied-air respirator£

Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter£

Up to 250 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 500 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; thermal skin burns; headache; sore throat; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

2,4,5-T	**CAS** 93-76-5
$Cl_3C_6H_2OCH_2COOH$	**RTECS** AJ8400000
Synonyms & Trade Names 2,4,5-Trichlorophenoxyacetic acid	**DOT ID & Guide** 2765 152

Exposure Limits	NIOSH REL: TWA 10 mg/m^3
	OSHA PEL: TWA 10 mg/m^3
IDLH 250 mg/m^3 See: 93765	**Conversion**

Physical Description
Colorless to tan, odorless, crystalline solid. [herbicide]

MW: 255.5	BP: Decomposes	MLT: 307°F	Sol(77°F): 0.03%
VP: 1 x 10-7 mmHg	IP: ?		Sp.Gr: 1.80
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid, but burns with difficulty.

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5001
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 50 mg/m^3: (APF = 5) Any dust and mist respirator
Up to 100 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator
Up to 250 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: ataxia; skin irritation, acne-like rash; liver damage

Target Organs Skin, liver, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 0075 See MEDICAL TESTS: 0249

NIOSH Pocket Guide to Chemical Hazards

Benzoyl peroxide	**CAS** 94-36-0
$(C_6H_5CO)_2O_2$	**RTECS** DM8575000
Synonyms & Trade Names Benzoperoxide, Dibenzoyl peroxide	**DOT ID & Guide** 2085 146 2087 146 2088 146 2089 145 2090 146

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL: TWA 5 mg/m^3
IDLH 1500 mg/m^3 See: 94360	**Conversion**

Physical Description
Colorless to white crystals or a granular powder with a faint, benzaldehyde-like odor.

MW: 242.2	BP: Decomposes explosively	MLT: 217°F	Sol: <1%
VP: <1 mmHg	IP: ?		Sp.Gr: 1.33
Fl.P: 176°F	UEL: ?	LEL: ?	

Combustible Solid (easily ignited and burns very rapidly).

Incompatibilities & Reactivities
Combustible substances (wood, paper, etc.), acids, alkalis, alcohols, amines, ethers [Note: Containers may explode when heated. Extremely explosion-sensitive to shock, heat & friction.]

Measurement Methods
NIOSH 5009
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*/(APF = 10) Any supplied-air respirator*

Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*

Up to 250 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1500 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; sensitization dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0225

NIOSH Pocket Guide to Chemical Hazards

2,4-D	**CAS** 94-75-7
$Cl_2C_6H_3OCH_2COOH$	**RTECS** AG6825000
Synonyms & Trade Names Dichlorophenoxyacetic acid; 2,4-Dichlorophenoxyacetic acid	**DOT ID & Guide** 2765 152

Exposure Limits	NIOSH REL: TWA 10 mg/m^3
	OSHA PEL: TWA 10 mg/m^3
IDLH 100 mg/m^3 See: 94757	**Conversion**

Physical Description
White to yellow, crystalline, odorless powder. [herbicide]

MW: 221.0	BP: Decomposes	MLT: 280°F	Sol: 0.05%
VP(320°F): 0.4 mmHg	IP: ?		Sp.Gr: 1.57
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5001
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 100 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Lassitude (weakness, exhaustion), stupor, hyporeflexia, muscle twitching; convulsions; dermatitis; in animals: liver, kidney injury

Target Organs Skin, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0033 See MEDICAL TESTS: 0248

NIOSH Pocket Guide to Chemical Hazards

Indene	**CAS** 95-13-6
C_9H_8	**RTECS** NK8225000
Synonyms & Trade Names Indonaphthene	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 ppm (45 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.75 mg/m^3

Physical Description
Colorless liquid. [Note: A solid below 29°F.]

MW: 116.2	BP: 359°F	FRZ: 29°F	Sol: Insoluble
VP: ?	IP: 8.81 eV		Sp.Gr: 0.997
Fl.P: 173°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
None reported [Note: Polymerizes & oxidizes on standing. It has exploded during nitration with (H_2SO_4 + HNO_3).]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms In animals: irritation eyes, skin, mucous membrane; dermatitis, skin sensitization; chemical pneumonitis (aspiration liquid); liver, kidney, spleen injury
Target Organs Eyes, skin, respiratory system, liver, kidneys, spleen

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

o-Xylene	**CAS** 95-47-6
$C_6H_4(CH_3)_2$	**RTECS** ZE2450000
Synonyms & Trade Names 1,2-Dimethylbenzene; ortho-Xylene; o-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)
IDLH 900 ppm See: 95476	**Conversion** 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 292°F	FRZ: -13°F	Sol: 0.02%
VP: 7 mmHg	IP: 8.56 eV		Sp.Gr: 0.88
Fl.P: 90°F	UEL: 6.7%	LEL: 0.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0084 See MEDICAL TESTS: 0243

NIOSH Pocket Guide to Chemical Hazards

o-Cresol	**CAS** 95-48-7
$CH_3C_6H_4OH$	**RTECS** GO6300000
Synonyms & Trade Names ortho-Cresol, 2-Cresol, o-Cresylic acid, 1-Hydroxy-2-methylbenzene, 2-Hydroxytoluene, 2-Methyl phenol	**DOT ID & Guide** 2076 153

Exposure Limits	NIOSH REL: TWA 2.3 ppm (10 mg/m^3)
	OSHA PEL: TWA 5 ppm (22 mg/m^3) [skin]
IDLH 250 ppm See: cresol	**Conversion** 1 ppm = 4.43 mg/m^3

Physical Description
White crystals with a sweet, tarry odor. [Note: A liquid above 88°F.]

MW: 108.2	BP: 376°F	MLT: 88°F	Sol: 2%
VP(77°F): 0.29 mmHg	IP: 8.93 eV		Sp.Gr: 1.05
Fl.P: 178°F	UEL: ?	LEL(300°F): 1.4%	

Combustible Solid Class IIIA Combustible Liquid

Incompatibilities & Reactivities
Strong oxidizers, acids

Measurement Methods
NIOSH 2546; OSHA 32
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 23 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter/(APF = 10) Any supplied-air respirator
Up to 57.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter
Up to 115 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 250 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; central nervous system effects: confusion, depression, respiratory failure; dyspnea (breathing difficulty), irregular rapid respiration, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys, pancreas, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0030

NIOSH Pocket Guide to Chemical Hazards

o-Chlorotoluene	**CAS** 95-49-8
$ClC_6H_4CH_3$	**RTECS** XS9000000
Synonyms & Trade Names 1-Chloro-2-methylbenzene, 2-Chloro-1-methylbenzene, 2-Chlorotoluene, o-Tolyl chloride	**DOT ID & Guide** 2238 130

Exposure Limits	NIOSH REL: TWA 50 ppm (250 mg/m^3) ST 75 ppm (375 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.18 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 126.6	BP: 320°F	FRZ: -31°F	Sol(77°F): 0.009%
VP(77°F): 4 mmHg	IP: 8.83 eV		Sp.Gr: 1.08
Fl.P: 96°F	UEL: ?	LEL: ?	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Acids, alkalis, oxidizers, reducing materials, water

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, mucous membrane; dermatitis; drowsiness, incoordination, anesthesia; cough; liver, kidney injury
Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

o-Dichlorobenzene	**CAS** 95-50-1
$C_6H_4Cl_2$	**RTECS** CZ4500000
Synonyms & Trade Names o-DCB; 1,2-Dichlorobenzene; ortho-Dichlorobenzene; o-Dichlorobenzol	**DOT ID & Guide** 1591 152

Exposure Limits	NIOSH REL: C 50 ppm (300 mg/m^3)
	OSHA PEL: C 50 ppm (300 mg/m^3)
IDLH 200 ppm See: 95501	**Conversion** 1 ppm = 6.01 mg/m^3

Physical Description
Colorless to pale-yellow liquid with a pleasant, aromatic odor. [herbicide]

MW: 147.0	BP: 357°F	FRZ: 1°F	Sol: 0.01%
VP: 1 mmHg	IP: 9.06 eV		Sp.Gr: 1.30
Fl.P: 151°F	UEL: 9.2%	LEL: 2.2%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, aluminum, chlorides, acids, acid fumes

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 200 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)[£]/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; liver, kidney damage; skin blisters

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 1066

NIOSH Pocket Guide to Chemical Hazards

o-Toluidine	**CAS** 95-53-4
$CH_3C_6H_4NH_2$	**RTECS** XU2975000
Synonyms & Trade Names o-Aminotoluene, 2-Aminotoluene, 1-Methyl-2-aminobenzene, o-Methylaniline, 2-Methylaniline, ortho-Toluidine	**DOT ID & Guide** 1708 153

Exposure Limits	NIOSH REL: Ca [skin] See Appendix A
	OSHA PEL: TWA 5 ppm (22 mg/m^3) [skin]
IDLH Ca [50 ppm] See: 95534	**Conversion** 1 ppm = 4.38 mg/m^3

Physical Description
Colorless to pale-yellow liquid with an aromatic, aniline-like odor.

MW: 107.2	BP: 392°F	FRZ: 6°F	Sol: 2%
VP: 0.3 mmHg	IP: 7.44 eV		Sp.Gr: 1.01
Fl.P: 185°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, nitric acid, bases

Measurement Methods
NIOSH 2002, 2017; OSHA 73
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; anoxia, headache, cyanosis; lassitude (weakness, exhaustion), dizziness, drowsiness; micro hematuria (blood in the urine); eye burns; dermatitis; [potential occupational carcinogen]

Target Organs Eyes, skin, blood, kidneys, liver, cardiovascular system

Cancer Site [bladder cancer]

See also: INTRODUCTION See ICSC CARD: 0341 See MEDICAL TESTS: 0234

NIOSH Pocket Guide to Chemical Hazards

1,2,4-Trimethylbenzene	**CAS** 95-63-6
$C_6H_3(CH_3)_3$	**RTECS** DC3325000
Synonyms & Trade Names Assymetrical trimethylbenzene, psi-Cumene, Pseudocumene [Note: Hemimellite is a mixture of the 1,2,3-isomer with up to 10% of related aromatics such as the 1,2,4-isomer.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 25 ppm (125 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.92 mg/m^3

Physical Description
Clear, colorless liquid with a distinctive, aromatic odor.

MW: 120.2	BP: 337°F	FRZ: -77°F	Sol: 0.006%
VP(56°F): 1 mmHg	IP: 8.27 eV		Sp.Gr: 0.88
Fl.P: 112°F	UEL: 6.4%	LEL: 0.9%	

Class II Flammable Liquid

Incompatibilities & Reactivities
Oxidizers, nitric acid

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, fatigue, dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)

Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

1,2-Dibromo-3-chloropropane	**CAS** 96-12-8
$CH_2BrCHBrCH_2Cl$	**RTECS** TX8750000
Synonyms & Trade Names 1-Chloro-2,3-dibromopropane; DBCP; Dibromochloropropane	**DOT ID & Guide** 2872 159

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1044] TWA 0.001 ppm
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion** 1 ppm = 9.67 mg/m^3

Physical Description
Dense yellow or amber liquid with a pungent odor at high concentrations. [pesticide] [Note: A solid below 43°F.]

MW: 236.4	BP: 384°F	FRZ: 43°F	Sol: 0.1%
VP: 0.8 mmHg	IP: ?		Sp.Gr: 2.05
Fl.P(oc): 170°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Chemically-active metals such as aluminum, magnesium & tin alloys [Note: Corrosive to metals.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; drowsiness; nausea, vomiting; pulmonary edema; liver, kidney injury; sterility; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys, spleen, reproductive system, digestive system

Cancer Site [in animals: cancer of the nasal cavity, tongue, pharynx, lungs, stomach, adrenal & mammary glands]

See also: INTRODUCTION See ICSC CARD: 0002 See MEDICAL TESTS: 0064

NIOSH Pocket Guide to Chemical Hazards

1,2,3-Trichloropropane	**CAS** 96-18-4
$CH_2ClCHClCH_2Cl$	**RTECS** TZ9275000
Synonyms & Trade Names Allyl trichloride, Glycerol trichlorohydrin, Glyceryl trichlorohydrin, Trichlorohydrin	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 10 ppm (60 mg/m^3) [skin] See Appendix A
	OSHA PEL†: TWA 50 ppm (300 mg/m^3)
IDLH Ca [100 ppm] See: 96184	**Conversion** 1 ppm = 6.03 mg/m^3

Physical Description
Colorless liquid with a chloroform-like odor.

MW: 147.4	BP: 314°F	FRZ: 6°F	Sol: 0.1%
VP: 3 mmHg	IP: ?		Sp.Gr: 1.39
Fl.P: 160°F	UEL(302°F): 12.6%	LEL(248°F): 3.2%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Chemically-active metals, strong caustics & oxidizers

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; central nervous system depression; in animals: liver, kidney injury; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

Cancer Site [in animals: forestomach, liver & mammary gland cancer]

See also: INTRODUCTION See ICSC CARD: 0683 See MEDICAL TESTS: 0238

NIOSH Pocket Guide to Chemical Hazards

Diethyl ketone	**CAS** 96-22-0
$CH_3CH_2COCH_2CH_3$	**RTECS** SA8050000
Synonyms & Trade Names DEK, Dimethylacetone, Ethyl ketone, Metacetone, 3-Pentanone, Propione	**DOT ID & Guide** 1156 127

Exposure Limits	NIOSH REL: TWA 200 ppm (705 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.53 mg/m^3

Physical Description
Colorless liquid with an acetone-like odor.

MW: 86.2	BP: 215°F	FRZ: -44°F	Sol: 5%
VP(77°F): 35 mmHg	IP: 9.32 eV		Sp.Gr: 0.81
Fl.P(oc): 55°F	UEL: 6.4%	LEL: 1.6%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, alkalis, mineral acids, (hydrogen peroxide + nitric acid)

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: Prevent eye contact Wash skin: Daily Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, mucous membrane, respiratory system; cough, sneezing
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0874

NIOSH Pocket Guide to Chemical Hazards

Methyl acrylate	**CAS** 96-33-3
CH_2=CHCOOCH$_3$	**RTECS** AT2800000
Synonyms & Trade Names Methoxycarbonylethylene, Methyl ester of acrylic acid, Methyl propenoate	**DOT ID & Guide** 1919 129P (inhibited)

Exposure Limits	NIOSH REL: TWA 10 ppm (35 mg/m^3) [skin]
	OSHA PEL: TWA 10 ppm (35 mg/m^3) [skin]
IDLH 250 ppm See: 96333	**Conversion** 1 ppm = 3.52 mg/m^3

Physical Description
Colorless liquid with an acrid odor.

MW: 86.1	BP: 176°F	FRZ: -106°F	Sol: 6%
VP: 65 mmHg	IP: 9.90 eV		Sp.Gr: 0.96
Fl.P: 27°F	UEL: 25%	LEL: 2.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates, oxidizers such as peroxides, strong alkalis [Note: Polymerizes easily; usually contains an inhibitor such as hydroquinone.]

Measurement Methods
NIOSH 1459; OSHA 92
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 100 ppm: (APF = 10) Any supplied-air respirator*
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0625

NIOSH Pocket Guide to Chemical Hazards

Ethylene thiourea	**CAS** 96-45-7
$C_3H_6N_2S$	**RTECS** NI9625000
Synonyms & Trade Names 1,3-Ethylene-2-thiourea; N,N-Ethylenethiourea; ETU; 2-Imidazolidine-2-thione	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca Use encapsulated form. See Appendix A
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
White to pale-green, crystalline solid with a faint, amine odor. [Note: Used as an accelerator in the curing of polychloroprene & other elastomers.]

MW: 102.2	BP: 446-595°F	MLT: 392°F	Sol(86°F): 2%
VP: 16 mmHg	IP: 8.15 eV		Sp.Gr: ?
Fl.P: 486°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Acrolein

Measurement Methods
NIOSH 5011; OSHA 95
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes; in animals: thickening of the skin; goiter; teratogenic effects; [potential occupational carcinogen]

Target Organs Eyes, skin, thyroid, reproductive system

Cancer Site [in animals: liver, thyroid & lymphatic system tumors]

See also: INTRODUCTION See ICSC CARD: 1148

NIOSH Pocket Guide to Chemical Hazards

4,4'-Thiobis(6-tert-butyl-m-cresol)	**CAS** 96-69-5
$[CH_3(OH)C_6H_2C(CH_3)_3]_2S$	**RTECS** GP3150000
Synonyms & Trade Names 4,4'-Thiobis(3-methyl-6-tert-butylphenol); 1,1'-Thiobis(2-methyl-4-hydroxy-5-tert-butylbenzene)	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Light-gray to tan powder with a slightly aromatic odor.

MW: 358.6	BP: ?	MLT: 302°F	Sol: 0.08%
VP: 0.0000006 mmHg	IP: ?		Sp.Gr: 1.10
Fl.P: 420°F	UEL: NA	LEL: NA	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0500; 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Disulfiram	**CAS** 97-77-8
$[(C_2H_5)_2NCS]_2S_2$	**RTECS** JO1225000
Synonyms & Trade Names Antabuse®, bis(Diethylthiocarbamoyl) disulfide, Ro-Sulfiram®, TETD, Tetraethylthiuram disulfide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2 mg/m^3 [Precautions should be taken to avoid concurrent exposure to ethylene dibromide.]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, yellowish, or light-gray powder with a slight odor. [fungicide]

MW: 296.6	BP: ?	MLT: 158°F	Sol: 0.02%
VP: ?	IP: ?		Sp.Gr: 1.30
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, respiratory system; sensitization dermatitis; lassitude (weakness, exhaustion), tremor, restlessness, headache, dizziness; metallic taste; peripheral neuropathy; liver damage
Target Organs Eyes, skin, respiratory system, central nervous system, peripheral nervous system, liver

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Furfuryl alcohol	**CAS** 98-00-0
$C_5H_6O_2$	**RTECS** LU9100000
Synonyms & Trade Names 2-Furylmethanol, 2-Hydroxymethylfuran	**DOT ID & Guide** 2874 153

Exposure Limits	NIOSH REL: TWA 10 ppm (40 mg/m^3) ST 15 ppm (60 mg/m^3) [skin]
	OSHA PEL†: TWA 50 ppm (200 mg/m^3)
IDLH 75 ppm See: 98000	**Conversion** 1 ppm = 4.01 mg/m^3

Physical Description
Colorless to amber liquid with a faint, burning odor. [Note: Darkens on exposure to light.]

MW: 98.1	BP: 338°F	FRZ: 6°F	Sol: Miscible
VP(77°F): 0.6 mmHg	IP: ?		Sp.Gr: 1.13
Fl.P: 149°F	UEL: 16.3%	LEL: 1.8%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers & acids [Note: Contact with organic acids may lead to polymerization.]

Measurement Methods
NIOSH 2505
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 75 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, mucous membrane; dizziness; nausea, diarrhea; diuresis; respiratory, body temperature depression; vomiting; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0794 See MEDICAL TESTS: 0111

NIOSH Pocket Guide to Chemical Hazards

Furfural	**CAS** 98-01-1
$C_5H_4O_2$	**RTECS** LT7000000
Synonyms & Trade Names Fural, 2-Furancarboxaldehyde, Furfuraldehyde, 2-Furfuraldehyde	**DOT ID & Guide** 1199 132P

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 5 ppm (20 mg/m^3) [skin]
IDLH 100 ppm See: 98011	**Conversion** 1 ppm = 3.93 mg/m^3

Physical Description
Colorless to amber liquid with an almond-like odor. [Note: Darkens in light and air.]

MW: 96.1	BP: 323°F	FRZ: -34°F	Sol: 8%
VP: 2 mmHg	IP: 9.21 eV		Sp.Gr: 1.16
Fl.P: 140°F	UEL: 19.3%	LEL: 2.1%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong acids, oxidizers, strong alkalis [Note: May polymerize on contact with strong acids or strong alkalis.]

Measurement Methods
NIOSH 2529; OSHA 72
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations OSHA
Up to 50 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; headache; dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0276

NIOSH Pocket Guide to Chemical Hazards

p-tert-Butyltoluene	**CAS** 98-51-1
$(CH_3)_3CC_6H_4CH_3$	**RTECS** XS8400000
Synonyms & Trade Names 4-tert-Butyltoluene, 1-Methyl-4-tert-butylbenzene	**DOT ID & Guide** 2667 131

Exposure Limits	NIOSH REL: TWA 10 ppm (60 mg/m^3) ST 20 ppm (120 mg/m^3)
	OSHA PEL†: TWA 10 ppm (60 mg/m^3)
IDLH 100 ppm See: 98511	**Conversion** 1 ppm = 6.07 mg/m^3

Physical Description
Colorless liquid with a distinct aromatic odor, somewhat like gasoline.

MW: 148.3	BP: 379°F	FRZ: -62°F	Sol: Insoluble
VP(77°F): 0.7 mmHg	IP: 8.28 eV		Sp.Gr: 0.86
Fl.P: 155°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
NIOSH 1501; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; dry nose, throat; headache; low blood pressure, tachycardia, abnormalities cardiovascular system stress; central nervous system, hematopoietic depression; metallic taste; liver, kidney injury

Target Organs Eyes, skin, respiratory system, cardiovascular system, central nervous system, bone marrow, liver, kidneys

See also: INTRODUCTION See MEDICAL TESTS: 0034

NIOSH Pocket Guide to Chemical Hazards

Cumene	**CAS** 98-82-8
$C_6H_5CH(CH_3)_2$	**RTECS** GR8575000
Synonyms & Trade Names Cumol, Isopropyl benzene, 2-Phenyl propane	**DOT ID & Guide** 1918 130

Exposure Limits	NIOSH REL: TWA 50 ppm (245 mg/m^3) [skin]
	OSHA PEL: TWA 50 ppm (245 mg/m^3) [skin]
IDLH 900 ppm [10%LEL] See: 98828	**Conversion** 1 ppm = 4.92 mg/m^3

Physical Description
Colorless liquid with a sharp, penetrating, aromatic odor.

MW: 120.2	BP: 306°F	FRZ: -141°F	Sol: Insoluble
VP: 8 mmHg	IP: 8.75 eV		Sp.Gr: 0.86
Fl.P: 96°F	UEL: 6.5%	LEL: 0.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Oxidizers, nitric acid, sulfur acid [Note: Forms cumene hydroperoxide upon long exposure to air.]

Measurement Methods
NIOSH 1501
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 900 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0170 See MEDICAL TESTS: 0060

NIOSH Pocket Guide to Chemical Hazards

alpha-Methyl styrene	**CAS** 98-83-9
$C_6H_5C(CH_3)=CH_2$	**RTECS** WL5075300
Synonyms & Trade Names AMS, Isopropenyl benzene, 1-Methyl-1-phenylethylene, 2-Phenyl propylene	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 50 ppm (240 mg/m^3) ST 100 ppm (485 mg/m^3)
	OSHA PEL†: C 100 ppm (480 mg/m^3)
IDLH 700 ppm See: 98839	**Conversion** 1 ppm = 4.83 mg/m^3

Physical Description
Colorless liquid with a characteristic odor.

MW: 118.2	BP: 330°F	FRZ: -10°F	Sol: Insoluble
VP: 2 mmHg	IP: 8.35 eV		Sp.Gr: 0.91
Fl.P: 129°F	UEL: 6.1%	LEL: 1.9%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Oxidizers, peroxides, halogens, catalysts for vinyl or ionic polymers; aluminum, iron chloride, copper [Note: Usually contains an inhibitor such as tert-butyl catechol.]

Measurement Methods
NIOSH 1501; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 700 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; drowsiness; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0732

NIOSH Pocket Guide to Chemical Hazards

Nitrobenzene	**CAS** 98-95-3
$C_6H_5NO_2$	**RTECS** DA6475000
Synonyms & Trade Names Essence of mirbane, Nitrobenzol, Oil of mirbane	**DOT ID & Guide** 1662 152

Exposure Limits	NIOSH REL: TWA 1 ppm (5 mg/m^3) [skin]
	OSHA PEL: TWA 1 ppm (5 mg/m^3) [skin]
IDLH 200 ppm See: 98953	**Conversion** 1 ppm = 5.04 mg/m^3

Physical Description
Yellow, oily liquid with a pungent odor like paste shoe polish. [Note: A solid below 42°F.]

MW: 123.1	BP: 411°F	FRZ: 42°F	Sol: 0.2%
VP(77°F): 0.3 mmHg	IP: 9.92 eV		Sp.Gr: 1.20
Fl.P: 190°F	UEL: ?	LEL(200°F): 1.8%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Concentrated nitric acid, nitrogen tetroxide, caustics, phosphorus pentachloride, chemically-active metals such as tin or zinc

Measurement Methods
NIOSH 2005, 2017
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: No recommendation Remove: When wet or contaminated Change: Daily Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 10 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 50 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 200 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; anoxia; dermatitis; anemia; methemoglobinemia; in animals: liver, kidney damage; testicular effects

Target Organs Eyes, skin, blood, liver, kidneys, cardiovascular system, reproductive system

See also: INTRODUCTION See ICSC CARD: 0065 See MEDICAL TESTS: 0161

NIOSH Pocket Guide to Chemical Hazards

m-Nitrotoluene	**CAS** 99-08-1
$NO_2C_6H_4CH_3$	**RTECS** XT2975000
Synonyms & Trade Names m-Methylnitrobenzene, 3-Methylnitrobenzene, meta-Nitrotoluene, 3-Nitrotoluene	**DOT ID & Guide** 1664 152

Exposure Limits	NIOSH REL: TWA 2 ppm (11 mg/m^3) [skin]
	OSHA PEL†: TWA 5 ppm (30 mg/m^3) [skin]
IDLH 200 ppm See: IDLH INDEX	**Conversion** 1 ppm = 5.61 mg/m^3

Physical Description
Yellow liquid with a weak, aromatic odor. [Note: A solid below 59°F.]

MW: 137.1	BP: 450°F	FRZ: 59°F	Sol: 0.05%
VP: 0.1 mmHg	IP: 9.48 eV		Sp.Gr: 1.16
Fl.P: 223°F	UEL: ?	LEL: 1.6%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, sulfuric acid

Measurement Methods
NIOSH 2005
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 20 ppm: (APF = 10) Any supplied-air respirator*
Up to 50 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 100 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 200 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Anoxia, cyanosis; headache, lassitude (weakness, exhaustion), dizziness; ataxia; dyspnea (breathing difficulty); tachycardia; nausea, vomiting

Target Organs Blood, central nervous system, cardiovascular system, skin, gastrointestinal tract

See also: INTRODUCTION See MEDICAL TESTS: 0168

NIOSH Pocket Guide to Chemical Hazards

m-Dinitrobenzene	**CAS** 99-65-0
$C_6H_4(NO_2)_2$	**RTECS** CZ7350000
Synonyms & Trade Names meta-Dinitrobenzene; 1,3-Dinitrobenzene	**DOT ID & Guide** 1597 152

Exposure Limits	NIOSH REL: TWA 1 mg/m^3 [skin]
	OSHA PEL: TWA 1 mg/m^3 [skin]
IDLH 50 mg/m^3 See: IDLH INDEX	**Conversion**

Physical Description
Pale-white or yellow solid.

MW: 168.1	BP: 572°F	MLT: 192°F	Sol: 0.02%
VP: ?	IP: 10.43 eV		Sp.Gr: 1.58
Fl.P: 302°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, caustics, metals such as tin & zinc [Note: Prolonged exposure to fire and heat may result in an explosion due to SPONTANEOUS decomposition.]

Measurement Methods
NIOSH S214 (II-4)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 10 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 50 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Anoxia, cyanosis; visual disturbance, central scotomas; bad taste, burning mouth, dry throat, thirst; yellowing hair, eyes, skin; anemia; liver damage

Target Organs Eyes, skin, blood, liver, cardiovascular system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0691 See MEDICAL TESTS: 0088

NIOSH Pocket Guide to Chemical Hazards

p-Nitrotoluene	**CAS** 99-99-0
$NO_2C_6H_4CH_3$	**RTECS** XT3325000
Synonyms & Trade Names p-Methylnitrobenzene, 4-Methylnitrobenzene, para-Nitrotoluene, 4-Nitrotoluene	**DOT ID & Guide** 1664 152

Exposure Limits	NIOSH REL: TWA 2 ppm (11 mg/m^3) [skin]
	OSHA PEL†: TWA 5 ppm (30 mg/m^3) [skin]
IDLH 200 ppm See: IDLH INDEX	**Conversion** 1 ppm = 5.61 mg/m^3

Physical Description
Crystalline solid with a weak, aromatic odor.

MW: 137.1	BP: 460°F	MLT: 126°F	Sol: 0.04%
VP: 0.1 mmHg	IP: 9.50 eV		Sp.Gr: 1.12
Fl.P: 223°F	UEL: ?	LEL: 1.6%	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, sulfuric acid

Measurement Methods
NIOSH 2005
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 20 ppm: (APF = 10) Any supplied-air respirator*
Up to 50 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 100 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 200 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Anoxia, cyanosis; headache, lassitude (weakness, exhaustion), dizziness; ataxia; dyspnea (breathing difficulty); tachycardia; nausea, vomiting

Target Organs Blood, central nervous system, cardiovascular system, skin, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 0932 See MEDICAL TESTS: 0168

NIOSH Pocket Guide to Chemical Hazards

p-Nitrochlorobenzene	**CAS** 100-00-5
$ClC_6H_4NO_2$	**RTECS** CZ1050000
Synonyms & Trade Names p-Chloronitrobenzene, 4-Chloronitrobenzene, 1-Chloro-4-nitrobenzene, 4-Nitrochlorobenzene, PCNB, PNCB	**DOT ID & Guide** 1578 152

Exposure Limits	NIOSH REL: Ca See Appendix A [skin]
	OSHA PEL: TWA 1 mg/m^3 [skin]
IDLH Ca [100 mg/m^3] See: 100005	**Conversion**

Physical Description
Yellow, crystalline solid with a sweet odor.

MW: 157.6	BP: 468°F	MLT: 182°F	Sol: Slight
VP(86°F): 0.2 mmHg	IP: 9.96 eV		Sp.Gr: 1.52
Fl.P: 261°F	UEL: ?	LEL: ?	

Solid that does not burn, or burns with difficulty.

Incompatibilities & Reactivities
Strong oxidizers, alkalis

Measurement Methods
NIOSH 2005
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Anoxia; unpleasant taste; anemia; methemoglobinemia; in animals: hematuria (blood in the urine); spleen, kidney, bone marrow changes; reproductive effects; [potential occupational carcinogen]

Target Organs Blood, liver, kidneys, cardiovascular system, spleen, bone marrow, reproductive system

Cancer Site [in animals: vascular & liver tumors]

See also: INTRODUCTION See ICSC CARD: 0846 See MEDICAL TESTS: 0163

NIOSH Pocket Guide to Chemical Hazards

p-Nitroaniline	**CAS** 100-01-6
$NO_2C_6H_4NH_2$	**RTECS** BY7000000
Synonyms & Trade Names para-Aminonitrobenzene, 4-Nitroaniline, 4-Nitrobenzenamine, p-Nitrophenylamine, PNA	**DOT ID & Guide** 1661 153

Exposure Limits	NIOSH REL: TWA 3 mg/m^3 [skin]
	OSHA PEL†: TWA 6 mg/m^3 (1 ppm) [skin]
IDLH 300 mg/m^3 See: 100016	**Conversion**

Physical Description
Bright yellow, crystalline powder with a slight ammonia-like odor.

MW: 138.1	BP: 630°F	MLT: 295°F	Sol: 0.08%
VP: 0.00002 mmHg	IP: 8.85 eV		Sp.Gr: 1.42
Fl.P: 390°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, strong reducers [Note: May result in spontaneous heating of organic materials in the presence of moisture.]

Measurement Methods
NIOSH 5033
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 30 mg/m^3: (APF = 10) Any supplied-air respirator*

Up to 75 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

Up to 150 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 300 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister in combination with a dust, mist, and fume filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation nose, throat; cyanosis, ataxia; tachycardia, tachypnea; dyspnea (breathing difficulty); irritability; vomiting, diarrhea; convulsions; respiratory arrest; anemia; methemoglobinemia; jaundice

Target Organs respiratory system, blood, heart, liver

See also: INTRODUCTION See ICSC CARD: 0308 See MEDICAL TESTS: 0160

NIOSH Pocket Guide to Chemical Hazards

p-Dinitrobenzene	**CAS** 100-25-4
$C_6H_4(NO_2)_2$	**RTECS** CZ7525000
Synonyms & Trade Names para-Dinitrobenzene; 1,4-Dinitrobenzene	**DOT ID & Guide** 1597 152

Exposure Limits	NIOSH REL: TWA 1 mg/m^3 [skin]
	OSHA PEL: TWA 1 mg/m^3 [skin]
IDLH 50 mg/m^3 See: IDLH INDEX	**Conversion**

Physical Description
Pale-white or yellow solid.

MW: 168.1	BP: 570°F	MLT: 343°F	Sol: 0.01%
VP: ?	IP: 10.50 eV		Sp.Gr: 1.63
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, caustics, metals such as tin & zinc [Note: Prolonged exposure to fire and heat may result in an explosion due to SPONTANEOUS decomposition.]

Measurement Methods
NIOSH S214 (II-4)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 10 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 50 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Anoxia, cyanosis; visual disturbance, central scotomas; bad taste, burning mouth, dry throat, thirst; yellowing hair, eyes, skin; anemia; liver damage

Target Organs Eyes, skin, blood, liver, cardiovascular system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0692 See MEDICAL TESTS: 0088

NIOSH Pocket Guide to Chemical Hazards

2-Diethylaminoethanol	**CAS** 100-37-8
$(C_2H_5)_2NCH_2CH_2OH$	**RTECS** KK5075000
Synonyms & Trade Names Diethylaminoethanol; 2-Diethylaminoethyl alcohol; N,N-Diethylethanolamine; Diethyl-(2-hydroxyethyl)amine; 2-Hydroxytriethylamine	**DOT ID & Guide** 2686 132

Exposure Limits	NIOSH REL: TWA 10 ppm (50 mg/m^3) [skin]
	OSHA PEL: TWA 10 ppm (50 mg/m^3) [skin]
IDLH 100 ppm See: 100378	**Conversion** 1 ppm = 4.79 mg/m^3

Physical Description
Colorless liquid with a nauseating, ammonia-like odor.

MW: 117.2	BP: 325°F	FRZ: -94°F	Sol: Miscible
VP: 1 mmHg	IP: ?		Sp.Gr: 0.89
Fl.P: 126°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 2007
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash (>5%), Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 100 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; nausea, vomiting

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0257

NIOSH Pocket Guide to Chemical Hazards

Ethyl benzene	**CAS** 100-41-4
$CH_3CH_2C_6H_5$	**RTECS** DA0700000
Synonyms & Trade Names Ethylbenzol, Phenylethane	**DOT ID & Guide** 1175 129

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 125 ppm (545 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)
IDLH 800 ppm [10%LEL] See: 100414	**Conversion** 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 277°F	FRZ: -139°F	Sol: 0.01%
VP: 7 mmHg	IP: 8.76 eV		Sp.Gr: 0.87
Fl.P: 55°F	UEL: 6.7%	LEL: 0.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1501; OSHA 7, 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 800 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0268 See MEDICAL TESTS: 0098

NIOSH Pocket Guide to Chemical Hazards

Styrene	**CAS** 100-42-5
$C_6H_5CH=CH_2$	**RTECS** WL3675000
Synonyms & Trade Names Ethenyl benzene, Phenylethylene, Styrene monomer, Styrol, Vinyl benzene	**DOT ID & Guide** 2055 128P (inhibited)

Exposure Limits	NIOSH REL: TWA 50 ppm (215 mg/m^3) ST 100 ppm (425 mg/m^3)
	OSHA PEL†: TWA 100 ppm C 200 ppm 600 ppm (5-minute maximum peak in any 3 hours)
IDLH 700 ppm See: 100425	**Conversion** 1 ppm = 4.26 mg/m^3

Physical Description
Colorless to yellow, oily liquid with a sweet, floral odor.

MW: 104.2	BP: 293°F	FRZ: -23°F	Sol: 0.03%
VP: 5 mmHg	IP: 8.40 eV		Sp.Gr: 0.91
Fl.P: 88°F	UEL: 6.8%	LEL: 0.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Oxidizers, catalysts for vinyl polymers, peroxides, strong acids, aluminum chloride [Note: May polymerize if contaminated or subjected to heat. Usually contains an inhibitor such as tert-butylcatechol.]

Measurement Methods
NIOSH 1501, 3800; OSHA 9, 89
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*

Up to 700 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, respiratory system; headache, lassitude (weakness, exhaustion), dizziness, confusion, malaise (vague feeling of discomfort), drowsiness, unsteady gait; narcosis; defatting dermatitis; possible liver injury; reproductive effects

Target Organs Eyes, skin, respiratory system, central nervous system, liver, reproductive system

See also: INTRODUCTION See ICSC CARD: 0073 See MEDICAL TESTS: 0214

NIOSH Pocket Guide to Chemical Hazards

Benzyl chloride	**CAS** 100-44-7
$C_6H_5CH_2Cl$	**RTECS** XS8925000
Synonyms & Trade Names Chloromethylbenzene, alpha-Chlorotoluene	**DOT ID & Guide** 1738 156

Exposure Limits	NIOSH REL: C 1 ppm (5 mg/m^3) [15-minute]
	OSHA PEL: TWA 1 ppm (5 mg/m^3)
IDLH 10 ppm See: IDLH INDEX	**Conversion** 1 ppm = 5.18 mg/m^3

Physical Description
Colorless to slightly yellow liquid with a pungent, aromatic odor.

MW: 126.6	BP: 354°F	FRZ: -38°F	Sol: 0.05%
VP: 1 mmHg	IP: ?		Sp.Gr: 1.10
Fl.P: 153°F	UEL: ?	LEL: 1.1%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Oxidizers, acids, copper, aluminum, magnesium, iron, zinc, tin [Note: Can polymerize when in contact with all common metals except nickel & lead. Hydrolyzes in H_2O to benzyl alcohol.]

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 10 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor and acid gas cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor and acid gas canister/(APF = 25) Any powered, air-purifying respirator with organic vapor and acid gas cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor and acid gas canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; lassitude (weakness, exhaustion); irritability; headache; skin eruption; pulmonary edema

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0016 See MEDICAL TESTS: 0024

NIOSH Pocket Guide to Chemical Hazards

Monomethyl aniline	**CAS** 100-61-8
$C_6H_5NHCH_3$	**RTECS** BY4550000
Synonyms & Trade Names MA, (Methylamino)benzene, N-Methyl aniline, Methylphenylamine, N-Phenylmethylamine	**DOT ID & Guide** 2294 153

Exposure Limits	NIOSH REL: TWA 0.5 ppm (2 mg/m^3) [skin]
	OSHA PEL†: TWA 2 ppm (9 mg/m^3) [skin]
IDLH 100 ppm See: 100618	**Conversion** 1 ppm = 4.38 mg/m^3

Physical Description
Yellow to light-brown liquid with a weak, ammonia-like odor.

MW: 107.2	BP: 384°F	FRZ: -71°F	Sol: Insoluble
VP: 0.3 mmHg	IP: 7.32 eV		Sp.Gr: 0.99
Fl.P: 175°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong acids, strong oxidizers

Measurement Methods
NIOSH 3511
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 25 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 100 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Lassitude (weakness, exhaustion), dizziness, headache; dyspnea (breathing difficulty), cyanosis; methemoglobinemia; pulmonary edema; liver, kidney damage

Target Organs respiratory system, liver, kidneys, blood, central nervous system

See also: INTRODUCTION See ICSC CARD: 0921 See MEDICAL TESTS: 0151

NIOSH Pocket Guide to Chemical Hazards

Phenylhydrazine	**CAS** 100-63-0
$C_6H_5NHNH_2$	**RTECS** MW8925000
Synonyms & Trade Names Hydrazinobenzene, Monophenylhydrazine	**DOT ID & Guide** 2572 153

Exposure Limits	NIOSH REL: Ca C 0.14 ppm (0.6 mg/m^3) [2-hr] [skin] See Appendix A
	OSHA PEL†: TWA 5 ppm (22 mg/m^3) [skin]
IDLH Ca [15 ppm] See: 100630	**Conversion** 1 ppm = 4.42 mg/m^3

Physical Description
Colorless to pale-yellow liquid or solid (below 67°F) with a faint, aromatic odor.

MW: 108.1	BP: 470°F (Decomposes)	FRZ: 67°F	Sol: Slight
VP(77°F): 0.04 mmHg	IP: 7.64 eV		Sp.Gr: 1.10
Fl.P: 190°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, lead dioxide

Measurement Methods
NIOSH 3518
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Skin sensitization, hemolytic anemia, dyspnea (breathing difficulty), cyanosis; jaundice; kidney damage; vascular thrombosis; [potential occupational carcinogen]

Target Organs Blood, respiratory system, liver, kidneys, skin

Cancer Site [in animals: tumors of the lungs, liver, blood vessels & intestine]

See also: INTRODUCTION See ICSC CARD: 0938 See MEDICAL TESTS: 0184

NIOSH Pocket Guide to Chemical Hazards

N-Ethylmorpholine	**CAS** 100-74-3
$C_4H_8ONCH_2CH_3$	**RTECS** QE4025000
Synonyms & Trade Names 4-Ethylmorpholine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 ppm (23 mg/m^3) [skin]
	OSHA PEL†: TWA 20 ppm (94 mg/m^3) [skin]
IDLH 100 ppm See: 100743	**Conversion** 1 ppm = 4.71 mg/m^3

Physical Description
Colorless liquid with an ammonia-like odor.

MW: 115.2	BP: 281°F	FRZ: -81°F	Sol: Miscible
VP: 6 mmHg	IP: ?		Sp.Gr: 0.90
Fl.P(oc): 90°F	UEL: ?	LEL: ?	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong acids, strong oxidizers

Measurement Methods
NIOSH S146 (II-3)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash (>15%), Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 50 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; visual disturbance: corneal edema, blue-gray vision, colored haloes

Target Organs Eyes, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

4,4'-Methylenebis(2-chloroaniline)	**CAS** 101-14-4
$CH_2(C_6H_4ClNH_2)_2$	**RTECS** CY1050000
Synonyms & Trade Names DACPM; 3,3'-Dichloro-4,4'-diaminodiphenylmethane; MBOCA; 4,4'-Methylenebis(o-chloro aniline); 4,4'-Methylenebis(2-chlorobenzenamine); MOCA	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 0.003 mg/m^3 [skin] See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Tan-colored pellets or flakes with a faint, amine-like odor.

MW: 267.2	BP: ?	MLT: 230°F	Sol: Slight
VP(77°F): 0.00001 mmHg	IP: ?		Sp.Gr: 1.44
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
Chemically-active metals (e.g., potassium, sodium, magnesium, zinc)

Measurement Methods
OSHA 24, 71
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Hematuria (blood in the urine), cyanosis, nausea, methemoglobinemia, kidney irritation; [potential occupational carcinogen]

Target Organs Liver, blood, kidneys

Cancer Site [in animals: liver, lung & bladder tumors]

See also: INTRODUCTION See ICSC CARD: 0508

NIOSH Pocket Guide to Chemical Hazards

Methylene bisphenyl isocyanate	**CAS** 101-68-8
$CH_2(C_6H_4NCO)_2$	**RTECS** NQ9350000
Synonyms & Trade Names 4,4'-Diphenylmethane diisocyanate; MDI; Methylene bis(4-phenyl isocyanate); Methylene di-p-phenylene ester of isocyanic acid	**DOT ID & Guide** 2489 156

Exposure Limits	NIOSH REL: TWA 0.05 mg/m^3 (0.005 ppm) C 0.2 mg/m^3 (0.020 ppm) [10-minute]
	OSHA PEL: C 0.2 mg/m^3 (0.02 ppm)
IDLH 75 mg/m^3 See: 101688	**Conversion** 1 ppm = 10.24 mg/m^3

Physical Description
White to light-yellow, odorless flakes. [Note: A liquid above 99°F.]

MW: 250.3	BP: 597°F	MLT: 99°F	Sol: 0.2%
VP(77°F): 0.000005 mmHg	IP: ?		Sp.Gr: 1.23 (Solid at 77°F) 1.19 (Liquid at 122°F)
Fl.P: 390°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong alkalis, acids, alcohol [Note: Polymerizes at 450°F.]

Measurement Methods
NIOSH 5521, 5522; OSHA 18
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 0.5 mg/m^3: (APF = 10) Any supplied-air respirator*

Up to 1.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

Up to 2.5 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 75 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; respiratory sensitization; cough, pulmonary secretions, chest pain, dyspnea (breathing difficulty); asthma

Target Organs Eyes, respiratory system

See also: INTRODUCTION See ICSC CARD: 0298 See MEDICAL TESTS: 0147

NIOSH Pocket Guide to Chemical Hazards

4,4'-Methylenedianiline	**CAS** 101-77-9
$CH_2(C_6H_4NH_2)_2$	**RTECS** BY5425000
Synonyms & Trade Names 4,4'-Diaminodiphenylmethane; para, para'-Diaminodiphenyl-methane; Dianilinomethane; 4,4'-Diphenylmethanediamine; MDA	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1050] TWA 0.010 ppm ST 0.100 ppm
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Pale-brown, crystalline solid with a faint, amine-like odor.

MW: 198.3	BP: 748°F	MLT: 198°F	Sol: 0.1%
VP(77°F): 0.0000002 mmHg	IP: 10.70 eV		Sp.Gr: 1.06 (Liquid at 212°F)
Fl.P: 374°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5029
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; jaundice, hepatitis; myocardial damage; in animals: heart, liver, spleen damage; [potential occupational carcinogen]

Target Organs Eyes, liver, cardiovascular system, spleen

Cancer Site [in animals: bladder cancer]

See also: INTRODUCTION See ICSC CARD: 1111

NIOSH Pocket Guide to Chemical Hazards

Phenyl ether (vapor)	**CAS** 101-84-8
$C_6H_5OC_6H_5$	**RTECS** KN8970000
Synonyms & Trade Names Diphenyl ether, Diphenyl oxide, Phenoxy benzene, Phenyl oxide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 ppm (7 mg/m^3)
	OSHA PEL: TWA 1 ppm (7 mg/m^3)
IDLH 100 ppm See: 101848	**Conversion** 1 ppm = 6.96 mg/m^3

Physical Description
Colorless, crystalline solid or liquid (above 82°F) with a geranium-like odor.

MW: 170.2	BP: 498°F	MLT: 82°F	Sol: Insoluble
VP(77°F): 0.02 mmHg	IP: 8.09 eV		Sp.Gr: 1.08
Fl.P: 239°F	UEL: 6.0%	LEL: 0.7%	

Combustible Solid Class IIIB Combustible Liquid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1617; OSHA PV2022
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter£
Up to 50 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 100 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, nose, skin; nausea

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0791

NIOSH Pocket Guide to Chemical Hazards

Dicyclopentadienyl iron	**CAS** 102-54-5
$(C_5H_5)_2Fe$	**RTECS** LK0700000
Synonyms & Trade Names bis(Cyclopentadienyl)iron, Ferrocene, Iron dicyclopentadienyl	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Orange, crystalline solid with a camphor-like odor.

MW: 186.1	BP: 480°F	MLT: 343°F	Sol: Insoluble
VP: ?	IP: 6.88 eV		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Ammonium perchlorate, tetranitromethane, mercury(II) nitrate

Measurement Methods
OSHA ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Possible irritation eyes, skin, respiratory system; in animals: liver, red blood cell, testicular changes
Target Organs Eyes, skin, respiratory system, liver, blood, reproductive system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

2-N-Dibutylaminoethanol	**CAS** 102-81-8
$(C_4H_9)_2NCH_2CH_2OH$	**RTECS** KK3850000
Synonyms & Trade Names Dibutylaminoethanol; 2-Dibutylaminoethanol; 2-Di-N-butylaminoethanol; 2-Di-N-butylaminoethyl alcohol; N,N-Dibutylethanolamine	**DOT ID & Guide** 2873 153

Exposure Limits	NIOSH REL: TWA 2 ppm (14 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 7.09 mg/m^3

Physical Description
Colorless liquid with a faint, amine-like odor.

MW: 173.3	BP: 446°F	FRZ: ?	Sol: 0.4%
VP: 0.1 mmHg	IP: ?		Sp.Gr: 0.86
Fl.P: 195°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
NIOSH 2007
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms In animals: irritation eyes, skin, nose; dermatitis; skin, corneal necrosis; weight loss	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

p-Anisidine	**CAS** 104-94-9
$NH_2C_6H_4OCH_3$	**RTECS** BZ5450000
Synonyms & Trade Names para-Aminoanisole, 4-Anisidine, p-Methoxyaniline	**DOT ID & Guide** 2431 153

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 [skin]
	OSHA PEL: TWA 0.5 mg/m^3 [skin]
IDLH 50 mg/m^3 See: 104949	**Conversion**

Physical Description
Yellow to brown, crystalline solid with an amine-like odor.

MW: 123.2	BP: 475°F	MLT: 135°F	Sol: Moderate
VP(77°F): 0.006 mmHg	IP: 7.44 eV		Sp.Gr: 1.07
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 2514
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 25 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode*

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Headache, dizziness; cyanosis; red blood cell Heinz bodies

Target Organs Blood, kidneys, liver, cardiovascular system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0971 See MEDICAL TESTS: 0015

NIOSH Pocket Guide to Chemical Hazards

sec-Butyl acetate	**CAS** 105-46-4
$CH_3COOCH(CH_3)CH_2CH_3$	**RTECS** AF7380000
Synonyms & Trade Names sec-Butyl ester of acetic acid, 1-Methylpropyl acetate	**DOT ID & Guide** 1123 129

Exposure Limits	NIOSH REL: TWA 200 ppm (950 mg/m^3)
	OSHA PEL: TWA 200 ppm (950 mg/m^3)
IDLH 1700 ppm [10%LEL] See: 105464	**Conversion** 1 ppm = 4.75 mg/m^3

Physical Description
Colorless liquid with a pleasant, fruity odor.

MW: 116.2	BP: 234°F	FRZ: -100°F	Sol: 0.8%
VP: 10 mmHg	IP: 9.91 eV		Sp.Gr: 0.86
Fl.P: 62°F	UEL: 9.8%	LEL: 1.7%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1450; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1700 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes; headache; drowsiness; dryness upper respiratory system, skin; narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0840

NIOSH Pocket Guide to Chemical Hazards

Caprolactam	**CAS** 105-60-2
$C_2H_{11}NO$	**RTECS** CM3675000
Synonyms & Trade Names Aminocaproic lactam, epsilon-Caprolactam, Hexahydro-2H-azepin-2-one, 2-Oxohexamethyleneimine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Dust: TWA 1 mg/m^3 ST 3 mg/m^3 Vapor: TWA 0.22 ppm (1 mg/m^3) ST 0.66 ppm (3 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.63 mg/m^3

Physical Description
White, crystalline solid or flakes with an unpleasant odor. [Note: Significant vapor concentrations would be expected only at elevated temperatures.]

MW: 113.2	BP: 515°F	MLT: 156°F	Sol: 53%
VP: 0.00000008 mmHg	IP: ?		Sp.Gr: 1.01
Fl.P: 282°F	UEL: 8.0%	LEL: 1.4%	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, (acetic acid + dinitrogen trioxide)

Measurement Methods
OSHA PV2012
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation skin, eyes, respiratory system; epistaxis (nosebleed); dermatitis, skin sensitization; asthma; irritability, confusion, dizziness, headache; abdominal cramps, diarrhea, nausea, vomiting; liver, kidney injury

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0118

NIOSH Pocket Guide to Chemical Hazards

Ethyl butyl ketone	**CAS** 106-35-4
$CH_3CH_2CO[CH_2]_3CH_3$	**RTECS** MJ5250000
Synonyms & Trade Names Butyl ethyl ketone, 3-Heptanone	**DOT ID & Guide** 1224 127

Exposure Limits	NIOSH REL: TWA 50 ppm (230 mg/m^3)
	OSHA PEL: TWA 50 ppm (230 mg/m^3)
IDLH 1000 ppm See: 106354	**Conversion** 1 ppm = 4.67 mg/m^3

Physical Description
Colorless liquid with a powerful, fruity odor.

MW: 114.2	BP: 298°F	FRZ: -38°F	Sol: 1%
VP: 4 mmHg	IP: 9.02 eV		Sp.Gr: 0.82
Fl.P(oc): 115°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Oxidizers, acetaldehyde, perchloric acid

Measurement Methods
NIOSH 1301; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 1000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; headache, narcosis, coma; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0889

NIOSH Pocket Guide to Chemical Hazards

p-Xylene	**CAS** 106-42-3
$C_6H_4(CH_3)_2$	**RTECS** ZE2625000
Synonyms & Trade Names 1,4-Dimethylbenzene; para-Xylene; p-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)
IDLH 900 ppm See: IDLH INDEX	**Conversion** 1 ppm = 4.41 mg/m^3

Physical Description
Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]

MW: 106.2	BP: 281°F	FRZ: 56°F	Sol: 0.02%
VP: 9 mmHg	IP: 8.44 eV		Sp.Gr: 0.86
Fl.P: 81°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0086 See MEDICAL TESTS: 0243

NIOSH Pocket Guide to Chemical Hazards

p-Cresol	**CAS** 106-44-5
$CH_3C_6H_4OH$	**RTECS** GO6475000
Synonyms & Trade Names para-Cresol, 4-Cresol, p-Cresylic acid, 1-Hydroxy-4-methylbenzene, 4-Hydroxytoluene, 4-Methyl phenol	**DOT ID & Guide** 2076 153

Exposure Limits	NIOSH REL: TWA 2.3 ppm (10 mg/m^3)
	OSHA PEL: TWA 5 ppm (22 mg/m^3) [skin]
IDLH 250 ppm See: cresol	**Conversion** 1 ppm = 4.43 mg/m^3

Physical Description
Crystalline solid with a sweet, tarry odor. [Note: A liquid above 95°F.]

MW: 108.2	BP: 396°F	MLT: 95°F	Sol: 2%
VP(77°F): 0.11 mmHg	IP: 8.97 eV		Sp.Gr: 1.04
Fl.P: 187°F	UEL: ?	LEL(300°F): 1.1%	

Combustible Solid Class IIIA Combustible Liquid

Incompatibilities & Reactivities
Strong oxidizers, acids

Measurement Methods
NIOSH 2546; OSHA 32
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 23 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter/(APF = 10) Any supplied-air respirator
Up to 57.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter
Up to 115 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 250 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; central nervous system effects: confusion, depression, respiratory failure; dyspnea (breathing difficulty), irregular rapid respiration, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys, pancreas, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0031 See MEDICAL TESTS: 0059

NIOSH Pocket Guide to Chemical Hazards

p-Dichlorobenzene	**CAS** 106-46-7
$C_6H_4Cl_2$	**RTECS** CZ4550000
Synonyms & Trade Names p-DCB; 1,4-Dichlorobenzene; para-Dichlorobenzene; Dichlorocide	**DOT ID & Guide** 1592 152

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: TWA 75 ppm (450 mg/m^3)
IDLH Ca [150 ppm] See: 106467	**Conversion** 1 ppm = 6.01 mg/m^3

Physical Description
Colorless or white crystalline solid with a mothball-like odor. [insecticide]

MW: 147.0	BP: 345°F	MLT: 128°F	Sol: 0.008%
VP: 1.3 mmHg	IP: 8.98 eV		Sp.Gr: 1.25
Fl.P: 150°F	UEL: ?	LEL: 2.5%	

Combustible Solid, but may take some effort to ignite.

Incompatibilities & Reactivities
Strong oxidizers (such as chlorine or permanganate)

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]

Target Organs Liver, respiratory system, eyes, kidneys, skin

Cancer Site [in animals: liver & kidney cancer]

See also: INTRODUCTION See ICSC CARD: 0037 See MEDICAL TESTS: 0073

NIOSH Pocket Guide to Chemical Hazards

p-Toluidine	**CAS** 106-49-0
$CH_3C_6H_4NH_2$	**RTECS** XU3150000
Synonyms & Trade Names 4-Aminotoluene, 4-Methylaniline, 4-Methylbenzenamine, 4-Toluidine, Tolylamine	**DOT ID & Guide** 1708 153

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
White solid with an aromatic odor. [Note: Used as a basis for many dyes.]

MW: 107.2	BP: 393°F	MLT: 111°F	Sol: 0.7%
VP(108°F): 1 mmHg	IP: 7.50 eV		Sp.Gr: 1.05
Fl.P: 188°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Oxidizers, acids

Measurement Methods
NIOSH 2002; OSHA 73
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; dermatitis; hematuria (blood in the urine), methemoglobinemia; cyanosis, nausea, vomiting, low blood pressure, convulsions; anemia, lassitude (weakness, exhaustion); [potential occupational carcinogen]

Target Organs Eyes, skin, blood, cardiovascular system

Cancer Site [in animals: liver tumors]

See also: INTRODUCTION See ICSC CARD: 0343

NIOSH Pocket Guide to Chemical Hazards

p-Phenylene diamine	**CAS** 106-50-3
$C_6H_4(NH_2)_2$	**RTECS** SS8050000
Synonyms & Trade Names 4-Aminoaniline; 1,4-Benzenediamine; p-Diaminobenzene; 1,4-Diaminobenzene; 1,4-Phenylene diamine	**DOT ID & Guide** 1673 153

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 [skin]
	OSHA PEL: TWA 0.1 mg/m^3 [skin]
IDLH 25 mg/m^3 See: 106503	**Conversion**

Physical Description
White to slightly red, crystalline solid.

MW: 108.2	BP: 513°F	MLT: 295°F	Sol(75°F): 4%
VP: <1 mmHg	IP: 6.89 eV		Sp.Gr: ?
Fl.P: 312°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
OSHA 87
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£

Up to 5 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 25 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation pharynx, larynx; bronchial asthma; sensitization dermatitis

Target Organs respiratory system, skin

See also: INTRODUCTION See ICSC CARD: 0805

NIOSH Pocket Guide to Chemical Hazards

Quinone	**CAS** 106-51-4
OC_6H_4O	**RTECS** DK2625000
Synonyms & Trade Names 1,4-Benzoquinone; p-Benzoquinone; 1,4-Cyclohexadiene dioxide; p-Quinone	**DOT ID & Guide** 2587 153

Exposure Limits	NIOSH REL: TWA 0.4 mg/m^3 (0.1 ppm)
	OSHA PEL: TWA 0.4 mg/m^3 (0.1 ppm)
IDLH 100 mg/m^3 See: 106514	**Conversion** 1 ppm = 4.42 mg/m^3

Physical Description
Pale-yellow solid with an acrid, chlorine-like odor.

MW: 108.1	BP: Sublimes	MLT: 240°F	Sol: Slight
VP(77°F): 0.1 mmHg	IP: 9.68 eV		Sp.Gr: 1.32
Fl.P: 100-200°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH S181 (II-4)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 10 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£

Up to 20 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 100 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Eye irritation, conjunctivitis; keratitis (inflammation of the cornea); skin irritation

Target Organs Eyes, skin

See also: INTRODUCTION See ICSC CARD: 0779 See MEDICAL TESTS: 0201

NIOSH Pocket Guide to Chemical Hazards

Vinyl cyclohexene dioxide	**CAS** 106-87-6
$C_8H_{12}O_2$	**RTECS** RN8640000
Synonyms & Trade Names 1-Epoxyethyl-3,4-epoxy-cyclohexane; 4-Vinylcyclohexene diepoxide; 4-Vinyl-1-cyclohexene dioxide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 10 ppm (60 mg/m^3) [skin] See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion** 1 ppm = 5.73 mg/m^3

Physical Description
Colorless liquid.

MW: 140.2	BP: 441°F	FRZ: -164°F	Sol: High
VP: 0.1 mmHg	IP: ?		Sp.Gr: 1.10
Fl.P(oc): 230°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Alcohols, amines, water [Note: Slowly hydrolyzes in water.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, skin, respiratory system; testicular atrophy; leukopenia (reduced blood leukocytes), necrosis thymus; skin sensitization; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, blood, thymus, reproductive system

Cancer Site [in animals: skin tumors]

See also: INTRODUCTION See ICSC CARD: 0820

NIOSH Pocket Guide to Chemical Hazards

Epichlorohydrin	**CAS** 106-89-8
C_3H_5OCl	**RTECS** TX4900000
Synonyms & Trade Names 1-Chloro-2,3-epoxypropane; 2-Chloropropylene oxide; gamma-Chloropropylene oxide	**DOT ID & Guide** 2023 131P

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: TWA 5 ppm (19 mg/m^3) [skin]
IDLH Ca [75 ppm] See: 106898	**Conversion** 1 ppm = 3.78 mg/m^3

Physical Description
Colorless liquid with a slightly irritating, chloroform-like odor.

MW: 92.5	BP: 242°F	FRZ: -54°F	Sol: 7%
VP: 13 mmHg	IP: 10.60 eV		Sp.Gr: 1.18
Fl.P: 93°F	UEL: 21.0%	LEL: 3.8%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids, certain salts, caustics, zinc, aluminum, water [Note: May polymerize in presence of strong acids and bases, particularly when hot.]

Measurement Methods
NIOSH 1010; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor and acid gas canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin with deep pain; nausea, vomiting; abdominal pain; respiratory distress, cough; cyanosis; reproductive effects; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, kidneys, liver, reproductive system

Cancer Site [in animals: nasal cancer]

See also: INTRODUCTION See ICSC CARD: 0043 See MEDICAL TESTS: 0093

NIOSH Pocket Guide to Chemical Hazards

Allyl glycidyl ether	**CAS** 106-92-3
$C_6H_{10}O_2$	**RTECS** RR0875000
Synonyms & Trade Names AGE; 1-Allyloxy-2,3-epoxypropane; Glycidyl allyl ether; [(2-Propenyloxy)methyl] oxirane	**DOT ID & Guide** 2219 129

Exposure Limits	NIOSH REL: TWA 5 ppm (22 mg/m^3) ST 10 ppm (44 mg/m^3) [skin]
	OSHA PEL†: C 10 ppm (45 mg/m^3)
IDLH 50 ppm See: 106923	**Conversion** 1 ppm = 4.67 mg/m^3

Physical Description
Colorless liquid with a pleasant odor.

MW: 114.2	BP: 309°F	FRZ: -148°F [forms glass]	Sol: 14%
VP: 2 mmHg	IP: ?		Sp.Gr: 0.97
Fl.P: 135°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 2545
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 50 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, respiratory system; dermatitis; pulmonary edema; narcosis; possible hematopoietic, reproductive effects

Target Organs Eyes, skin, respiratory system, blood, reproductive system

See also: INTRODUCTION See ICSC CARD: 0096

NIOSH Pocket Guide to Chemical Hazards

Ethylene dibromide	**CAS** 106-93-4
$BrCH_2CH_2Br$	**RTECS** KH9275000
Synonyms & Trade Names 1,2-Dibromoethane; Ethylene bromide; Glycol dibromide	**DOT ID & Guide** 1605 154

Exposure Limits	NIOSH REL: Ca TWA 0.045 ppm C 0.13 ppm [15-minute] See Appendix A
	OSHA PEL: TWA 20 ppm C 30 ppm 50 ppm [5-minute maximum peak]
IDLH Ca [100 ppm] See: 106934	**Conversion** 1 ppm = 7.69 mg/m^3

Physical Description
Colorless liquid or solid (below 50°F) with a sweet odor. [fumigant]

MW: 187.9	BP: 268°F	FRZ: 50°F	Sol: 0.4%
VP: 12 mmHg	IP: 9.45 eV		Sp.Gr: 2.17
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Chemically-active metals such as sodium, potassium, calcium, hot aluminum & magnesium; liquid ammonia; strong oxidizers

Measurement Methods
NIOSH 1008; OSHA 2
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; dermatitis with vesiculation; liver, heart, spleen, kidney damage; reproductive effects; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys, reproductive system

Cancer Site [in animals: skin & lung tumors]

See also: INTRODUCTION See ICSC CARD: 0045 See MEDICAL TESTS: 0103

NIOSH Pocket Guide to Chemical Hazards

n-Butane	**CAS** 106-97-8
$CH_3CH_2CH_2CH_3$	**RTECS** EJ4200000
Synonyms & Trade Names normal-Butane, Butyl hydride, Diethyl, Methylethylmethane [Note: Also see specific listing for Isobutane.]	**DOT ID & Guide** 1011 115 1075 115

Exposure Limits	NIOSH REL: TWA 800 ppm (1900 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.38 mg/m^3

Physical Description
Colorless gas with a gasoline-like or natural gas odor. [Note: Shipped as a liquefied compressed gas. A liquid below 31°F.]

MW: 58.1	BP: 31°F	FRZ: -217°F	Sol: Slight
VP: 2.05 atm	IP: 10.63 eV	RGasD: 2.11	Sp.Gr: 0.6 (Liquid at 31°F)
Fl.P: NA (Gas)	UEL: 8.4%	LEL: 1.6%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Strong oxidizers (e.g., nitrates & perchlorates), chlorine, fluorine, (nickel carbonyl + oxygen)

Measurement Methods
OSHA 56
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact (liquid)	
Symptoms Drowsiness, narcosis, asphyxia; liquid: frostbite	
Target Organs central nervous system	

See also: INTRODUCTION See ICSC CARD: 0232

NIOSH Pocket Guide to Chemical Hazards

1,3-Butadiene	**CAS** 106-99-0
CH_2=CHCH=CH_2	**RTECS** EI9275000
Synonyms & Trade Names Biethylene, Bivinyl, Butadiene, Divinyl, Erythrene, Vinylethylene	**DOT ID & Guide** 1010 116P (inhibited)

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1051] TWA 1 ppm ST 5 ppm
IDLH Ca [2000 ppm] [10%LEL] See: 106990	**Conversion** 1 ppm = 2.21 mg/m^3

Physical Description
Colorless gas with a mild aromatic or gasoline-like odor. [Note: A liquid below 24°F. Shipped as a liquefied compressed gas.]

MW: 54.1	BP: 24°F	FRZ: -164°F	Sol: Insoluble
VP: 2.4 atm	IP: 9.07 eV	RGasD: 1.88	Sp.Gr: 0.65 (Liquid at 24°F)
Fl.P: NA (Gas) - 105°F (Liquid)	UEL: 12.0%	LEL: 2.0%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Phenol, chlorine dioxide, copper, crotonaldehyde [Note: May contain inhibitors (such as tributylcatechol) to prevent self-polymerization. May form explosive peroxides upon exposure to air.]

Measurement Methods
NIOSH 1024; OSHA 56
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Irritation eyes, nose, throat; drowsiness, dizziness; liquid: frostbite; teratogenic, reproductive effects; [potential occupational carcinogen]

Target Organs Eyes, respiratory system, central nervous system, reproductive system

Cancer Site [hematopoietic cancer]

See also: INTRODUCTION See ICSC CARD: 0017

NIOSH Pocket Guide to Chemical Hazards

Acrolein	**CAS** 107-02-8
CH_2=CHCHO	**RTECS** AS1050000
Synonyms & Trade Names Acraldehyde, Acrylaldehyde, Acrylic aldehyde, Allyl aldehyde, Propenal, 2-Propenal	**DOT ID & Guide** 1092 131P (inhibited)

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.25 mg/m^3) ST 0.3 ppm (0.8 mg/m^3) See Appendix C (Aldehydes)
	OSHA PEL†: TWA 0.1 ppm (0.25 mg/m^3)
IDLH 2 ppm See: 107028	**Conversion** 1 ppm = 2.29 mg/m^3

Physical Description
Colorless or yellow liquid with a piercing, disagreeable odor.

MW: 56.1	BP: 127°F	FRZ: -126°F	Sol: 40%
VP: 210 mmHg	IP: 10.13 eV		Sp.Gr: 0.84
Fl.P: -15°F	UEL: 31%	LEL: 2.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers, acids, alkalis, ammonia, amines [Note: Polymerizes readily unless inhibited--usually with hydroquinone. May form shock-sensitive peroxides over time.]

Measurement Methods
NIOSH 2501; OSHA 52
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; decreased pulmonary function; delayed pulmonary edema; chronic respiratory disease

Target Organs Eyes, skin, respiratory system, heart

See also: INTRODUCTION See ICSC CARD: 0090 See MEDICAL TESTS: 0006

NIOSH Pocket Guide to Chemical Hazards

1-Propanethiol	**CAS** 107-03-9
$CH_3CH_2CH_2SH$	**RTECS** TZ7300000
Synonyms & Trade Names 3-Mercaptopropane, Propane-1-thiol, Propyl mercaptan, n-Propyl mercaptan	**DOT ID & Guide** 2402 130

Exposure Limits	NIOSH REL: C 0.5 ppm (1.6 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.12 mg/m^3

Physical Description
Colorless liquid with an offensive, cabbage-like odor.

MW: 76.2	BP: 153°F	FRZ: -172°F	Sol: Slight
VP(77°F): 155 mmHg	IP: 9.195 eV		Sp.Gr: 0.84
Fl.P: -5°F	UEL: ?	LEL: ?	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers, reducing agents, strong acids & bases, alkali metals, calcium hypochlorite

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Eyewash	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; headache, nausea, dizziness, cyanosis; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, blood, liver, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Allyl chloride	**CAS** 107-05-1
CH_2=$CHCH_2Cl$	**RTECS** UC7350000
Synonyms & Trade Names 3-Chloropropene, 1-Chloro-2-propene, 3-Chloropropylene	**DOT ID & Guide** 1100 131

Exposure Limits	NIOSH REL: TWA 1 ppm (3 mg/m^3) ST 2 ppm (6 mg/m^3)
	OSHA PEL†: TWA 1 ppm (3 mg/m^3)
IDLH 250 ppm See: 107051	**Conversion** 1 ppm = 3.13 mg/m^3

Physical Description
Colorless, brown, yellow, or purple liquid with a pungent, unpleasant odor.

MW: 76.5	BP: 113°F	MLT: -210°F	Sol: 0.4%
VP: 295 mmHg	IP: 10.05 eV		Sp.Gr: 0.94
Fl.P: -25°F	UEL: 11.1%	LEL: 2.9%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, acids, amines, iron & aluminum chlorides, magnesium, zinc

Measurement Methods
NIOSH 1000; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 50 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 250 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, mucous membrane; pulmonary edema; in animals: liver, kidney injury

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0010 See MEDICAL TESTS: 0010

NIOSH Pocket Guide to Chemical Hazards

Ethylene dichloride	**CAS** 107-06-2
$ClCH_2CH_2Cl$	**RTECS** KI0525000
Synonyms & Trade Names 1,2-Dichloroethane; Ethylene chloride; Glycol dichloride	**DOT ID & Guide** 1184 129

Exposure Limits	NIOSH REL: Ca TWA 1 ppm (4 mg/m^3) ST 2 ppm (8 mg/m^3) See Appendix A See Appendix C (Chloroethanes)
	OSHA PEL†: TWA 50 ppm C 100 ppm 200 ppm [5-minute maximum peak in any 3 hours]
IDLH Ca [50 ppm] See: 107062	**Conversion** 1 ppm = 4.05 mg/m^3

Physical Description
Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.]

MW: 99.0	BP: 182°F	FRZ: -32°F	Sol: 0.9%
VP: 64 mmHg	IP: 11.05 eV		Sp.Gr: 1.24
Fl.P: 56°F	UEL: 16%	LEL: 6.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers & caustics; chemically-active metals such as magnesium or aluminum powder, sodium & potassium; liquid ammonia [Note: Decomposes to vinyl chloride & HCl above 1112°F.]

Measurement Methods
NIOSH 1003; OSHA 3
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin absorption, skin and/or eye contact

Symptoms Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]

Target Organs Eyes, skin, kidneys, liver, central nervous system, cardiovascular system

Cancer Site [in animals: forestomach, mammary gland & circulatory system cancer]

See also: INTRODUCTION See ICSC CARD: 0250 See MEDICAL TESTS: 0104

NIOSH Pocket Guide to Chemical Hazards

Ethylene chlorohydrin	**CAS** 107-07-3
CH_2ClCH_2OH	**RTECS** KK0875000
Synonyms & Trade Names 2-Chloroethanol, 2-Chloroethyl alcohol, Ethylene chlorhydrin	**DOT ID & Guide** 1135 131

Exposure Limits	NIOSH REL: C 1 ppm (3 mg/m^3) [skin]
	OSHA PEL†: TWA 5 ppm (16 mg/m^3) [skin]
IDLH 7 ppm See: 107073	**Conversion** 1 ppm = 3.29 mg/m^3

Physical Description
Colorless liquid with a faint, ether-like odor.

MW: 80.5	BP: 262°F	FRZ: -90°F	Sol: Miscible
VP: 5 mmHg	IP: 10.90 eV		Sp.Gr: 1.20
Fl.P: 140°F	UEL: 15.9%	LEL: 4.9%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, strong caustics, water or steam

Measurement Methods
NIOSH 2513; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 7 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation mucous membrane; nausea, vomiting; dizziness, incoordination; numbness; visual disturbance; headache; thirst; delirium; low blood pressure; collapse, shock, coma; liver, kidney damage

Target Organs respiratory system, liver, kidneys, central nervous system, cardiovascular system, eyes

See also: INTRODUCTION See ICSC CARD: 0236 See MEDICAL TESTS: 0101

NIOSH Pocket Guide to Chemical Hazards

Propionitrile	**CAS** 107-12-0
CH_3CH_2CN	**RTECS** UF9625000
Synonyms & Trade Names Cyanoethane, Ethyl cyanide, Propanenitrile, Propionic nitrile, Propiononitrile	**DOT ID & Guide** 2404 131

Exposure Limits	NIOSH REL: TWA 6 ppm (14 mg/m^3)
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.25 mg/m^3

Physical Description
Colorless liquid with a pleasant, sweetish, ethereal odor. [Note: Forms cyanide in the body.]

MW: 55.1	BP: 207°F	FRZ: -133°F	Sol: 11.9%
VP: 35 mmHg	IP: 11.84 eV		Sp.Gr: 0.78
Fl.P: 36°F	UEL: ?	LEL: 3.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers & reducing agents, strong acids & bases [Note: Hydrogen cyanide is produced when propionitrile is heated to decomposition.]

Measurement Methods
NIOSH 1606 (adapt)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 60 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator

Up to 150 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)

Up to 300 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1000 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; nausea, vomiting; chest pain; lassitude (weakness, exhaustion); stupor, convulsions; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, cardiovascular system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0320

NIOSH Pocket Guide to Chemical Hazards

Acrylonitrile	**CAS** 107-13-1
CH_2=CHCN	**RTECS** AT5250000
Synonyms & Trade Names Acrylonitrile monomer, AN, Cyanoethylene, Propenenitrile, 2-Propenenitrile, VCN, Vinyl cyanide	**DOT ID & Guide** 1093 131P (inhibited)

Exposure Limits	NIOSH REL: Ca TWA 1 ppm C 10 ppm [15-minute] [skin] See Appendix A
	OSHA PEL: [1910.1045] TWA 2 ppm C 10 ppm [15-minute] [skin]
IDLH Ca [85 ppm] See: 107131	**Conversion** 1 ppm = 2.17 mg/m^3

Physical Description
Colorless to pale-yellow liquid with an unpleasant odor. [Note: Odor can only be detected above the PEL.]

MW: 53.1	BP: 171°F	FRZ: -116°F	Sol: 7%
VP: 83 mmHg	IP: 10.91 eV		Sp.Gr: 0.81
Fl.P: 30°F	UEL: 17%	LEL: 3.0%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, acids & alkalis; bromine; amines [Note: Unless inhibited (usually with methylhydroquinone), may polymerize spontaneously or when heated or in presence of strong alkali. Attacks copper.]

Measurement Methods
NIOSH 1604; OSHA 37
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; asphyxia; headache; sneezing; nausea, vomiting; lassitude (weakness, exhaustion), dizziness; skin vesiculation; scaling dermatitis; [potential occupational carcinogen]

Target Organs Eyes, skin, cardiovascular system, liver, kidneys, central nervous system

Cancer Site [brain tumors, lung & bowel cancer]

See also: INTRODUCTION See ICSC CARD: 0092 See MEDICAL TESTS: 0008

NIOSH Pocket Guide to Chemical Hazards

Ethylenediamine	**CAS** 107-15-3
$NH_2CH_2CH_2NH_2$	**RTECS** KH8575000
Synonyms & Trade Names 1,2-Diaminoethane; 1,2-Ethanediamine; Ethylenediamine (anhydrous)	**DOT ID & Guide** 1604 132

Exposure Limits	NIOSH REL: TWA 10 ppm (25 mg/m^3)
	OSHA PEL: TWA 10 ppm (25 mg/m^3)
IDLH 1000 ppm See: 107153	**Conversion** 1 ppm = 2.46 mg/m^3

Physical Description
Colorless, viscous liquid with an ammonia-like odor. [fungicide] [Note: A solid below 47°F.]

MW: 60.1	BP: 241°F	FRZ: 47°F	Sol: Miscible
VP: 11 mmHg	IP: 8.60 eV		Sp.Gr: 0.91
Fl.P: 93°F	UEL(212°F): 12%	LEL(212°F): 2.5%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong acids & oxidizers, carbon tetrachloride & other chlorinated organic compounds, carbon disulfide [Note: Corrosive to metals.]

Measurement Methods
NIOSH 2540; OSHA 60
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet (flammable) Change: No recommendation Provide: Eyewash (>5%), Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern£
Up to 500 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1000 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation nose, respiratory system; sensitization dermatitis; asthma; liver, kidney damage

Target Organs Skin, respiratory system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0269

NIOSH Pocket Guide to Chemical Hazards

Glycolonitrile	**CAS** 107-16-4
$HOCH_2CN$	**RTECS** AM0350000
Synonyms & Trade Names Cyanomethanol, Formaldehyde cyanohydrin, Glycolic nitrile, Glyconitrile, Hydroxyacetonitrile	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 2 ppm (5 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.34 mg/m^3

Physical Description
Colorless, odorless, oily liquid. [Note: Forms cyanide in the body.]

MW: 57.1	BP: 361°F (Decomposes)	FRZ: <-98°F	Sol: Soluble
VP(145°F): 1 mmHg	IP: ?		Sp.Gr(66°F): 1.10
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Traces of alkalis (promote violent polymerization)

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 20 ppm: (APF = 10) Any supplied-air respirator
Up to 50 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 100 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 250 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; headache, dizziness, lassitude (weakness, exhaustion), confusion, convulsions; dyspnea (breathing difficulty); abdominal pain, nausea, vomiting

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Allyl alcohol	**CAS** 107-18-6
CH_2=$CHCH_2OH$	**RTECS** BA5075000
Synonyms & Trade Names AA, Allylic alcohol, Propenol, 1-Propen-3-ol, 2-Propenol, Vinyl carbinol	**DOT ID & Guide** 1098 131

Exposure Limits	NIOSH REL: TWA 2 ppm (5 mg/m^3) ST 4 ppm (10 mg/m^3) [skin]
	OSHA PEL†: TWA 2 ppm (5 mg/m^3) [skin]
IDLH 20 ppm See: 107186	**Conversion** 1 ppm = 2.38 mg/m^3

Physical Description
Colorless liquid with a pungent, mustard-like odor.

MW: 58.1	BP: 205°F	FRZ: -200°F	Sol: Miscible
VP: 17 mmHg	IP: 9.63 eV		Sp.Gr: 0.85
Fl.P: 70°F	UEL: 18.0%	LEL: 2.5%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, acids, carbon tetrachloride [Note: Polymerization may be caused by elevated temperatures, oxidizers, or peroxides.]

Measurement Methods
NIOSH 1402
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 20 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Eye irritation, tissue damage; irritation upper respiratory system, skin; pulmonary edema

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0095

NIOSH Pocket Guide to Chemical Hazards

Propargyl alcohol	**CAS** 107-19-7
C_3H_3OH	**RTECS** UK5075000
Synonyms & Trade Names 1-Propyn-3-ol; 2-Propyn-1-ol; 2-Propynyl alcohol	**DOT ID & Guide** 1986 131

Exposure Limits	NIOSH REL: TWA 1 ppm (2 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.29 mg/m^3

Physical Description
Colorless to straw-colored liquid with a mild, geranium odor.

MW: 56.1	BP: 237°F	FRZ: -62°F	Sol: Miscible
VP: 12 mmHg	IP: 10.51 eV		Sp.Gr: 0.97
Fl.P(oc): 97°F	UEL: ?	LEL: ?	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Phosphorus pentoxide, oxidizers

Measurement Methods
OSHA 97
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation skin, mucous membrane; central nervous system depression; in animals: liver, kidney damage
Target Organs Skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0673

NIOSH Pocket Guide to Chemical Hazards

Chloroacetaldehyde	**CAS** 107-20-0
$ClCH_2CHO$	**RTECS** AB2450000
Synonyms & Trade Names Chloroacetaldehyde (40% aqueous solution), 2-Chloroacetaldehyde, 2-Chloroethanal	**DOT ID & Guide** 2232 153

Exposure Limits	NIOSH REL: C 1 ppm (3 mg/m^3)
	OSHA PEL: C 1 ppm (3 mg/m^3)
IDLH 45 ppm See: 107200	**Conversion** 1 ppm = 3.21 mg/m^3

Physical Description
Colorless liquid with an acrid, penetrating odor. [Note: Typically found as a 40% aqueous solution.]

MW: 78.5	BP: 186°F	FRZ: -3°F (40% solution)	Sol: Miscible
VP: 100 mmHg	IP: 10.61 eV		Sp.Gr: 1.19 (40% solution)
Fl.P: 190°F (40% solution)	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Oxidizers, acids

Measurement Methods
NIOSH 2015; OSHA 76
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 10 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*

Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*

Up to 45 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation skin, eyes, mucous membrane; skin burns; eye damage; pulmonary edema; skin, respiratory system sensitization

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0706

NIOSH Pocket Guide to Chemical Hazards

Ethylene glycol	**CAS** 107-21-1
$HOCH_2CH_2OH$	**RTECS** KW2975000
Synonyms & Trade Names 1,2-Dihydroxyethane; 1,2-Ethanediol; Glycol; Glycol alcohol; Monoethylene glycol	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Clear, colorless, syrupy, odorless liquid. [antifreeze] [Note: A solid below 9°F.]

MW: 62.1	BP: 388°F	FRZ: 9°F	Sol: Miscible
VP: 0.06 mmHg	IP: ?		Sp.Gr: 1.11
Fl.P: 232°F	UEL: 15.3%	LEL: 3.2%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, chromium trioxide, potassium permanganate, sodium peroxide [Note: Hygroscopic (i.e., absorbs moisture from the air).]

Measurement Methods
NIOSH 5523; OSHA PV2024
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; nausea, vomiting, abdominal pain, lassitude (weakness, exhaustion); dizziness, stupor, convulsions, central nervous system depression; skin sensitization

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0270

NIOSH Pocket Guide to Chemical Hazards

Chloromethyl methyl ether	**CAS** 107-30-2
CH_3OCH_2Cl	**RTECS** KN6650000
Synonyms & Trade Names Chlorodimethyl ether, Chloromethoxymethane, CMME, Dimethylchloroether, Methylchloromethyl ether	**DOT ID & Guide** 1239 131

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1006] See Appendix B
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Colorless liquid with an irritating odor.

MW: 80.5	BP: 138°F	FRZ: -154°F	Sol: Reacts
VP(70°F): 192 mmHg	IP: 10.25 eV		Sp.Gr: 1.06
Fl.P(oc): 32°F	UEL: ?	LEL: ?	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Water [Note: Reacts with water to form hydrochloric acid & formaldehyde.]

Measurement Methods
NIOSH P&CAM220 (II-1); OSHA 10
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet (flammable) Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; pulmonary edema, pulmonary congestion, pneumonitis; skin burns, necrosis; cough, wheezing, pulmonary congestion; blood stained-sputum; weight loss; bronchial secretions; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system

Cancer Site [in animals: skin & lung cancer]

See also: INTRODUCTION See ICSC CARD: 0238 See MEDICAL TESTS: 0048

NIOSH Pocket Guide to Chemical Hazards

Methyl formate	**CAS** 107-31-3
$HCOOCH_3$	**RTECS** LQ8925000
Synonyms & Trade Names Methyl ester of formic acid, Methyl methanoate	**DOT ID & Guide** 1243 129

Exposure Limits	NIOSH REL: TWA 100 ppm (250 mg/m^3) ST 150 ppm (375 mg/m^3)
	OSHA PEL†: TWA 100 ppm (250 mg/m^3)
IDLH 4500 ppm See: 107313	**Conversion** 1 ppm = 2.46 mg/m^3

Physical Description
Colorless liquid with a pleasant odor. [Note: A gas above 89°F.]

MW: 60.1	BP: 89°F	FRZ: -148°F	Sol: 30%
VP: 476 mmHg	IP: 10.82 eV		Sp.Gr: 0.98
Fl.P: -2°F	UEL: 23%	LEL: 4.5%	

Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F.

Incompatibilities & Reactivities
Strong oxidizers [Note: Reacts slowly with water to form methanol & formic acid.]

Measurement Methods
NIOSH S291 (II-5); OSHA PV2041
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1000 ppm: (APF = 10) Any supplied-air respirator*
Up to 2500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 4500 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; chest tightness, dyspnea (breathing difficulty); visual disturbance; central nervous system depression; in animals: pulmonary edema; narcosis

Target Organs Eyes, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0664

NIOSH Pocket Guide to Chemical Hazards

Hexylene glycol	**CAS** 107-41-5
$(CH_3)_2COHCH_2CHOHCH_3$	**RTECS** SA0810000
Synonyms & Trade Names 2,4-Dihydroxy-2-methylpentane; 2-Methyl-2,4-pentanediol; 4-Methyl-2,4-pentanediol; 2-Methylpentane-2,4-diol	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 25 ppm (125 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.83 mg/m^3

Physical Description
Colorless liquid with a mild, sweetish odor.

MW: 118.2	BP: 388°F	FRZ: -58°F (Sets to glass)	Sol: Miscible
VP: 0.05 mmHg	IP: ?		Sp.Gr: 0.92
Fl.P: 209°F	UEL(est): 7.4%	LEL(calc): 1.3%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids [Note: Hygroscopic (i.e., absorbs moisture from the air).]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; headache, dizziness, nausea, incoordination, central nervous system depression; dermatitis, skin sensitization	
Target Organs Eyes, skin, respiratory system, central nervous system	

See also: INTRODUCTION See ICSC CARD: 0660

NIOSH Pocket Guide to Chemical Hazards

TEPP	**CAS** 107-49-3
$[(CH_3CH_2O)_2PO]_2O$	**RTECS** UX6825000
Synonyms & Trade Names Ethyl pyrophosphate, Tetraethyl pyrophosphate, Tetron®	**DOT ID & Guide** 2783 152 3018 152 (liquid)

Exposure Limits	NIOSH REL: TWA 0.05 mg/m^3 [skin]
	OSHA PEL: TWA 0.05 mg/m^3 [skin]
IDLH 5 mg/m^3 See: 107493	**Conversion** 1 ppm = 11.87 mg/m^3

Physical Description
Colorless to amber liquid with a faint, fruity odor. [insecticide] [Note: A solid below 32°F.]

MW: 290.2	BP: Decomposes	FRZ: 32°F	Sol: Miscible
VP: 0.0002 mmHg	IP: ?		Sp.Gr: 1.19
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Strong oxidizers, alkalis, water [Note: Hydrolyzes quickly in water to form pyrophosphoric acid.]

Measurement Methods
NIOSH 2504
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 0.5 mg/m^3: (APF = 10) Any supplied-air respirator
Up to 1.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 2.5 mg/m^3: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 5 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Eye pain, blurred vision, lacrimation (discharge of tears); rhinorrhea (discharge of thin mucus); headache, chest tightness, cyanosis; anorexia, nausea, vomiting, diarrhea; lassitude (weakness, exhaustion), twitching, paralysis, Cheyne-Stokes respiration, convulsions; low blood pressure, cardiac irregularities; sweating

Target Organs Eyes, respiratory system, central nervous system, cardiovascular system, gastrointestinal tract, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 1158 See MEDICAL TESTS: 0221

NIOSH Pocket Guide to Chemical Hazards

Dibutyl phosphate	**CAS** 107-66-4
$(C_4H_9O)_2(OH)PO$	**RTECS** TB9605000
Synonyms & Trade Names Dibutyl acid o-phosphate, Di-n-butyl hydrogen phosphate, Dibutyl phosphoric acid	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 ppm (5 mg/m^3) ST 2 ppm (10 mg/m^3)
	OSHA PEL†: TWA 1 ppm (5 mg/m^3)
IDLH 30 ppm See: 107664	**Conversion** 1 ppm = 8.60 mg/m^3

Physical Description
Pale-amber, odorless liquid.

MW: 210.2	BP: 212°F (Decomposes)	FRZ: ?	Sol: Insoluble
VP: 1 mmHg (approx)	IP: ?		Sp.Gr: 1.06
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5017
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 10 ppm: (APF = 10) Any supplied-air respirator
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 30 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; headache

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 1278 See MEDICAL TESTS: 0070

NIOSH Pocket Guide to Chemical Hazards

2-Pentanone	**CAS** 107-87-9
$CH_3COCH_2CH_2CH_3$	**RTECS** SA7875000
Synonyms & Trade Names Ethyl acetone, Methyl propyl ketone, MPK	**DOT ID & Guide** 1249 127

Exposure Limits	NIOSH REL: TWA 150 ppm (530 mg/m^3)
	OSHA PEL†: TWA 200 ppm (700 mg/m^3)
IDLH 1500 ppm See: 107879	**Conversion** 1 ppm = 3.52 mg/m^3

Physical Description
Colorless to water-white liquid with a characteristic acetone-like odor.

MW: 86.1	BP: 215°F	FRZ: -108°F	Sol: 6%
VP: 27 mmHg	IP: 9.39 eV		Sp.Gr: 0.81
Fl.P: 45°F	UEL: 8.2%	LEL: 1.5%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers, bromine trifluoride

Measurement Methods
NIOSH 1300
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 1500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0816 See MEDICAL TESTS: 0146

NIOSH Pocket Guide to Chemical Hazards

Propylene glycol monomethyl ether	**CAS** 107-98-2
$CH_3OCH_2CHCH_3$	**RTECS** UB7700000
Synonyms & Trade Names Dowtherm® 209, 1-Methoxy-2-hydroxypropane, 1-Methoxy-2-propanol, 2-Methoxy-1-methylethanol, Propylene glycol methyl ether	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 100 ppm (360 mg/m^3) ST 150 ppm (540 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.69 mg/m^3

Physical Description
Clear, colorless liquid with a mild, ethereal odor.

MW: 90.1	BP: 248°F	FRZ: -139°F (Sets to glass)	Sol: Miscible
VP(77°F): 12 mmHg	IP: ?		Sp.Gr: 0.96
Fl.P: 97°F	UEL(calc): 13.8%	LEL(calc.): 1.6%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Oxidizers, strong acids [Note: Hygroscopic (i.e., absorbs moisture from the air). May slowly form reactive peroxides during prolonged storage.]

Measurement Methods
OSHA 99
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation	Eye: Irrigate immediately Skin: Water wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache, nausea, dizziness, drowsiness, incoordination; vomiting, diarrhea

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0551

NIOSH Pocket Guide to Chemical Hazards

1-Nitropropane	**CAS** 108-03-2
$CH_3CH_2CH_2NO_2$	**RTECS** TZ5075000
Synonyms & Trade Names Nitropropane, 1-NP	**DOT ID & Guide** 2608 129

Exposure Limits	NIOSH REL: TWA 25 ppm (90 mg/m^3)
	OSHA PEL: TWA 25 ppm (90 mg/m^3)
IDLH 1000 ppm See: 108032	**Conversion** 1 ppm = 3.64 mg/m^3

Physical Description
Colorless liquid with a somewhat disagreeable odor.

MW: 89.1	BP: 269°F	FRZ: -162°F	Sol: 1%
VP: 8 mmHg	IP: 10.81 eV		Sp.Gr: 1.00
Fl.P: 96°F	UEL: ?	LEL: 2.2%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Amines; strong acids, alkalis & oxidizers; hydrocarbons & other combustible materials; metal oxides

Measurement Methods
OSHA 46
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 250 ppm: (APF = 10) Any supplied-air respirator*
Up to 625 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 1000 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes; headache, nausea, vomiting, diarrhea; in animals: liver, kidney damage

Target Organs Eyes, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 1050

NIOSH Pocket Guide to Chemical Hazards

Vinyl acetate	**CAS** 108-05-4
CH_2=CHOOCCH_3	**RTECS** AK0875000
Synonyms & Trade Names 1-Acetoxyethylene, Ethenyl acetate, Ethenyl ethanoate, VAC, Vinyl acetate monomer, Vinyl ethanoate	**DOT ID & Guide** 1301 129P

Exposure Limits	NIOSH REL: C 4 ppm (15 mg/m^3) [15-minute]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.52 mg/m^3

Physical Description
Colorless liquid with a pleasant, fruity odor. [Note: Raw material for many polyvinyl resins.]

MW: 86.1	BP: 162°F	FRZ: -136°F	Sol: 2%
VP: 83 mmHg	IP: 9.19 eV		Sp.Gr: 0.93
Fl.P: 18°F	UEL: 13.4%	LEL: 2.6%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Acids, bases, silica gel, alumina, oxidizers, azo compounds, ozone [Note: Usually contains a stabilizer (e.g., hydroquinone or diphenylamine) to prevent polymerization.]

Measurement Methods
NIOSH 1453; OSHA 51
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 40 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*

Up to 100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*

Up to 200 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 4000 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode*

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; hoarseness, cough; loss of smell; eye burns, skin blisters

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0347

NIOSH Pocket Guide to Chemical Hazards

Hexone	**CAS** 108-10-1
$CH_3COCH_2CH(CH_3)_2$	**RTECS** SA9275000
Synonyms & Trade Names Isobutyl methyl ketone, Methyl isobutyl ketone, 4-Methyl 2-pentanone, MIBK	**DOT ID & Guide** 1245 127

Exposure Limits	NIOSH REL: TWA 50 ppm (205 mg/m^3) ST 75 ppm (300 mg/m^3)
	OSHA PEL†: TWA 100 ppm (410 mg/m^3)
IDLH 500 ppm See: 108101	**Conversion** 1 ppm = 4.10 mg/m^3

Physical Description
Colorless liquid with a pleasant odor.

MW: 100.2	BP: 242°F	FRZ: -120°F	Sol: 2%
VP: 16 mmHg	IP: 9.30 eV		Sp.Gr: 0.80
Fl.P: 64°F	UEL(200°F): 8.0%	LEL(200°F): 1.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, potassium tert-butoxide

Measurement Methods
NIOSH 1300; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; headache, narcosis, coma; dermatitis; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0511 See MEDICAL TESTS: 0134

NIOSH Pocket Guide to Chemical Hazards

Methyl isobutyl carbinol	**CAS** 108-11-2
$(CH_3)_2CHCH_2CH(OH)CH_3$	**RTECS** SA7350000
Synonyms & Trade Names Isobutylmethylcarbinol, Methyl amyl alcohol, 4-Methyl-2-pentanol, MIBC	**DOT ID & Guide** 2053 129

Exposure Limits	NIOSH REL: TWA 25 ppm (100 mg/m^3) ST 40 ppm (165 mg/m^3) [skin]
	OSHA PEL†: TWA 25 ppm (100 mg/m^3) [skin]
IDLH 400 ppm See: 108112	**Conversion** 1 ppm = 4.18 mg/m^3

Physical Description
Colorless liquid with a mild odor.

MW: 102.2	BP: 271°F	FRZ: -130°F	Sol: 2%
VP: 3 mmHg	IP: ?		Sp.Gr: 0.81
Fl.P: 106°F	UEL: 5.5%	LEL: 1.0%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1402; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 250 ppm: (APF = 10) Any supplied-air respirator*
Up to 400 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; headache, drowsiness; dermatitis; in animals: narcosis

Target Organs Eyes, skin, central nervous system

See also: INTRODUCTION See ICSC CARD: 0665

NIOSH Pocket Guide to Chemical Hazards

Diisopropylamine	**CAS** 108-18-9
$[(CH_3)_2CH]_2NH$	**RTECS** IM4025000
Synonyms & Trade Names DIPA, N-(1-Methylethyl)-2-propanamine	**DOT ID & Guide** 1158 132

Exposure Limits	NIOSH REL: TWA 5 ppm (20 mg/m^3) [skin]
	OSHA PEL: TWA 5 ppm (20 mg/m^3) [skin]
IDLH 200 ppm See: 108189	**Conversion** 1 ppm = 4.14 mg/m^3

Physical Description
Colorless liquid with an ammonia- or fish-like odor.

MW: 101.2	BP: 183°F	FRZ: -141°F	Sol: Miscible
VP: 70 mmHg	IP: 7.73 eV		Sp.Gr: 0.72
Fl.P: 20°F	UEL: 7.1%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH S141 (II-4)
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact (>5%)
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash (>5%)

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£
Up to 200 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; nausea, vomiting; headache; visual disturbance

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0449

NIOSH Pocket Guide to Chemical Hazards

Isopropyl ether	**CAS** 108-20-3
$(CH_3)_2CHOCH(CH_3)_2$	**RTECS** TZ5425000
Synonyms & Trade Names Diisopropyl ether, Diisopropyl oxide, 2-Isopropoxy propane	**DOT ID & Guide** 1159 127

Exposure Limits	NIOSH REL: TWA 500 ppm (2100 mg/m^3)
	OSHA PEL: TWA 500 ppm (2100 mg/m^3)
IDLH 1400 ppm [10%LEL] See: 108203	**Conversion** 1 ppm = 4.18 mg/m^3

Physical Description
Colorless liquid with a sharp, sweet, ether-like odor.

MW: 102.2	BP: 154°F	FRZ: -76°F	Sol: 0.2%
VP: 119 mmHg	IP: 9.20 eV		Sp.Gr: 0.73
Fl.P: -18°F	UEL: 7.9%	LEL: 1.4%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, acids [Note: Unstable peroxides may form on long contact with air.]

Measurement Methods
NIOSH 1618; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1400 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; respiratory discomfort; dermatitis; in animals: drowsiness, dizziness, unconsciousness, narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0906

NIOSH Pocket Guide to Chemical Hazards

Isopropyl acetate	**CAS** 108-21-4
$CH_3COOCH(CH_3)_2$	**RTECS** AI4930000
Synonyms & Trade Names Isopropyl ester of acetic acid, 1-Methylethyl ester of acetic acid, 2-Propyl acetate	**DOT ID & Guide** 1220 129

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 250 ppm (950 mg/m^3)
IDLH 1800 ppm See: 108214	**Conversion** 1 ppm = 4.18 mg/m^3

Physical Description
Colorless liquid with a fruity odor.

MW: 102.2	BP: 194°F	FRZ: -92°F	Sol: 3%
VP: 42 mmHg	IP: 9.95 eV		Sp.Gr: 0.87
Fl.P: 36°F	UEL: 8%	LEL(100°F): 1.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1454; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations OSHA
Up to 1800 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; dermatitis; in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0907

NIOSH Pocket Guide to Chemical Hazards

Acetic anhydride	**CAS** 108-24-7
$(CH_3CO)_2O$	**RTECS** AK1925000
Synonyms & Trade Names Acetic acid anhydride, Acetic oxide, Acetyl oxide, Ethanoic anhydride	**DOT ID & Guide** 1715 137

Exposure Limits	NIOSH REL: C 5 ppm (20 mg/m^3)
	OSHA PEL†: TWA 5 ppm (20 mg/m^3)
IDLH 200 ppm See: 108247	**Conversion** 1 ppm = 4.18 mg/m^3

Physical Description
Colorless liquid with a strong, pungent, vinegar-like odor.

MW: 102.1	BP: 282°F	FRZ: -99°F	Sol: 12%
VP: 4 mmHg	IP: 10.00 eV		Sp.Gr: 1.08
Fl.P: 120°F	UEL: 10.3%	LEL: 2.7%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Water, alcohols, strong oxidizers (especially chromic acid), amines, strong caustics [Note: Corrosive to iron, steel & other metals. Reacts with water to form acetic acid.]

Measurement Methods
NIOSH 3506; OSHA 82, 102
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£
Up to 200 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Conjunctivitis, lacrimation (discharge of tears), corneal edema, opacity, photophobia (abnormal visual intolerance to light); nasal, pharyngeal irritation; cough, dyspnea (breathing difficulty), bronchitis; skin burns, vesiculation, sensitization dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0209

NIOSH Pocket Guide to Chemical Hazards

Maleic anhydride	**CAS** 108-31-6
$C_4H_2O_3$	**RTECS** ON3675000
Synonyms & Trade Names cis-Butenedioic anhydride; 2,5-Furanedione; Maleic acid anhydride; Toxilic anhydride	**DOT ID & Guide** 2215 156

Exposure Limits	NIOSH REL: TWA 1 mg/m^3 (0.25 ppm)
	OSHA PEL: TWA 1 mg/m^3 (0.25 ppm)
IDLH 10 mg/m^3 See: 108316	**Conversion** 1 ppm = 4.01 mg/m^3

Physical Description
Colorless needles, white lumps, or pellets with an irritating, choking odor.

MW: 98.1	BP: 396°F	MLT: 127°F	Sol: Reacts
VP: 0.2 mmHg	IP: 9.90 eV		Sp.Gr: 1.48
Fl.P: 218°F	UEL: 7.1%	LEL: 1.4%	

Combustible Solid, but may be difficult to ignite.

Incompatibilities & Reactivities
Strong oxidizers, water, alkalis, metals, caustics & amines above 150°F [Note: Reacts slowly with water (hydrolyzes) to form maleic acid.]

Measurement Methods
NIOSH 3512; OSHA 25, 86
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 10 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£]/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation nose, upper respiratory system; conjunctivitis; photophobia (abnormal visual intolerance to light), double vision; bronchial asthma; dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0799

NIOSH Pocket Guide to Chemical Hazards

m-Xylene	**CAS** 108-38-3
$C_6H_4(CH_3)_2$	**RTECS** ZE2275000
Synonyms & Trade Names 1,3-Dimethylbenzene; meta-Xylene; m-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)
IDLH 900 ppm See: IDLH INDEX	**Conversion** 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 282°F	FRZ: -54°F	Sol: Slight
VP: 9 mmHg	IP: 8.56 eV		Sp.Gr: 0.86
Fl.P: 82°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0085 See MEDICAL TESTS: 0243

NIOSH Pocket Guide to Chemical Hazards

m-Cresol	**CAS** 108-39-4
$CH_3C_6H_4OH$	**RTECS** GO6125000
Synonyms & Trade Names meta-Cresol, 3-Cresol, m-Cresylic acid, 1-Hydroxy-3-methylbenzene, 3-Hydroxytoluene, 3-Methyl phenol	**DOT ID & Guide** 2076 153

Exposure Limits	NIOSH REL: TWA 2.3 ppm (10 mg/m^3)
	OSHA PEL: TWA 5 ppm (22 mg/m^3) [skin]
IDLH 250 ppm See: cresol	**Conversion** 1 ppm = 4.43 mg/m^3

Physical Description
Colorless to yellowish liquid with a sweet, tarry odor. [Note: A solid below 54°F.]

MW: 108.2	BP: 397°F	FRZ: 54°F	Sol: 2%
VP(77°F): 0.14 mmHg	IP: 8.98 eV		Sp.Gr: 1.03
Fl.P: 187°F	UEL: ?	LEL(300°F): 1.1%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, acids

Measurement Methods
NIOSH 2546; OSHA 32
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 23 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter/(APF = 10) Any supplied-air respirator
Up to 57.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter
Up to 115 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 250 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; central nervous system effects: confusion, depression, respiratory failure; dyspnea (breathing difficulty), irregular rapid respiration, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys, pancreas, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0646

NIOSH Pocket Guide to Chemical Hazards

m-Toluidine	**CAS** 108-44-1
$CH_3C_6H_4NH_2$	**RTECS** XU2800000
Synonyms & Trade Names 3-Amino-1-methylbenzene, 1-Aminophenylmethane, m-Aminotoluene, 3-Methylaniline, 3-Methylbenzenamine, 3-Toluidine, m-Tolylamine	**DOT ID & Guide** 1708 153

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless to light-yellow liquid with an aromatic, amine-like odor. [Note: Used as a basis for many dyes.]

MW: 107.2	BP: 397°F	FRZ: -23°F	Sol: 2%
VP(106°F): 1 mmHg	IP: 7.50 eV		Sp.Gr: 0.999
Fl.P: 187°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Oxidizers, acids

Measurement Methods
NIOSH 2002; OSHA 73
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; dermatitis; hematuria (blood in the urine), methemoglobinemia; cyanosis, nausea, vomiting, low blood pressure, convulsions; anemia, lassitude (weakness, exhaustion)

Target Organs Eyes, skin, blood, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0342

NIOSH Pocket Guide to Chemical Hazards

Resorcinol	**CAS** 108-46-3
$C_6H_4(OH)_2$	**RTECS** VG9625000
Synonyms & Trade Names 1,3-Benzenediol; m-Benzenediol; 1,3-Dihydroxybenzene; m-Dihydroxybenzene; 3-Hydroxyphenol; m-Hydroxyphenol	**DOT ID & Guide** 2876 153

Exposure Limits	NIOSH REL: TWA 10 ppm (45 mg/m^3) ST 20 ppm (90 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.50 mg/m^3

Physical Description
White needles, plates, crystals, flakes, or powder with a faint odor. [Note: Turns pink on exposure to air or light, or contact with iron.]

MW: 110.1	BP: 531°F	MLT: 228°F	Sol: 110%
VP(77°F): 0.0002 mmHg	IP: 8.63 eV		Sp.Gr: 1.27
Fl.P: 261°F	UEL: ?	LEL(392°F): 1.4%	

Class IIIB Combustible Liquid, but may be difficult to ignite.

Incompatibilities & Reactivities
Acetanilide, albumin, alkalis, antipyrine, camphor, ferric salts, menthol, spirit nitrous ether, strong oxidizers & bases [Note: Hygroscopic (i.e., absorbs moisture from the air).]

Measurement Methods
NIOSH 5701; OSHA PV2053
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, upper respiratory system; methemoglobinemia; cyanosis, convulsions; restlessness, bluish skin, increased heart rate, dyspnea (breathing difficulty); dizziness, drowsiness, hypothermia, hematuria (blood in the urine); spleen, kidney, liver changes; dermatitis

Target Organs Eyes, skin, respiratory system, cardiovascular system, central nervous system, blood, spleen, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 1033

NIOSH Pocket Guide to Chemical Hazards

1,3,5-Trimethylbenzene	**CAS** 108-67-8
$C_6H_3(CH_3)_3$	**RTECS** OX6825000
Synonyms & Trade Names Mesitylene, Symmetrical trimethylbenzene, sym-Trimethylbenzene	**DOT ID & Guide** 2325 129

Exposure Limits	NIOSH REL: TWA 25 ppm (125 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.92 mg/m^3

Physical Description
Clear, colorless liquid with a distinctive, aromatic odor.

MW: 120.2	BP: 329°F	FRZ: -49°F	Sol: 0.002%
VP: 2 mmHg	IP: 8.39 eV		Sp.Gr: 0.86
Fl.P: 122°F	UEL: ?	LEL: ?	

Class II Flammable Liquid

Incompatibilities & Reactivities
Oxidizers, nitric acid

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)
Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION See ICSC CARD: 1155

NIOSH Pocket Guide to Chemical Hazards

Diisobutyl ketone	**CAS** 108-83-8
$[(CH_3)_2CHCH_2]_2CO$	**RTECS** MJ5775000
Synonyms & Trade Names DIBK; sym-Diisopropyl acetone; 2,6-Dimethyl-4-heptanone; Isovalerone; Valerone	**DOT ID & Guide** 1157 127

Exposure Limits	NIOSH REL: TWA 25 ppm (150 mg/m^3)
	OSHA PEL†: TWA 50 ppm (290 mg/m^3)
IDLH 500 ppm See: 108838	**Conversion** 1 ppm = 5.82 mg/m^3

Physical Description
Colorless liquid with a mild, sweet odor.

MW: 142.3	BP: 334°F	FRZ: -43°F	Sol: 0.05%
VP: 2 mmHg	IP: 9.04 eV		Sp.Gr: 0.81
Fl.P: 120°F	UEL(200°F): 7.1%	LEL(200°F): 0.8%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1300; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: No recommendation
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache, dizziness; dermatitis; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0713 See MEDICAL TESTS: 0079

NIOSH Pocket Guide to Chemical Hazards

sec-Hexyl acetate	**CAS** 108-84-9
$C_8H_{16}O_2$	**RTECS** SA7525000
Synonyms & Trade Names 1,3-Dimethylbutyl acetate; Methylisoamyl acetate	**DOT ID & Guide** 1233 129

Exposure Limits	NIOSH REL: TWA 50 ppm (300 mg/m^3)
	OSHA PEL: TWA 50 ppm (300 mg/m^3)
IDLH 500 ppm See: 108849	**Conversion** 1 ppm = 5.90 mg/m^3

Physical Description
Colorless liquid with a mild, pleasant, fruity odor.

MW: 144.2	BP: 297°F	FRZ: -83°F	Sol: 0.08%
VP: 3 mmHg	IP: ?		Sp.Gr: 0.86
Fl.P: 113°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1450; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache; in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 1335

NIOSH Pocket Guide to Chemical Hazards

Methylcyclohexane	**CAS** 108-87-2
$CH_3C_6H_{11}$	**RTECS** GV6125000
Synonyms & Trade Names Cyclohexylmethane, Hexahydrotoluene	**DOT ID & Guide** 2296 128

Exposure Limits	NIOSH REL: TWA 400 ppm (1600 mg/m^3)
	OSHA PEL†: TWA 500 ppm (2000 mg/m^3)
IDLH 1200 ppm [LEL] See: 108872	**Conversion** 1 ppm = 4.02 mg/m^3

Physical Description
Colorless liquid with a faint, benzene-like odor.

MW: 98.2	BP: 214°F	FRZ: -196°F	Sol: Insoluble
VP: 37 mmHg	IP: 9.85 eV		Sp.Gr: 0.77
Fl.P: 25°F	UEL: 6.7%	LEL: 1.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 1200 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, drowsiness; in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0923

NIOSH Pocket Guide to Chemical Hazards

Toluene	**CAS** 108-88-3
$C_6H_5CH_3$	**RTECS** XS5250000
Synonyms & Trade Names Methyl benzene, Methyl benzol, Phenyl methane, Toluol	**DOT ID & Guide** 1294 130

Exposure Limits	NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
	OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)
IDLH 500 ppm See: 108883	**Conversion** 1 ppm = 3.77 mg/m^3

Physical Description
Colorless liquid with a sweet, pungent, benzene-like odor.

MW: 92.1	BP: 232°F	FRZ: -139°F	Sol(74°F): 0.07%
VP: 21 mmHg	IP: 8.82 eV		Sp.Gr: 0.87
Fl.P: 40°F	UEL: 7.1%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500, 1501, 3800, 4000; OSHA 111
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0078 See MEDICAL TESTS: 0232

NIOSH Pocket Guide to Chemical Hazards

Chlorobenzene	**CAS** 108-90-7
C_6H_5Cl	**RTECS** CZ0175000
Synonyms & Trade Names Benzene chloride, Chlorobenzol, MCB, Monochlorobenzene, Phenyl chloride	**DOT ID & Guide** 1134 130

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL: TWA 75 ppm (350 mg/m^3)
IDLH 1000 ppm See: 108907	**Conversion** 1 ppm = 4.61 mg/m^3

Physical Description
Colorless liquid with an almond-like odor.

MW: 112.6	BP: 270°F	FRZ: -50°F	Sol: 0.05%
VP: 9 mmHg	IP: 9.07 eV		Sp.Gr: 1.11
Fl.P: 82°F	UEL: 9.6%	LEL: 1.3%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations OSHA
Up to 1000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; in animals: liver, lung, kidney injury

Target Organs Eyes, skin, respiratory system, central nervous system, liver

See also: INTRODUCTION See ICSC CARD: 0642

NIOSH Pocket Guide to Chemical Hazards

Cyclohexylamine	**CAS** 108-91-8
$C_6H_{11}NH_2$	**RTECS** GX0700000
Synonyms & Trade Names Aminocyclohexane, Aminohexahydrobenzene, Hexahydroaniline, Hexahydrobenzenamine	**DOT ID & Guide** 2357 132

Exposure Limits	NIOSH REL: TWA 10 ppm (40 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.06 mg/m^3

Physical Description
Colorless or yellow liquid with a strong, fishy, amine-like odor.

MW: 99.2	BP: 274°F	FRZ: 0°F	Sol: Miscible
VP: 11 mmHg	IP: 8.37 eV		Sp.Gr: 0.87
Fl.P: 88°F	UEL: 9.4%	LEL: 1.5%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Oxidizers, organic compounds, acid anhydrides, acid chlorides, acids, lead [Note: Corrosive to copper, aluminum, zinc & galvanized steel.]

Measurement Methods
NIOSH 2010; OSHA PV2016
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, mucous membrane, respiratory system; eye, skin burns; skin sensitization; cough, pulmonary edema; drowsiness, dizziness; diarrhea, nausea, vomiting	
Target Organs Eyes, skin, respiratory system, central nervous system	

See also: INTRODUCTION See ICSC CARD: 0245

NIOSH Pocket Guide to Chemical Hazards

Cyclohexanol	**CAS** 108-93-0
$C_6H_{11}OH$	**RTECS** GV7875000
Synonyms & Trade Names Anol, Cyclohexyl alcohol, Hexahydrophenol, Hexalin, Hydralin, Hydroxycyclohexane	**DOT ID & Guide** 1993 128 (combustible liquid, n.o.s.)

Exposure Limits	NIOSH REL: TWA 50 ppm (200 mg/m^3) [skin]
	OSHA PEL†: TWA 50 ppm (200 mg/m^3)
IDLH 400 ppm See: 108930	**Conversion** 1 ppm = 4.10 mg/m^3

Physical Description
Sticky solid or colorless to light-yellow liquid (above 77°F) with a camphor-like odor.

MW: 100.2	BP: 322°F	MLT: 77°F	Sol: 4%
VP: 1 mmHg	IP: 10.00 eV		Sp.Gr: 0.96
Fl.P: 154°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers (such as hydrogen peroxide & nitric acid)

Measurement Methods
NIOSH 1402; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 400 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; narcosis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0243

NIOSH Pocket Guide to Chemical Hazards

Cyclohexanone	**CAS** 108-94-1
$C_6H_{10}O$	**RTECS** GW1050000
Synonyms & Trade Names Anone, Cyclohexyl ketone, Pimelic ketone	**DOT ID & Guide** 1915 127

Exposure Limits	NIOSH REL: TWA 25 ppm (100 mg/m^3) [skin]
	OSHA PEL†: TWA 50 ppm (200 mg/m^3)
IDLH 700 ppm See: 108941	**Conversion** 1 ppm = 4.02 mg/m^3

Physical Description
Water-white to pale-yellow liquid with a peppermint- or acetone-like odor.

MW: 98.2	BP: 312°F	FRZ: -49°F	Sol: 15%
VP: 5 mmHg	IP: 9.14 eV		Sp.Gr: 0.95
Fl.P: 146°F	UEL: 9.4%	LEL(212°F): 1.1%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Oxidizers, nitric acid

Measurement Methods
NIOSH 1300; OSHA 1
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 625 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£
Up to 700 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; headache; narcosis, coma; dermatitis; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0425 See MEDICAL TESTS: 0063

NIOSH Pocket Guide to Chemical Hazards

Phenol	**CAS** 108-95-2
C_6H_5OH	**RTECS** SJ3325000
Synonyms & Trade Names Carbolic acid, Hydroxybenzene, Monohydroxybenzene, Phenyl alcohol, Phenyl hydroxide	**DOT ID & Guide** 1671 153 (solid) 2312 153 (molten) 2821 153 (solution)

Exposure Limits	NIOSH REL: TWA 5 ppm (19 mg/m^3) C 15.6 ppm (60 mg/m^3) [15-minute] [skin]
	OSHA PEL: TWA 5 ppm (19 mg/m^3) [skin]
IDLH 250 ppm See: 108952	**Conversion** 1 ppm = 3.85 mg/m^3

Physical Description
Colorless to light-pink, crystalline solid with a sweet, acrid odor. [Note: Phenol liquefies by mixing with about 8% water.]

MW: 94.1	BP: 359°F	MLT: 109°F	Sol(77°F): 9%
VP: 0.4 mmHg	IP: 8.50 eV		Sp.Gr: 1.06
Fl.P: 175°F	UEL: 8.6%	LEL: 1.8%	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, calcium hypochlorite, aluminum chloride, acids

Measurement Methods
NIOSH 2546; OSHA 32
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 50 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter/(APF = 10) Any supplied-air respirator

Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter

Up to 250 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; anorexia, weight loss; lassitude (weakness, exhaustion), muscle ache, pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor, convulsions, twitching

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0070 See MEDICAL TESTS: 0182

NIOSH Pocket Guide to Chemical Hazards

Benzenethiol	**CAS** 108-98-5
C_6H_5SH	**RTECS** DC0525000
Synonyms & Trade Names Mercaptobenzene, Phenyl mercaptan, Thiophenol	**DOT ID & Guide** 2337 131

Exposure Limits	NIOSH REL: C 0.1 ppm (0.5 mg/m^3) [15-minute]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.51 mg/m^3

Physical Description
Water-white liquid with an offensive, garlic-like odor. [Note: A solid below 5°F.]

MW: 110.2	BP: 336°F	FRZ: 5°F	Sol(77°F): 0.08%
VP(65°F): 1 mmHg	IP: 8.33 eV		Sp.Gr: 1.08
Fl.P: 132°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong acids & bases, calcium hypochlorite, alkali metals [Note: Oxidizes on exposure to air.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 1 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 5 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; dermatitis; cyanosis; cough, wheezing, dyspnea (breathing difficulty), pulmonary edema, pneumonitis; headache, dizziness, central nervous system depression; nausea, vomiting; kidney, liver, spleen damage

Target Organs Eyes, skin, respiratory system, central nervous system, kidneys, liver, spleen

See also: INTRODUCTION See ICSC CARD: 0463

NIOSH Pocket Guide to Chemical Hazards

2-Isopropoxyethanol	**CAS** 109-59-1
$(CH_3)_2CHOCH_2CH_2OH$	**RTECS** KL5075000
Synonyms & Trade Names Ethylene glycol isopropyl ether, beta-Hydroxyethyl isopropyl ether, Isopropyl Cellosolve®, Isopropyl glycol	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless liquid with a mild, ethereal odor.

MW: 104.2	BP: 283°F	FRZ: ?	Sol: Miscible
VP: 3 mmHg	IP: ?		Sp.Gr: 0.90
Fl.P(oc): 92°F	UEL: ?	LEL: ?	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms In animals: irritation eyes, skin; hematuria (blood in the urine), anemia, pulmonary edema
Target Organs Eyes, skin, respiratory system, blood

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

n-Propyl acetate	**CAS** 109-60-4
$CH_3COOCH_2CH_2CH_3$	**RTECS** AJ3675000
Synonyms & Trade Names Propylacetate, n-Propyl ester of acetic acid	**DOT ID & Guide** 1276 129

Exposure Limits	NIOSH REL: TWA 200 ppm (840 mg/m^3) ST 250 ppm (1050 mg/m^3)
	OSHA PEL†: TWA 200 ppm (840 mg/m^3)
IDLH 1700 ppm See: 109604	**Conversion** 1 ppm = 4.18 mg/m^3

Physical Description
Colorless liquid with a mild, fruity odor.

MW: 102.2	BP: 215°F	FRZ: -134°F	Sol: 2%
VP: 25 mmHg	IP: 10.04 eV		Sp.Gr: 0.84
Fl.P: 55°F	UEL: 8%	LEL(100°F): 1.7%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1450; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1700 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, nose, throat; narcosis; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0940

NIOSH Pocket Guide to Chemical Hazards

n-Pentane	**CAS** 109-66-0
$CH_3[CH_2]_3CH_3$	**RTECS** RZ9450000
Synonyms & Trade Names Pentane, normal-Pentane	**DOT ID & Guide** 1265 128

Exposure Limits	NIOSH REL: TWA 120 ppm (350 mg/m^3) C 610 ppm (1800 mg/m^3) [15-minute]
	OSHA PEL†: TWA 1000 ppm (2950 mg/m^3)
IDLH 1500 ppm [10%LEL] See: 109660	**Conversion** 1 ppm = 2.95 mg/m^3

Physical Description
Colorless liquid with a gasoline-like odor. [Note: A gas above 97°F. May be utilized as a fuel.]

MW: 72.2	BP: 97°F	FRZ: -202°F	Sol: 0.04%
VP: 420 mmHg	IP: 10.34 eV		Sp.Gr: 0.63
Fl.P: -57°F	UEL: 7.8%	LEL: 1.5%	

Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 1200 ppm: (APF = 10) Any supplied-air respirator
Up to 1500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; dermatitis; chemical pneumonitis (aspiration liquid); drowsiness; in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0534

NIOSH Pocket Guide to Chemical Hazards

n-Butylamine	**CAS** 109-73-9
$CH_3CH_2CH_2CH_2NH_2$	**RTECS** EO2975000
Synonyms & Trade Names 1-Aminobutane, Butylamine	**DOT ID & Guide** 1125 132

Exposure Limits	NIOSH REL: C 5 ppm (15 mg/m^3) [skin]
	OSHA PEL: C 5 ppm (15 mg/m^3) [skin]
IDLH 300 ppm See: 109739	**Conversion** 1 ppm = 2.99 mg/m^3

Physical Description
Colorless liquid with a fishy, ammonia-like odor.

MW: 73.2	BP: 172°F	FRZ: -58°F	Sol: Miscible
VP: 82 mmHg	IP: 8.71 eV		Sp.Gr: 0.74
Fl.P: 10°F	UEL: 9.8%	LEL: 1.7%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids [Note: May corrode some metals in presence of water.]

Measurement Methods
NIOSH 2012
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 50 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern*/(APF = 10) Any supplied-air respirator*
Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*
Up to 250 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 300 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache; skin flush, burns

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0374

NIOSH Pocket Guide to Chemical Hazards

n-Butyronitrile	**CAS** 109-74-0
$CH_3CH_2CH_2CN$	**RTECS** ET8750000
Synonyms & Trade Names Butanenitrile, Butyronitrile, 1-Cyanopropane, Propyl cyanide, n-Propyl cyanide	**DOT ID & Guide** 2411 131

Exposure Limits	NIOSH REL: TWA 8 ppm (22 mg/m^3)
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.83 mg/m^3

Physical Description
Colorless liquid with a sharp, suffocating odor. [Note: Forms cyanide in the body.]

MW: 69.1	BP: 244°F	FRZ: -170°F	Sol(77°F): 3%
VP: 14 mmHg	IP: 11.67 eV		Sp.Gr: 0.81
Fl.P: 62°F	UEL: ?	LEL: 1.65%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers & reducing agents, strong acids & bases

Measurement Methods
NIOSH 1606 (adapt)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 80 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 200 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 400 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1000 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; headache, dizziness, lassitude (weakness, exhaustion), confusion, convulsions; dyspnea (breathing difficulty); abdominal pain, nausea, vomiting

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Malononitrile	**CAS** 109-77-3
$NCCH_2CN$	**RTECS** OO3150000
Synonyms & Trade Names Cyanoacetonitrile, Dicyanomethane, Malonic dinitrile	**DOT ID & Guide** 2647 153

Exposure Limits	NIOSH REL: TWA 3 ppm (8 mg/m^3)
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.70 mg/m^3

Physical Description
White powder or colorless crystals. [Note: Melts above 90°F. Forms cyanide in the body.]

MW: 66.1	BP: 426°F	MLT: 90°F	Sol: 13%
VP: ?	IP: 12.88 eV		Sp.Gr: 1.19
Fl.P(oc): 266°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong bases [Note: May polymerize violently on prolonged heating at 265°F, or in contact with strong bases at lower temperatures.]

Measurement Methods
NIOSH Nitriles Crit. Doc.
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 80 mg/m^3: (APF = 10) Any supplied-air respirator

Up to 200 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 400 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 667 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache, dizziness, lassitude (weakness, exhaustion), confusion, convulsions; dyspnea (breathing difficulty); abdominal pain, nausea, vomiting

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

n-Butyl mercaptan	**CAS** 109-79-5
$CH_3CH_2CH_2CH_2SH$	**RTECS** EK6300000
Synonyms & Trade Names Butanethiol, 1-Butanethiol, n-Butanethiol, 1-Mercaptobutane	**DOT ID & Guide** 2347 130

Exposure Limits	NIOSH REL: C 0.5 ppm (1.8 mg/m^3) [15-minute]
	OSHA PEL†: TWA 10 ppm (35 mg/m^3)
IDLH 500 ppm See: 109795	**Conversion** 1 ppm = 3.69 mg/m^3

Physical Description
Colorless liquid with a strong, garlic-, cabbage-, or skunk-like odor.

MW: 90.2	BP: 209°F	FRZ: -176°F	Sol: 0.06%
VP: 35 mmHg	IP: 9.15 eV		Sp.Gr: 0.83
Fl.P: 35°F	UEL: ?	LEL: ?	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers (such as dry bleaches), acids

Measurement Methods
NIOSH 2525, 2542
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 500 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode*
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; muscle weakness, malaise (vague feeling of discomfort), sweating, nausea, vomiting, headache, confusion; in animals: narcosis, incoordination, lassitude (weakness, exhaustion); cyanosis, pulmonary irritation; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0018 See MEDICAL TESTS: 0033

NIOSH Pocket Guide to Chemical Hazards

Methyl Cellosolve®	**CAS** 109-86-4
$CH_3OCH_2CH_2OH$	**RTECS** KL5775000
Synonyms & Trade Names EGME, Ethylene glycol monomethyl ether, Glycol monomethyl ether, 2-Methoxyethanol	**DOT ID & Guide** 1188 127

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.3 mg/m^3) [skin]
	OSHA PEL: TWA 25 ppm (80 mg/m^3) [skin]
IDLH 200 ppm See: 109864	**Conversion** 1 ppm = 3.11 mg/m^3

Physical Description
Colorless liquid with a mild, ether-like odor.

MW: 76.1	BP: 256°F	FRZ: -121°F	Sol: Miscible
VP: 6 mmHg	IP: 9.60 eV		Sp.Gr: 0.96
Fl.P: 102°F	UEL: 14%	LEL: 1.8%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers, caustics

Measurement Methods
NIOSH 1403; OSHA 53, 79
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 1 ppm: (APF = 10) Any supplied-air respirator*
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 5 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 100 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode*
Up to 200 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; headache, drowsiness, lassitude (weakness, exhaustion); ataxia, tremor; anemic pallor; in animals: reproductive, teratogenic effects

Target Organs Eyes, respiratory system, central nervous system, blood, kidneys, reproductive system, hematopoietic system

See also: INTRODUCTION See ICSC CARD: 0061 See MEDICAL TESTS: 0139

NIOSH Pocket Guide to Chemical Hazards

Methylal	**CAS** 109-87-5
$CH_3OCH_2OCH_3$	**RTECS** PA8750000
Synonyms & Trade Names Dimethoxymethane, Formal, Formaldehyde dimethylacetal, Methoxymethyl methyl ether, Methylene dimethyl ether	**DOT ID & Guide** 1234 127

Exposure Limits	NIOSH REL: TWA 1000 ppm (3100 mg/m^3)
	OSHA PEL: TWA 1000 ppm (3100 mg/m^3)
IDLH 2200 ppm [10%LEL] See: 109875	**Conversion** 1 ppm = 3.11 mg/m^3

Physical Description
Colorless liquid with a chloroform-like odor.

MW: 76.1	BP: 111°F	FRZ: -157°F	Sol: 33%
VP: 330 mmHg	IP: 10.00 eV		Sp.Gr: 0.86
Fl.P(oc): -26°F	UEL: 13.8%	LEL: 2.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, acids

Measurement Methods
NIOSH 1611
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2200 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; anesthesia

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 1152

NIOSH Pocket Guide to Chemical Hazards

Diethylamine	**CAS** 109-89-7
$(C_2H_5)_2NH$	**RTECS** HZ8750000
Synonyms & Trade Names Diethamine; N,N-Diethylamine; N-Ethylethanamine	**DOT ID & Guide** 1154 132

Exposure Limits	NIOSH REL: TWA 10 ppm (30 mg/m^3) ST 25 ppm (75 mg/m^3)
	OSHA PEL†: TWA 25 ppm (75 mg/m^3)
IDLH 200 ppm See: 109897	**Conversion** 1 ppm = 2.99 mg/m^3

Physical Description
Colorless liquid with a fishy, ammonia-like odor.

MW: 73.1	BP: 132°F	FRZ: -58°F	Sol: Miscible
VP: 192 mmHg	IP: 8.01 eV		Sp.Gr: 0.71
Fl.P: -15°F	UEL: 10.1%	LEL: 1.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids, cellulose nitrate

Measurement Methods
NIOSH 2010; OSHA 41
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash (>0.5%), Quick drench (liquid)

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 200 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern£/(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; in animals; myocardial degeneration

Target Organs Eyes, skin, respiratory system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0444

NIOSH Pocket Guide to Chemical Hazards

Ethyl formate	**CAS** 109-94-4
CH_3CH_2OCHO	**RTECS** LQ8400000
Synonyms & Trade Names Ethyl ester of formic acid, Ethyl methanoate	**DOT ID & Guide** 1190 129

Exposure Limits	NIOSH REL: TWA 100 ppm (300 mg/m^3)
	OSHA PEL: TWA 100 ppm (300 mg/m^3)
IDLH 1500 ppm See: 109944	**Conversion** 1 ppm = 3.03 mg/m^3

Physical Description
Colorless liquid with a fruity odor.

MW: 74.1	BP: 130°F	FRZ: -113°F	Sol(64°F): 9%
VP: 200 mmHg	IP: 10.61 eV		Sp.Gr: 0.92
Fl.P: -4°F	UEL: 16.0%	LEL: 2.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids [Note: Decomposes slowly in water to form ethyl alcohol and formic acid.]

Measurement Methods
NIOSH 1452; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, upper respiratory system; in animals: narcosis

Target Organs Eyes, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0623

NIOSH Pocket Guide to Chemical Hazards

Tetrahydrofuran	**CAS** 109-99-9
C_4H_8O	**RTECS** LU5950000
Synonyms & Trade Names Diethylene oxide; 1,4-Epoxybutane; Tetramethylene oxide; THF	**DOT ID & Guide** 2056 127

Exposure Limits	NIOSH REL: TWA 200 ppm (590 mg/m^3) ST 250 ppm (735 mg/m^3)
	OSHA PEL†: TWA 200 ppm (590 mg/m^3)
IDLH 2000 ppm [10%LEL] See: 109999	**Conversion** 1 ppm = 2.95 mg/m^3

Physical Description
Colorless liquid with an ether-like odor.

MW: 72.1	BP: 151°F	FRZ: -163°F	Sol: Miscible
VP: 132 mmHg	IP: 9.45 eV		Sp.Gr: 0.89
Fl.P: 6°F	UEL: 11.8%	LEL: 2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, lithium-aluminum alloys [Note: Peroxides may accumulate upon prolonged storage in presence of air.]

Measurement Methods
NIOSH 1609, 3800; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, upper respiratory system; nausea, dizziness, headache, central nervous system depression

Target Organs Eyes, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0578

NIOSH Pocket Guide to Chemical Hazards

Methyl isoamyl ketone	**CAS** 110-12-3
$CH_3COCH_2CH_2CH(CH_3)_2$	**RTECS** MP3850000
Synonyms & Trade Names Isoamyl methyl ketone, Isopentyl methyl ketone, 2-Methyl-5-hexanone, 5-Methyl-2-hexanone, MIAK	**DOT ID & Guide** 2302 127

Exposure Limits	NIOSH REL: TWA 50 ppm (240 mg/m^3)
	OSHA PEL†: TWA 100 ppm (475 mg/m^3)
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.67 mg/m^3

Physical Description
Colorless, clear liquid with a pleasant, fruity odor.

MW: 114.2	BP: 291°F	FRZ: -101°F	Sol: 0.5%
VP: 5 mmHg	IP: 9.284 eV		Sp.Gr: 0.81
Fl.P: 97°F	UEL(200°F): 8.2%	LEL(200°F): 1.0%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
OSHA PV2042
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 1250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 2500 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 5000 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; headache, narcosis, coma; dermatitis; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0815

NIOSH Pocket Guide to Chemical Hazards

Isobutyl acetate	**CAS** 110-19-0
$CH_3COOCH_2CH(CH_3)_2$	**RTECS** AI4025000
Synonyms & Trade Names Isobutyl ester of acetic acid, 2-Methylpropyl acetate, 2-Methylpropyl ester of acetic acid, beta-Methylpropyl ethanoate	**DOT ID & Guide** 1213 129

Exposure Limits	NIOSH REL: TWA 150 ppm (700 mg/m^3)
	OSHA PEL: TWA 150 ppm (700 mg/m^3)
IDLH 1300 ppm [10%LEL] See: 110190	**Conversion** 1 ppm = 4.75 mg/m^3

Physical Description
Colorless liquid with a fruity, floral odor.

MW: 116.2	BP: 243°F	FRZ: -145°F	Sol(77°F): 0.6%
VP: 13 mmHg	IP: 9.97 eV		Sp.Gr: 0.87
Fl.P: 64°F	UEL: 10.5%	LEL: 1.3%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1450; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1300 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; headache, drowsiness, anesthesia; in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0494

NIOSH Pocket Guide to Chemical Hazards

Methyl (n-amyl) ketone	**CAS** 110-43-0
$CH_3CO[CH_2]_4CH_3$	**RTECS** MJ5075000
Synonyms & Trade Names Amyl methyl ketone, n-Amyl methyl ketone, 2-Heptanone	**DOT ID & Guide** 1110 127

Exposure Limits	NIOSH REL: TWA 100 ppm (465 mg/m^3)
	OSHA PEL: TWA 100 ppm (465 mg/m^3)
IDLH 800 ppm See: 110430	**Conversion** 1 ppm = 4.67 mg/m^3

Physical Description
Colorless to white liquid with a banana-like, fruity odor.

MW: 114.2	BP: 305°F	FRZ: -32°F	Sol: 0.4%
VP: 3 mmHg	IP: 9.33 eV		Sp.Gr: 0.81
Fl.P: 102°F	UEL(250°F): 7.9%	LEL(151°F): 1.1%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong acids, alkalis & oxidizers [Note: Will attack some forms of plastic.]

Measurement Methods
NIOSH 1301
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 800 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; headache; narcosis, coma; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, peripheral nervous system

See also: INTRODUCTION See ICSC CARD: 0920 See MEDICAL TESTS: 0145

NIOSH Pocket Guide to Chemical Hazards

Methyl Cellosolve® acetate	**CAS** 110-49-6
$CH_3COOCH_2CH_2OCH_3$	**RTECS** KL5950000
Synonyms & Trade Names EGMEA, Ethylene glycol monomethyl ether acetate, Glycol monomethyl ether acetate, 2-Methoxyethyl acetate	**DOT ID & Guide** 1189 129

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.5 mg/m^3) [skin]
	OSHA PEL: TWA 25 ppm (120 mg/m^3) [skin]
IDLH 200 ppm See: 110496	**Conversion** 1 ppm = 4.83 mg/m^3

Physical Description
Colorless liquid with a mild, ether-like odor.

MW: 118.1	BP: 293°F	FRZ: -85°F	Sol: Miscible
VP: 2 mmHg	IP: ?		Sp.Gr: 1.01
Fl.P: 120°F	UEL: 8.2%	LEL: 1.7%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1451; OSHA 53, 79
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 1 ppm: (APF = 10) Any supplied-air respirator*
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 5 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 100 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode*
Up to 200 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; kidney, brain damage; in animals: narcosis; reproductive, teratogenic effects

Target Organs Eyes, respiratory system, kidneys, brain, central nervous system, peripheral nervous system, reproductive system, hematopoietic system

See also: INTRODUCTION See ICSC CARD: 0476

NIOSH Pocket Guide to Chemical Hazards

n-Hexane	**CAS** 110-54-3
$CH_3[CH_2]_4CH_3$	**RTECS** MN9275000
Synonyms & Trade Names Hexane, Hexyl hydride, normal-Hexane	**DOT ID & Guide** 1208 128

Exposure Limits	NIOSH REL: TWA 50 ppm (180 mg/m^3)
	OSHA PEL†: TWA 500 ppm (1800 mg/m^3)
IDLH 1100 ppm [10%LEL] See: 110543	**Conversion** 1 ppm = 3.53 mg/m^3

Physical Description
Colorless liquid with a gasoline-like odor.

MW: 86.2	BP: 156°F	FRZ: -219°F	Sol: 0.002%
VP: 124 mmHg	IP: 10.18 eV		Sp.Gr: 0.66
Fl.P: -7°F	UEL: 7.5%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500, 3800; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any supplied-air respirator*
Up to 1100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; nausea, headache; peripheral neuropathy: numb extremities, muscle weakness; dermatitis; dizziness; chemical pneumonitis (aspiration liquid)

Target Organs Eyes, skin, respiratory system, central nervous system, peripheral nervous system

See also: INTRODUCTION See ICSC CARD: 0279 See MEDICAL TESTS: 0114

NIOSH Pocket Guide to Chemical Hazards

Succinonitrile	**CAS** 110-61-2
$NCCH_2CH_2CN$	**RTECS** WN3850000
Synonyms & Trade Names Butanedinitrile; 1,2-Dicyanoethane; Dinile; Ethylene cyanide; Ethylene dicyanide; Succinic dinitrile	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 6 ppm (20 mg/m^3)
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.28 mg/m^3

Physical Description
Colorless, odorless, waxy solid. [Note: Forms cyanide in the body.]

MW: 80.1	BP: 509°F	MLT: 134°F	Sol: 13%
VP(212°F): 2 mmHg	IP: ?		Sp.Gr: 0.99
Fl.P: 270°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
NIOSH Nitriles Crit. Doc.
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 60 ppm: (APF = 10) Any supplied-air respirator
Up to 150 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 250 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; headache, dizziness, lassitude (weakness, exhaustion), confusion, convulsions; blurred vision; dyspnea (breathing difficulty); abdominal pain, nausea, vomiting

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

n-Valeraldehyde	**CAS** 110-62-3
$CH_3(CH_2)_3CHO$	**RTECS** YV3600000
Synonyms & Trade Names Amyl aldehyde, Pentanal, Valeral, Valeraldehyde, Valeric aldehyde	**DOT ID & Guide** 2058 129

Exposure Limits	NIOSH REL: TWA 50 ppm (175 mg/m^3) See Appendix C (Aldehydes)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.53 mg/m^3

Physical Description
Colorless liquid with a strong, acrid, pungent odor.

MW: 86.2	BP: 217°F	FRZ: -133°F	Sol: Slight
VP: 26 mmHg	IP: 9.82 eV		Sp.Gr: 0.81
Fl.P: 54°F	UEL: ?	LEL: ?	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 2536; OSHA 85
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, nose, throat
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

1-Pentanethiol	**CAS** 110-66-7
$CH_3(CH_2)_4SH$	**RTECS** SA3150000
Synonyms & Trade Names Amyl hydrosulfide, Amyl mercaptan, Amyl sulfhydrate, Pentyl mercaptan	**DOT ID & Guide** 1111 130

Exposure Limits	NIOSH REL: C 0.5 ppm (2.1 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.26 mg/m^3

Physical Description
Water-white to yellowish liquid with a strong, garlic-like odor.

MW: 104.2	BP: 260°F	FRZ: -104°F	Sol: Insoluble
VP(77°F): 14 mmHg	IP: ?		Sp.Gr: 0.84
Fl.P(oc): 65°F	UEL: ?	LEL: ?	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers, reducing agents, alkali metals, calcium hypochlorite, concentrated nitric acid

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; headache, nausea, dizziness; vomiting, diarrhea; dermatitis, skin sensitization

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

2-Ethoxyethanol	**CAS** 110-80-5
$C_2H_5OCH_2CH_2OH$	**RTECS** KK8050000
Synonyms & Trade Names Cellosolve®, EGEE, Ethylene glycol monoethyl ether	**DOT ID & Guide** 1171 127

Exposure Limits	NIOSH REL: TWA 0.5 ppm (1.8 mg/m^3) [skin]
	OSHA PEL: TWA 200 ppm (740 mg/m^3) [skin]
IDLH 500 ppm See: 110805	**Conversion** 1 ppm = 3.69 mg/m^3

Physical Description
Colorless liquid with a sweet, pleasant, ether-like odor.

MW: 90.1	BP: 275°F	FRZ: -130°F	Sol: Miscible
VP: 4 mmHg	IP: ?		Sp.Gr: 0.93
Fl.P: 110°F	UEL(200°F): 15.6%	LEL(200°F): 1.7%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1403; OSHA 53, 79
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any supplied-air respirator*
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 25 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 500 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode*
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, respiratory system; blood changes; liver, kidney, lung damage; reproductive, teratogenic effects

Target Organs Eyes, respiratory system, blood, kidneys, liver, reproductive system, hematopoietic system

See also: INTRODUCTION See ICSC CARD: 0060 See MEDICAL TESTS: 0096

NIOSH Pocket Guide to Chemical Hazards

Cyclohexane	**CAS** 110-82-7
C_6H_{12}	**RTECS** GU6300000
Synonyms & Trade Names Benzene hexahydride, Hexahydrobenzene, Hexamethylene, Hexanaphthene	**DOT ID & Guide** 1145 128

Exposure Limits	NIOSH REL: TWA 300 ppm (1050 mg/m^3)
	OSHA PEL: TWA 300 ppm (1050 mg/m^3)
IDLH 1300 ppm [10%LEL] See: 110827	**Conversion** 1 ppm = 3.44 mg/m^3

Physical Description
Colorless liquid with a sweet, chloroform-like odor. [Note: A solid below 44°F.]

MW: 84.2	BP: 177°F	FRZ: 44°F	Sol: Insoluble
VP: 78 mmHg	IP: 9.88 eV		Sp.Gr: 0.78
Fl.P: 0°F	UEL: 8%	LEL: 1.3%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
NIOSH 1500; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1300 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; drowsiness; dermatitis; narcosis, coma

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0242 See MEDICAL TESTS: 0062

NIOSH Pocket Guide to Chemical Hazards

Cyclohexene	**CAS** 110-83-8
C_6H_{10}	**RTECS** GW2500000
Synonyms & Trade Names Benzene tetrahydride, Tetrahydrobenzene	**DOT ID & Guide** 2256 130

Exposure Limits	NIOSH REL: TWA 300 ppm (1015 mg/m^3)
	OSHA PEL: TWA 300 ppm (1015 mg/m^3)
IDLH 2000 ppm See: 110838	**Conversion** 1 ppm = 3.36 mg/m^3

Physical Description
Colorless liquid with a sweet odor.

MW: 82.2	BP: 181°F	FRZ: -154°F	Sol: Insoluble
VP: 67 mmHg	IP: 8.95 eV		Sp.Gr: 0.81
Fl.P: 11°F	UEL: ?	LEL: ?	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers [Note: Forms explosive peroxides with oxygen upon storage.]

Measurement Methods
NIOSH 1500; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; drowsiness

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 1054

NIOSH Pocket Guide to Chemical Hazards

Pyridine	**CAS** 110-86-1
C_5H_5N	**RTECS** UR8400000
Synonyms & Trade Names Azabenzene, Azine	**DOT ID & Guide** 1282 129

Exposure Limits	NIOSH REL: TWA 5 ppm (15 mg/m^3)
	OSHA PEL: TWA 5 ppm (15 mg/m^3)
IDLH 1000 ppm See: 110861	**Conversion** 1 ppm = 3.24 mg/m^3

Physical Description
Colorless to yellow liquid with a nauseating, fish-like odor.

MW: 79.1	BP: 240°F	FRZ: -44°F	Sol: Miscible
VP: 16 mmHg	IP: 9.27 eV		Sp.Gr: 0.98
Fl.P: 68°F	UEL: 12.4%	LEL: 1.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1613; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£
Up to 50 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1000 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; headache, anxiety, dizziness, insomnia; nausea, anorexia; dermatitis; liver, kidney damage

Target Organs Eyes, skin, central nervous system, liver, kidneys, gastrointestinal tract,

See also: INTRODUCTION See ICSC CARD: 0323 See MEDICAL TESTS: 0200

NIOSH Pocket Guide to Chemical Hazards

Morpholine	**CAS** 110-91-8
C_4H_9ON	**RTECS** QD6475000
Synonyms & Trade Names Diethylene imidoxide; Diethylene oximide; Tetrahydro-1,4-oxazine; Tetrahydro-p-oxazine	**DOT ID & Guide** 1760 154 (aqueous) 2054 132

Exposure Limits	NIOSH REL: TWA 20 ppm (70 mg/m^3) ST 30 ppm (105 mg/m^3) [skin]
	OSHA PEL†: TWA 20 ppm (70 mg/m^3) [skin]
IDLH 1400 ppm [10%LEL] See: 110918	**Conversion** 1 ppm = 3.56 mg/m^3

Physical Description
Colorless liquid with a weak, ammonia- or fish-like odor. [Note: A solid below 23°F.]

MW: 87.1	BP: 264°F	FRZ: 23°F	Sol: Miscible
VP: 6 mmHg	IP: 8.88 eV		Sp.Gr: 1.007
Fl.P(oc): 98°F	UEL: 11.2%	LEL: 1.4%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong acids, strong oxidizers, metals, nitro compounds [Note: Corrosive to metals.]

Measurement Methods
NIOSH S150 (II-3)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash (>15%), Quick drench (>25%)	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£
Up to 1000 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1400 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, respiratory system; visual disturbance; cough; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0302

NIOSH Pocket Guide to Chemical Hazards

2-Ethoxyethyl acetate	**CAS** 111-15-9
$CH_3COOCH_2CH_2OC_2H_5$	**RTECS** KK8225000
Synonyms & Trade Names Cellosolve® acetate, EGEEA, Ethylene glycol monoethyl ether acetate, Glycol monoethyl ether acetate	**DOT ID & Guide** 1172 129

Exposure Limits	NIOSH REL: TWA 0.5 ppm (2.7 mg/m^3) [skin]
	OSHA PEL: TWA 100 ppm (540 mg/m^3) [skin]
IDLH 500 ppm See: 111159	**Conversion** 1 ppm = 5.41 mg/m^3

Physical Description
Colorless liquid with a mild odor.

MW: 132.2	BP: 313°F	FRZ: -79°F	Sol: 23%
VP: 2 mmHg	IP: ?		Sp.Gr: 0.98
Fl.P: 124°F	UEL: ?	LEL: 1.7%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1450; OSHA 53
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 500 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode*
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; vomiting; kidney damage; paralysis; in animals: reproductive, teratogenic effects

Target Organs Eyes, respiratory system, gastrointestinal tract, reproductive system, hematopoietic system

See also: INTRODUCTION See ICSC CARD: 0364

NIOSH Pocket Guide to Chemical Hazards

Glutaraldehyde	**CAS** 111-30-8
$OCH(CH_2)_3CHO$	**RTECS** MA2450000
Synonyms & Trade Names Glutaric dialdehyde; 1,5-Pentanedial	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 0.2 ppm (0.8 mg/m^3) See Appendix C (Aldehydes)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.09 mg/m^3

Physical Description
Colorless liquid with a pungent odor.

MW: 100.1	BP: 212°F	FRZ: 7°F	Sol: Miscible
VP: 17 mmHg	IP: ?		Sp.Gr: 1.10
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Strong oxidizers, strong bases [Note: Alkaline solutions of glutaraldehyde (i.e., activated glutaraldehyde) react with alcohol, ketones, amines, hydrazines & proteins.]

Measurement Methods
NIOSH 2532; OSHA 64
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, respiratory system; dermatitis, sensitization skin; cough, asthma; nausea, vomiting
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0158

NIOSH Pocket Guide to Chemical Hazards

n-Hexanethiol	**CAS** 111-31-9
$CH_3[CH_2]_5SH$	**RTECS** MO4550000
Synonyms & Trade Names 1-Hexanethiol, Hexyl mercaptan, n-Hexyl mercaptan, n-Hexylthiol	**DOT ID & Guide** 1228 131

Exposure Limits	NIOSH REL: C 0.5 ppm (2.7 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.83 mg/m^3

Physical Description
Colorless liquid with an unpleasant odor.

MW: 118.2	BP: 304°F	FRZ: -113°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.84
Fl.P: 68°F	UEL: ?	LEL: ?	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers, reducing agents, strong acids & bases, alkali metals

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; lassitude (weakness, exhaustion), cyanosis, increased respiration, nausea, drowsiness, headache, vomiting

Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Diethylenetriamine	**CAS** 111-40-0
$(NH_2CH_2CH_2)_2NH$	**RTECS** IE1225000
Synonyms & Trade Names N-(2-Aminoethyl)1,2-ethanediamine; bis(2-Aminoethyl)amine; DETA; 2,2'-Diaminodiethylamine	**DOT ID & Guide** 2079 154

Exposure Limits	NIOSH REL: TWA 1 ppm (4 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.22 mg/m^3

Physical Description
Colorless to yellow liquid with a strong, ammonia-like odor. [Note: Hygroscopic (i.e., absorbs moisture from the air).]

MW: 103.2	BP: 405°F	FRZ: -38°F	Sol: Miscible
VP: 0.4 mmHg	IP: ?		Sp.Gr: 0.96
Fl.P: 208°F	UEL: 6.7%	LEL: 2%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Oxidizers, strong acids, cellulose nitrate [Note: May form explosive complexes with silver, cobalt, or chromium compounds. Corrosive to aluminum copper, brass & zinc.]

Measurement Methods
NIOSH 2540; OSHA 60
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane, upper respiratory system; dermatitis, skin sensitization; eye, skin necrosis; cough, dyspnea (breathing difficulty), pulmonary sensitization

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0620

NIOSH Pocket Guide to Chemical Hazards

Diethanolamine	**CAS** 111-42-2
$(HOCH_2CH_2)_2NH$	**RTECS** KL2975000
Synonyms & Trade Names DEA; Di(2-hydroxyethyl)amine; 2,2'-Dihydroxydiethyamine; Diolamine; bis(2-Hydroxyethyl)amine; 2,2'-Iminodiethanol	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 3 ppm (15 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.30 mg/m^3

Physical Description
Colorless crystals or a syrupy, white liquid (above 82°F) with a mild, ammonia-like odor.

MW: 105.2	BP: 516°F (Decomposes)	MLT: 82°F	Sol: 95%
VP: <0.01 mmHg	IP: ?		Sp.Gr: 1.10
Fl.P: 279°F	UEL: 9.8%	LEL: 1.6%	

Class IIIB Combustible Liquid
Combustible Solid

Incompatibilities & Reactivities
Oxidizers, strong acids, acid anhydrides, halides [Note: Reacts with CO_2 in the air. Hygroscopic (i.e., absorbs moisture from the air). Corrosive to copper, zinc & galvanized iron.]

Measurement Methods
NIOSH 3509; OSHA PV2018
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, nose, throat; eye burns, corneal necrosis; skin burns; lacrimation (discharge of tears), cough, sneezing	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0618

NIOSH Pocket Guide to Chemical Hazards

Dichloroethyl ether	**CAS** 111-44-4
$(ClCH_2CH_2)_2O$	**RTECS** KN0875000
Synonyms & Trade Names bis(2-Chloroethyl)ether; 2,2'-Dichlorodiethyl ether, 2,2'-Dichloroethyl ether	**DOT ID & Guide** 1916 152

Exposure Limits	NIOSH REL: Ca TWA 5 ppm (30 mg/m^3) ST 10 ppm (60 mg/m^3) [skin] See Appendix A
	OSHA PEL†: TWA 15 ppm (90 mg/m^3) [skin]
IDLH Ca [100 ppm] See: 111444	**Conversion** 1 ppm = 5.85 mg/m^3

Physical Description
Colorless liquid with a chlorinated solvent-like odor.

MW: 143.0	BP: 352°F	FRZ: -58°F	Sol: 1%
VP: 0.7 mmHg	IP: ?		Sp.Gr: 1.22
Fl.P: 131°F	UEL: ?	LEL: 2.7%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers [Note: Decomposes in presence of moisture to form hydrochloric acid.]

Measurement Methods
NIOSH 1004; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation nose, throat, respiratory system; lacrimation (discharge of tears); cough; nausea, vomiting; in animals: pulmonary edema; liver damage; [potential occupational carcinogen]

Target Organs Eyes, respiratory system, liver

Cancer Site [in animals: liver tumors]

See also: INTRODUCTION See ICSC CARD: 0417 See MEDICAL TESTS: 0075

NIOSH Pocket Guide to Chemical Hazards

Octane	**CAS** 111-65-9
$CH_3[CH_2]_6CH_3$	**RTECS** RG8400000
Synonyms & Trade Names n-Octane, normal-Octane	**DOT ID & Guide** 1262 128

Exposure Limits	NIOSH REL: TWA 75 ppm (350 mg/m^3) C 385 ppm (1800 mg/m^3) [15-minute]
	OSHA PEL†: TWA 500 ppm (2350 mg/m^3)
IDLH 1000 ppm [10%LEL] See: 111659	**Conversion** 1 ppm = 4.67 mg/m^3

Physical Description
Colorless liquid with a gasoline-like odor.

MW: 114.2	BP: 258°F	FRZ: -70°F	Sol(77°F): 0.00007%
VP: 10 mmHg	IP: 9.82 eV		Sp.Gr: 0.70
Fl.P: 56°F	UEL: 6.5%	LEL: 1.0%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 750 ppm: (APF = 10) Any supplied-air respirator*
Up to 1000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; drowsiness; dermatitis; chemical pneumonitis (aspiration liquid); in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0933

NIOSH Pocket Guide to Chemical Hazards

Adiponitrile	**CAS** 111-69-3
$NC(CH_2)_4CN$	**RTECS** AV2625000
Synonyms & Trade Names 1,4-Dicyanobutane; Hexanedinitrile; Tetramethylene cyanide	**DOT ID & Guide** 2205 153

Exposure Limits	NIOSH REL: TWA 4 ppm (18 mg/m^3)
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.43 mg/m^3

Physical Description
Water-white, practically odorless, oily liquid. [Note: A solid below 34°F. Forms cyanide in the body.]

MW: 108.2	BP: 563°F	FRZ: 34°F	Sol: 4.5%
VP: 0.002 mmHg	IP: ?		Sp.Gr: 0.97
Fl.P(o.c.): 199°F	UEL: 5.0%	LEL: 1.7%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Oxidizers (e.g., perchlorates, nitrates), strong acids (e.g., sulfuric acid) [Note: Decomposes above 194°F, forming hydrogen cyanide.]

Measurement Methods
NIOSH Nitriles Crit. Doc.
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 40 ppm: (APF = 10) Any supplied-air respirator
Up to 100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 200 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 250 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; headache, dizziness, lassitude (weakness, exhaustion), confusion, convulsions; blurred vision; dyspnea (breathing difficulty); abdominal pain, nausea, vomiting

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0211

NIOSH Pocket Guide to Chemical Hazards

2-Butoxyethanol	**CAS** 111-76-2
$C_4H_9OCH_2CH_2OH$	**RTECS** KJ8575000
Synonyms & Trade Names Butyl Cellosolve®, Butyl oxitol, Dowanol® EB, EGBE, Ektasolve EB®, Ethylene glycol monobutyl ether, Jeffersol EB	**DOT ID & Guide** 2369 152

Exposure Limits	NIOSH REL: TWA 5 ppm (24 mg/m^3) [skin]
	OSHA PEL†: TWA 50 ppm (240 mg/m^3) [skin]
IDLH 700 ppm See: 111762	**Conversion** 1 ppm = 4.83 mg/m^3

Physical Description
Colorless liquid with a mild, ether-like odor.

MW: 118.2	BP: 339°F	FRZ: -107°F	Sol: Miscible
VP: 0.8 mmHg	IP: 10.00 eV		Sp.Gr: 0.90
Fl.P: 143°F	UEL(275°F): 12.7%	LEL(200°F): 1.1%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, strong caustics

Measurement Methods
NIOSH 1403; OSHA 83
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 50 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 250 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 700 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; hemolysis, hematuria (blood in the urine); central nervous system depression, headache; vomiting

Target Organs Eyes, skin, respiratory system, central nervous system, hematopoietic system, blood, kidneys, liver, lymphoid system

See also: INTRODUCTION See ICSC CARD: 0059 See MEDICAL TESTS: 0029

NIOSH Pocket Guide to Chemical Hazards

Nonane	**CAS** 111-84-2
$CH_3(CH_2)_7CH_3$	**RTECS** RA6115000
Synonyms & Trade Names n-Nonane, Nonyl hydride	**DOT ID & Guide** 1920 128

Exposure Limits	NIOSH REL: TWA 200 ppm (1050 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.25 mg/m^3

Physical Description
Colorless liquid with a gasoline-like odor.

MW: 128.3	BP: 303°F	FRZ: -60°F	Sol: Insoluble
VP: 3 mmHg	IP: 10.21 eV		Sp.Gr: 0.72
Fl.P: 88°F	UEL: 2.9%	LEL: 0.8%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers (e.g., peroxides, nitrates, perchlorates)

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: Prevent eye contact Wash skin: Daily Remove: When wet (flammable) Change: No recommendation Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, nose, throat; headache, drowsiness, dizziness, confusion, nausea, tremor, incoordination; chemical pneumonitis (aspiration liquid)
Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 1245

NIOSH Pocket Guide to Chemical Hazards

1-Octanethiol	**CAS** 111-88-6
$CH_3(CH_2)_7SH$	**RTECS**
Synonyms & Trade Names 1-Mercaptooctane, n-Octyl mercaptan, Octylthiol, 1-Octylthiol	**DOT ID & Guide** 1228 131

Exposure Limits	NIOSH REL: C 0.5 ppm (3.0 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.98 mg/m^3

Physical Description
Water-white liquid with a mild odor.

MW: 146.3	BP: 390°F	FRZ: -57°F	Sol: Insoluble
VP(212°F): 3 mmHg	IP: ?		Sp.Gr: 0.84
Fl.P(oc): 115°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Oxidizers, reducing agents, strong acids & bases, alkali metals

Measurement Methods
NIOSH 2510
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; lassitude (weakness, exhaustion), cyanosis, increased respiration, nausea, drowsiness, headache, vomiting

Target Organs Eyes, skin, respiratory system, blood, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

2-Butoxyethanol acetate	**CAS** 112-07-2
$C_4H_9O(CH_2)_2OCOCH_3$	**RTECS** KJ8925000
Synonyms & Trade Names 2-Butoxyethyl acetate, Butyl Cellosolve® acetate, Butyl glycol acetate, EGBEA, Ektasolve EB® acetate, Ethylene glycol monobutyl ether acetate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 ppm (33 mg/m^3)
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.55 mg/m^3

Physical Description
Colorless liquid with a pleasant, sweet, fruity odor.

MW: 160.2	BP: 378°F	FRZ: -82°F	Sol: 1.5%
VP: 0.3 mmHg	IP: ?		Sp.Gr: 0.94
Fl.P: 71°F	UEL(275°F): 8.54%	LEL(200°F): 0.88%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
OSHA 83
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 50 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 250 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 700 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; hemolysis, hematuria (blood in the urine); central nervous system depression, headache; vomiting

Target Organs Eyes, skin, respiratory system, central nervous system, hematopoietic system, blood, kidneys, liver, lymphoid system

See also: INTRODUCTION See ICSC CARD: 0839

NIOSH Pocket Guide to Chemical Hazards

1-Dodecanethiol	**CAS** 112-55-0
$CH_3(CH_2)_{11}SH$	**RTECS** JR3155000
Synonyms & Trade Names Dodecyl mercaptan, 1-Dodecyl mercaptan, n-Dodecyl mercaptan, Lauryl mercaptan, n-Lauryl mercaptan, 1-Mercaptododecane	**DOT ID & Guide** 1228 131

Exposure Limits	NIOSH REL: C 0.5 ppm (4.1 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 8.28 mg/m^3

Physical Description
Colorless, water-white, or pale-yellow, oily liquid with a mild, skunk-like odor. [Note: A solid below 15°F.]

MW: 202.4	BP: 441-478°F	FRZ: 15°F	Sol: Insoluble
VP(77°F): 3 mmHg	IP: ?		Sp.Gr: 0.85
Fl.P(oc): 190°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers & acids, strong bases, reducing agents, alkali metals, water, steam

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator

Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)

Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; cough; dizziness, dyspnea (breathing difficulty), lassitude (weakness, exhaustion), confusion, cyanosis; abdominal pain, nausea; skin sensitization

Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION See ICSC CARD: 0042

NIOSH Pocket Guide to Chemical Hazards

Propoxur	**CAS** 114-26-1
$CH_3NHCOOC_6H_4OCH(CH_3)_2$	**RTECS** FC3150000
Synonyms & Trade Names Aprocarb®, o-Isopropoxyphenyl-N-methylcarbamate, N-Methyl-2-isopropoxyphenyl-carbamate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White to tan, crystalline powder with a faint, characteristic odor. [insecticide]

MW: 209.3	BP: Decomposes	MLT: 187-197°F	Sol: 0.2%
VP: 0.000007 mmHg	IP: ?		Sp.Gr: ?
Fl.P: >300°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, alkalis [Note: Emits highly toxic methyl isocyanate fumes when heated to decomposition.]

Measurement Methods
NIOSH 5601; OSHA PV2007
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Miosis, blurred vision; sweating, salivation; abdominal cramps, nausea, diarrhea, vomiting; headache, lassitude (weakness, exhaustion), muscle twitching

Target Organs central nervous system, liver, kidneys, gastrointestinal tract, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0191

NIOSH Pocket Guide to Chemical Hazards

Endosulfan	**CAS** 115-29-7
$C_9H_6Cl_6O_3S$	**RTECS** RB9275000
Synonyms & Trade Names Benzoepin; Endosulphan; 6,7,8,9,10-Hexachloro-1,5,5a,6,9,9a-hexachloro-6,9-methano- 2,4,3-benzo-dioxathiepin-3-oxide; Thiodan®	**DOT ID & Guide** 2761 151

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Brown crystals with a slight, sulfur dioxide odor. [insecticide] [Note: Technical product is a tan, waxy, isomer mixture.]

MW: 406.9	BP: Decomposes	MLT: 223°F	Sol: 0.00001%
VP(77°F): 0.00001 mmHg	IP: ?		Sp.Gr: 1.74
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Alkalis, acids, water [Note: Corrosive to iron. Hydrolyzes slowly on contact with water or decomposes in presence of alkalis and acids to form sulfur dioxide.]

Measurement Methods
OSHA PV2023
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation skin; nausea, confusion, agitation, flushing, dry mouth, tremor, convulsions, headache; in animals: kidney, liver injury; decreased testis weight	
Target Organs Skin, central nervous system, liver, kidneys, reproductive system	

See also: INTRODUCTION See ICSC CARD: 0742

NIOSH Pocket Guide to Chemical Hazards

Pentaerythritol	**CAS** 115-77-5
$C(CH_2OH)_4$	**RTECS** RZ2490000
Synonyms & Trade Names 2,2-bis(Hydroxymethyl)-1,3-propanediol; Methane tetramethylol; Monopentaerythritol; PE; Tetrahydroxymethylolmethane; Tetramethylolmethane	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless to white, crystalline, odorless powder. [Note: Technical grade is 88% monopentaerythritol & 12% dipentaerythritol.]

MW: 136.2	BP: Sublimes	MLT: 500°F (Sublimes)	Sol(59°F): 6%
VP: 0.00000008 mmHg	IP: ?		Sp.Gr: 1.38
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Organic acids, oxidizers [Note: Explosive compound is formed when a mixture of PE & thiophosphoryl chloride is heated.]

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Water wash Breathing: Fresh air Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, respiratory system	
Target Organs Eyes, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Triphenyl phosphate	**CAS** 115-86-6
$(C_6H_5O)_3PO$	**RTECS** TC8400000
Synonyms & Trade Names Phenyl phosphate, TPP, Triphenyl ester of phosphoric acid	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 3 mg/m^3
	OSHA PEL: TWA 3 mg/m^3
IDLH 1000 mg/m^3 See: 115866	**Conversion**

Physical Description
Colorless, crystalline powder with a phenol-like odor.

MW: 326.3	BP: 776°F	MLT: 120°F	Sol(129°F): 0.002%
VP(380°F): 1 mmHg	IP: ?		Sp.Gr: 1.29
Fl.P: 428°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5038
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 15 mg/m^3: (APF = 5) Any dust respirator

Up to 30 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any dust respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 75 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 150 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1000 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion

Symptoms Minor changes in blood enzymes; in animals: muscle weakness, paralysis

Target Organs Blood, peripheral nervous system

See also: INTRODUCTION See ICSC CARD: 1062

NIOSH Pocket Guide to Chemical Hazards

Fensulfothion	**CAS** 115-90-2
$C_{11}H_{17}O_4PS_2$	**RTECS** TF3850000
Synonyms & Trade Names Dasanit®; O,O-Diethyl O-(p-methylsulfinyl)phenyl)phosphorothioate; Terracur P®	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Brown liquid or yellow oil. [pesticide]

MW: 308.4	BP: ?	FRZ: ?	Sol(77°F): 0.2%
VP: ?	IP: ?		Sp.Gr: 1.20
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Alkalis

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation skin; nausea, vomiting, abdominal cramps, diarrhea, salivation; headache, dizziness, lassitude (weakness, exhaustion); rhinorrhea (discharge of thin mucus), chest tightness; blurred vision, miosis; cardiac irregular; muscle fasciculation; dyspnea (breathing difficulty)
Target Organs Skin, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Di-sec octyl phthalate	**CAS** 117-81-7
$C_{24}H_{38}O_4$	**RTECS** TI0350000
Synonyms & Trade Names DEHP, Di(2-ethylhexyl)phthalate, DOP, bis-(2-Ethylhexyl)phthalate, Octyl phthalate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 5 mg/m^3 ST 10 mg/m^3 See Appendix A
	OSHA PEL†: TWA 5 mg/m^3
IDLH Ca [5000 mg/m^3] See: 117817	**Conversion**

Physical Description
Colorless, oily liquid with a slight odor.

MW: 390.5	BP: 727°F	FRZ: -58°F	Sol(75°F): 0.00003%
VP: <0.01 mmHg	IP: ?		Sp.Gr: 0.99
Fl.P(oc): 420°F	UEL: ?	LEL(474°F): 0.3%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, acids & alkalis

Measurement Methods
NIOSH 5020
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, mucous membrane; in animals: liver damage; teratogenic effects; [potential occupational carcinogen]

Target Organs Eyes, respiratory system, central nervous system, liver, reproductive system, gastrointestinal tract

Cancer Site [in animals: liver tumors]

See also: INTRODUCTION See ICSC CARD: 0271

NIOSH Pocket Guide to Chemical Hazards

1,3-Dichloro-5,5-dimethylhydantoin	**CAS** 118-52-5
$C_5H_6Cl_2N_2O_2$	**RTECS** MU0700000
Synonyms & Trade Names Dactin, DDH, Halane	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.2 mg/m^3 ST 0.4 mg/m^3
	OSHA PEL†: TWA 0.2 mg/m^3
IDLH 5 mg/m^3 See: 118525	**Conversion**

Physical Description
White powder with a chlorine-like odor.

MW: 197.0	BP: ?	MLT: 270°F	Sol: 0.2%
VP: ?	IP: ?		Sp.Gr: 1.5
Fl.P: 346°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Water, strong acids, easily oxidized materials such as ammonia salts & sulfides

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2 mg/m^3: (APF = 10) Any supplied-air respirator

Up to 5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, mucous membrane, respiratory system

Target Organs Eyes, respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0072

NIOSH Pocket Guide to Chemical Hazards

2,4,6-Trinitrotoluene	**CAS** 118-96-7
$CH_3C_6H_2(NO_2)_3$	**RTECS** XU0175000
Synonyms & Trade Names 1-Methyl-2,4,6-trinitrobenzene; TNT; Trinitrotoluene; sym-Trinitrotoluene; Trinitrotoluol	**DOT ID & Guide** 1356 113 (wet)

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 [skin]
	OSHA PEL†: TWA 1.5 mg/m^3 [skin]
IDLH 500 mg/m^3 See: 118967	**Conversion**

Physical Description
Colorless to pale-yellow, odorless solid or crushed flakes.

MW: 227.1	BP: 464°F (Explodes)	MLT: 176°F	Sol(77°F): 0.01%
VP: 0.0002 mmHg	IP: 10.59 eV		Sp.Gr: 1.65
Fl.P: ? (Explodes)	UEL: ?	LEL: ?	

Combustible Solid (Class A Explosive)

Incompatibilities & Reactivities
Strong oxidizers, ammonia, strong alkalis, combustible materials, heat [Note: Rapid heating will result in detonation.]

Measurement Methods
OSHA 44
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 5 mg/m^3: (APF = 10) Any supplied-air respirator*

Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

Up to 25 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 500 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation skin, mucous membrane; liver damage, jaundice; cyanosis; sneezing; cough, sore throat; peripheral neuropathy, muscle pain; kidney damage; cataract; sensitization dermatitis; leukocytosis (increased blood leukocytes); anemia; cardiac irregularities

Target Organs Eyes, skin, respiratory system, blood, liver, cardiovascular system, central nervous system, kidneys

See also: INTRODUCTION See ICSC CARD: 0967 See MEDICAL TESTS: 0231

NIOSH Pocket Guide to Chemical Hazards

o-Dianisidine	**CAS** 119-90-4
$(NH_2C_6H_3OCH_3)_2$	**RTECS** DD0875000
Synonyms & Trade Names Dianisidine; 3,3'-Dianisidine; 3,3'-Dimethoxybenzidine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A See Appendix C
	OSHA PEL: See Appendix C
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Colorless crystals that turn a violet color on standing. [Note: Used as a basis for many dyes.]

MW: 244.3	BP: ?	MLT: 279°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: 403°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
NIOSH 5013; OSHA 71
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation skin; in animals: kidney, liver damage; thyroid, spleen changes; [potential occupational carcinogen]

Target Organs Skin, kidneys, liver, thyroid, liver

Cancer Site [in animals: bladder, liver, stomach & mammary gland tumors]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

o-Tolidine	**CAS** 119-93-7
$C_{14}H_{16}N_2$	**RTECS** DD1225000
Synonyms & Trade Names 4,4'-Diamino-3,3'-dimethylbiphenyl; Diaminoditolyl; 3,3'-Dimethylbenzidine; 3,3'-Dimethyl-4,4'-diphenyldiamine; 3,3'-Tolidine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca C 0.02 mg/m^3 [60-minute] [skin] See Appendix A See Appendix C
	OSHA PEL: See Appendix C
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
White to reddish crystals or powder. [Note: Darkens on exposure to air. Often used in paste or wet cake form. Used as a basis for many dyes.]

MW: 212.3	BP: 572°F	MLT: 264°F	Sol: 0.1%
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5013; OSHA 71
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; in animals: liver, kidney damage; [potential occupational carcinogen]

Target Organs Eyes, respiratory system, liver, kidneys

Cancer Site [in animals: liver, bladder & mammary gland tumors]

See also: INTRODUCTION See ICSC CARD: 0960

NIOSH Pocket Guide to Chemical Hazards

Catechol	**CAS** 120-80-9
$C_6H_4(OH)_2$	**RTECS** UX1050000
Synonyms & Trade Names 1,2-Benzenediol; o-Benzenediol; 1,2-Dihydroxybenzene; o-Dihydroxybenzene; 2-Hydroxyphenol; Pyrocatechol	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 ppm (20 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.50 mg/m^3

Physical Description
Colorless, crystalline solid with a faint odor. [Note: Discolors to brown in air & light.]

MW: 110.1	BP: 474°F	MLT: 221°F	Sol: 44%
VP(244°F): 10 mmHg	IP: ?		Sp.Gr: 1.34
Fl.P: 261°F	UEL: ?	LEL: 1.4%	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, nitric acid

Measurement Methods
OSHA PV2014
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; skin sensitization, dermatitis; lacrimation (discharge of tears), burns eyes; convulsions, increased blood pressure, kidney injury

Target Organs Eyes, skin, respiratory system, central nervous system, kidneys

See also: INTRODUCTION See ICSC CARD: 0411

NIOSH Pocket Guide to Chemical Hazards

1,2,4-Trichlorobenzene	**CAS** 120-82-1
$C_6H_3Cl_3$	**RTECS** DC2100000
Synonyms & Trade Names unsym-Trichlorobenzene; 1,2,4-Trichlorobenzol	**DOT ID & Guide** 2321 153 (liquid)

Exposure Limits	NIOSH REL: C 5 ppm (40 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 7.42 mg/m^3

Physical Description
Colorless liquid or crystalline solid (below 63°F) with an aromatic odor.

MW: 181.4	BP: 416°F	FRZ: 63°F	Sol: 0.003%
VP: 1 mmHg	IP: ?		Sp.Gr: 1.45
Fl.P: 222°F	UEL(302°F): 6.6%	LEL(302°F): 2.5%	

Class IIIB Combustible Liquid
Combustible Solid

Incompatibilities & Reactivities
Acids, acid fumes, oxidizers, steam

Measurement Methods
NIOSH 5517
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, mucous membrane; in animals: liver, kidney damage; possible teratogenic effects
Target Organs Eyes, skin, respiratory system, liver, reproductive system

See also: INTRODUCTION See ICSC CARD: 1049

NIOSH Pocket Guide to Chemical Hazards

Triethylamine	**CAS** 121-44-8
$(C_2H_5)_3N$	**RTECS** YEO175000
Synonyms & Trade Names TEA	**DOT ID & Guide** 1296 132

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 25 ppm (100 mg/m^3)
IDLH 200 ppm See: 121448	**Conversion** 1 ppm = 4.14 mg/m^3

Physical Description
Colorless liquid with a strong, ammonia-like odor.

MW: 101.2	BP: 193°F	FRZ: -175°F	Sol: 2%
VP: 54 mmHg	IP: 7.50 eV		Sp.Gr: 0.73
Fl.P: 20°F	UEL: 8.0%	LEL: 1.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids, chlorine, hypochlorite, halogenated compounds

Measurement Methods
NIOSH S152 (II-3); OSHA PV2060
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash (>1%), Quick drench (>1%)

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations OSHA
Up to 200 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; in animals: myocardial, kidney, liver damage

Target Organs Eyes, skin, respiratory system, cardiovascular system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0203

NIOSH Pocket Guide to Chemical Hazards

Trimethyl phosphite	**CAS** 121-45-9
$(CH_3O)_3P$	**RTECS** TH1400000
Synonyms & Trade Names Methyl phosphite, Trimethoxyphosphine, Trimethyl ester of phosphorous acid	**DOT ID & Guide** 2329 129

Exposure Limits	NIOSH REL: TWA 2 ppm (10 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.08 mg/m^3

Physical Description
Colorless liquid with a distinctive, pungent odor.

MW: 124.1	BP: 232°F	FRZ: -108°F	Sol: Reacts
VP(77°F): 24 mmHg	IP: ?		Sp.Gr: 1.05
Fl.P: 82°F	UEL: ?	LEL: ?	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Magnesium perchlorate, water [Note: Reacts (hydrolyzes) with water.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, upper respiratory system; dermatitis; in animals: teratogenic effects
Target Organs Eyes, skin, respiratory system, reproductive system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

N,N-Dimethylaniline	**CAS** 121-69-7
$C_6H_5N(CH_3)_2$	**RTECS** BX4725000
Synonyms & Trade Names N,N-Dimethylbenzeneamine; N,N-Dimethylphenylamine [Note: Also known as Dimethylaniline which is a correct synonym for Xylidine.]	**DOT ID & Guide** 2253 153

Exposure Limits	NIOSH REL: TWA 5 ppm (25 mg/m^3) ST 10 ppm (50 mg/m^3) [skin]
	OSHA PEL†: TWA 5 ppm (25 mg/m^3) [skin]
IDLH 100 ppm See: 121697	**Conversion** 1 ppm = 4.96 mg/m^3

Physical Description
Pale yellow, oily liquid with an amine-like odor. [Note: A solid below 36°F.]

MW: 121.2	BP: 378°F	FRZ: 36°F	Sol: 2%
VP: 1 mmHg	IP: 7.14 eV		Sp.Gr: 0.96
Fl.P: 142°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids, benzoyl peroxide

Measurement Methods
NIOSH 2002; OSHA PV2064
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 50 ppm: (APF = 10) Any supplied-air respirator
Up to 100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Anoxia symptoms: cyanosis, lassitude (weakness, exhaustion), dizziness, ataxia; methemoglobinemia

Target Organs Blood, kidneys, liver, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0877 See MEDICAL TESTS: 0085

NIOSH Pocket Guide to Chemical Hazards

Malathion	**CAS** 121-75-5
$C_{10}H_{19}O_6PS_2$	**RTECS** WM8400000
Synonyms & Trade Names S-[1,2-bis(ethoxycarbonyl) ethyl]O,O-dimethyl-phosphorodithioate; Diethyl (dimethoxyphosphinothioylthio) succinate	**DOT ID & Guide** 2783 152

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 [skin]
	OSHA PEL†: TWA 15 mg/m^3 [skin]
IDLH 250 mg/m^3 See: 121755	**Conversion**

Physical Description
Deep-brown to yellow liquid with a garlic-like odor. [insecticide] [Note: A solid below 37°F.]

MW: 330.4	BP: 140°F (Decomposes)	FRZ: 37°F	Sol: 0.02%
VP: 0.00004 mmHg	IP: ?		Sp.Gr: 1.21
Fl.P(oc): >325°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid, but may be difficult to ignite.

Incompatibilities & Reactivities
Strong oxidizers, magnesium, alkaline pesticides [Note: Corrosive to metals.]

Measurement Methods
NIOSH 5600; OSHA 62
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 100 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 10) Any supplied-air respirator

Up to 250 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; miosis, aching eyes, blurred vision, lacrimation (discharge of tears); salivation; anorexia, nausea, vomiting, abdominal cramps, diarrhea, dizziness, confusion, ataxia; rhinorrhea (discharge of thin mucus), headache; chest tightness, wheezing, laryngeal spasm

Target Organs Eyes, skin, respiratory system, liver, blood cholinesterase, central nervous system, cardiovascular system, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 0172 See MEDICAL TESTS: 0130

NIOSH Pocket Guide to Chemical Hazards

Cyclonite	**CAS** 121-82-4
$C_3H_6N_6O_6$	**RTECS** XY9450000
Synonyms & Trade Names Cyclotrimethylenetrinitramine; Hexahydro-1,3,5-trinitro-s-triazine; RDX; Trimethylenetrinitramine; 1,3,5-Trinitro-1,3,5-triazacyclohexane	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1.5 mg/m^3 ST 3 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, crystalline powder. [Note: A powerful high explosive.]

MW: 222.2	BP: ?	MLT: 401°F	Sol: Insoluble
VP(230°F): 0.0004 mmHg	IP: ?		Sp.Gr: 1.82
Fl.P: Explodes	UEL: ?	LEL: ?	

Combustible Solid [EXPLOSIVE!]

Incompatibilities & Reactivities
Strong oxidizers, combustible materials, heat [Note: Detonates on contact with mercury fulminate.]

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin; headache, irritability, lassitude (weakness, exhaustion), tremor, nausea, dizziness, vomiting, insomnia, convulsions	
Target Organs Eyes, skin, central nervous system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Diphenylamine	**CAS** 122-39-4
$(C_6H_5)_2NH$	**RTECS** JJ7800000
Synonyms & Trade Names Anilinobenzene, DPA, Phenylaniline, N-Phenylaniline, N-Phenylbenzenamine [Note: The carcinogen 4-Aminodiphenyl may be present as an impurity in the commercial product.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless, tan, amber, or brown crystalline solid with a pleasant, floral odor. [fungicide]

MW: 169.2	BP: 576°F	MLT: 127°F	Sol: 0.03%
VP(227°F): 1 mmHg	IP: 7.40 eV		Sp.Gr: 1.16
Fl.P: 307°F	UEL: ?	LEL: ?	

Combustible Solid; explosive if a cloud of dust is exposed to a source of ignition.

Incompatibilities & Reactivities
Oxidizers, hexachloromelamine, trichloromelamine

Measurement Methods
OSHA 22, 78
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; eczema; tachycardia, hypertension; cough, sneezing; methemoglobinemia; increased blood pressure, heart rate; proteinuria, hematuria (blood in the urine), bladder injury; in animals: teratogenic effects

Target Organs Eyes, skin, respiratory system, cardiovascular system, blood, bladder, reproductive system

See also: INTRODUCTION See ICSC CARD: 0466

NIOSH Pocket Guide to Chemical Hazards

Phenyl glycidyl ether	**CAS** 122-60-1
$C_9H_{10}O_2$	**RTECS** TZ3675000
Synonyms & Trade Names 1,2-Epoxy-3-phenoxy propane; Glycidyl phenyl ether; PGE; Phenyl 2,3-epoxypropyl ether	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca C 1 ppm (6 mg/m^3) [15-minute] See Appendix A
	OSHA PEL†: TWA 10 ppm (60 mg/m^3)
IDLH Ca [100 ppm] See: 122601	**Conversion** 1 ppm = 6.14 mg/m^3

Physical Description
Colorless liquid. [Note: A solid below 38°F.]

MW: 150.1	BP: 473°F	FRZ: 38°F	Sol: 0.2%
VP: 0.01 mmHg	IP: ?		Sp.Gr: 1.11
Fl.P: 248°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, amines, strong acids, strong bases

Measurement Methods
NIOSH 1619; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; upper respiratory system; skin sensitization; narcosis; possible hematopoietic, reproductive effects; [potential occupational carcinogen]

Target Organs Eyes, skin, central nervous system, hematopoietic system, reproductive system

Cancer Site [in animals: nasal cancer]

See also: INTRODUCTION See ICSC CARD: 0188 See MEDICAL TESTS: 0183

NIOSH Pocket Guide to Chemical Hazards

Dipropyl ketone	**CAS** 123-19-3
$(CH_3CH_2CH_2)_2CO$	**RTECS** MJ5600000
Synonyms & Trade Names Butyrone, DPK, 4-Heptanone, Heptan-4-one, Propyl ketone	**DOT ID & Guide** 2710 127

Exposure Limits	NIOSH REL: TWA 50 ppm (235 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.67 mg/m^3

Physical Description
Colorless liquid with a pleasant odor.

MW: 114.2	BP: 291°F	FRZ: -27°F	Sol: Insoluble
VP: 5 mmHg	IP: 9.10 eV		Sp.Gr: 0.82
Fl.P: 120°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion,skin and/or eye contact
Symptoms Irritation eyes, skin; central nervous system depression, dizziness, drowsiness, decreased breathing; in animals: liver injury; narcosis
Target Organs Eyes, skin, central nervous system, liver

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Hydroquinone	**CAS** 123-31-9
$C_6H_4(OH)_2$	**RTECS** MX3500000
Synonyms & Trade Names p-Benzenediol; 1,4-Benzenediol; Dihydroxybenzene; 1,4-Dihydroxybenzene; Quinol	**DOT ID & Guide** 2662 153

Exposure Limits	NIOSH REL: C 2 mg/m^3 [15-minute]
	OSHA PEL: TWA 2 mg/m^3
IDLH 50 mg/m^3 See: 123319	**Conversion**

Physical Description
Light-tan, light-gray, or colorless crystals.

MW: 110.1	BP: 545°F	MLT: 338°F	Sol: 7%
VP: 0.00001 mmHg	IP: 7.95 eV		Sp.Gr: 1.33
Fl.P: 329°F (Molten)	UEL: ?	LEL: ?	

Combustible Solid; dust cloud may explode if ignited in an enclosed area.

Incompatibilities & Reactivities
Strong oxidizers, alkalis

Measurement Methods
NIOSH 5004
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash (>7%)	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m^3: (APF = 25) Any powered, air-purifying respirator with a dust filter£/(APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes: conjunctivitis; keratitis (inflammation of the cornea); central nervous system excitement; colored urine, nausea, dizziness, suffocation, rapid breathing; muscle twitching, delirium; collapse; skin irritation, sensitization, dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0166 See MEDICAL TESTS: 0120

NIOSH Pocket Guide to Chemical Hazards

Diacetone alcohol	**CAS** 123-42-2
$CH_3COCH_2C(CH_3)_2OH$	**RTECS** SA9100000
Synonyms & Trade Names Diacetone, 4-Hydroxy-4-methyl-2-pentanone, 2-Methyl-2-pentanol-4-one	**DOT ID & Guide** 1148 129

Exposure Limits	NIOSH REL: TWA 50 ppm (240 mg/m^3)
	OSHA PEL: TWA 50 ppm (240 mg/m^3)
IDLH 1800 ppm [10%LEL] See: 123422	**Conversion** 1 ppm = 4.75 mg/m^3

Physical Description
Colorless liquid with a faint, minty odor.

MW: 116.2	BP: 334°F	FRZ: -47°F	Sol: Miscible
VP: 1 mmHg	IP: ?		Sp.Gr: 0.94
Fl.P: 125°F	UEL: 6.9%	LEL: 1.8%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers, strong alkalis

Measurement Methods
NIOSH 1402; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£
Up to 1800 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; corneal damage; in animals: narcosis, liver damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver

See also: INTRODUCTION See MEDICAL TESTS: 0067

NIOSH Pocket Guide to Chemical Hazards

Isoamyl alcohol (primary)	**CAS** 123-51-3
$(CH_3)_2CHCH_2CH_2OH$	**RTECS** EL5425000
Synonyms & Trade Names Fermentation amyl alcohol, Fusel oil, Isobutyl carbinol, Isopentyl alcohol, 3-Methyl-1-butanol, Primary isoamyl alcohol	**DOT ID & Guide** 1105 129

Exposure Limits	NIOSH REL: TWA 100 ppm (360 mg/m^3) ST 125 ppm (450 mg/m^3)
	OSHA PEL†: TWA 100 ppm (360 mg/m^3)
IDLH 500 ppm See: 123513	**Conversion** 1 ppm = 3.61 mg/m^3

Physical Description
Colorless liquid with a disagreeable odor.

MW: 88.2	BP: 270°F	FRZ: -179°F	Sol(57°F): 2%
VP: 28 mmHg	IP: ?		Sp.Gr(57°F): 0.81
Fl.P: 109°F	UEL(212°F): 9.0%	LEL: 1.2%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1402
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£]/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)[£]/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache, dizziness; cough, dyspnea (breathing difficulty), nausea, vomiting, diarrhea; skin cracking; in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0798

NIOSH Pocket Guide to Chemical Hazards

n-Butyl acetate	**CAS** 123-86-4
$CH_3COO[CH_2]_3CH_3$	**RTECS** AF7350000
Synonyms & Trade Names Butyl acetate, n-Butyl ester of acetic acid, Butyl ethanoate	**DOT ID & Guide** 1123 129

Exposure Limits	NIOSH REL: TWA 150 ppm (710 mg/m^3) ST 200 ppm (950 mg/m^3)
	OSHA PEL†: TWA 150 ppm (710 mg/m^3)
IDLH 1700 ppm [10%LEL] See: 123864	**Conversion** 1 ppm = 4.75 mg/m^3

Physical Description
Colorless liquid with a fruity odor.

MW: 116.2	BP: 258°F	FRZ: -107°F	Sol: 1%
VP: 10 mmHg	IP: 10.00 eV		Sp.Gr: 0.88
Fl.P: 72°F	UEL: 7.6%	LEL: 1.7%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1450; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 1700 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; headache, drowsiness, narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0399

NIOSH Pocket Guide to Chemical Hazards

Dioxane	**CAS** 123-91-1
$C_4H_8O_2$	**RTECS** JG8225000
Synonyms & Trade Names Diethylene dioxide; Diethylene ether; Dioxan; p-Dioxane; 1,4-Dioxane	**DOT ID & Guide** 1165 127

Exposure Limits	NIOSH REL: Ca C 1 ppm (3.6 mg/m^3) [30-minute] See Appendix A
	OSHA PEL†: TWA 100 ppm (360 mg/m^3) [skin]
IDLH Ca [500 ppm] See: 123911	**Conversion** 1 ppm = 3.60 mg/m^3

Physical Description
Colorless liquid or solid (below 53°F) with a mild, ether-like odor.

MW: 88.1	BP: 214°F	FRZ: 53°F	Sol: Miscible
VP: 29 mmHg	IP: 9.13 eV		Sp.Gr: 1.03
Fl.P: 55°F	UEL: 22%	LEL: 2.0%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, decaborane, triethynyl aluminum

Measurement Methods
NIOSH 1602; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; drowsiness, headache; nausea, vomiting; liver damage; kidney failure; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys

Cancer Site [in animals: lung, liver & nasal cavity tumors]

See also: INTRODUCTION See ICSC CARD: 0041 See MEDICAL TESTS: 0090

NIOSH Pocket Guide to Chemical Hazards

Isoamyl acetate	**CAS** 123-92-2
$CH_3COOCH_2CH_2CH(CH_3)_2$	**RTECS** NS9800000
Synonyms & Trade Names Banana oil, Isopentyl acetate, 3-Methyl-1-butanol acetate, 3-Methylbutyl ester of acetic acid, 3-Methylbutyl ethanoate	**DOT ID & Guide** 1104 129

Exposure Limits	NIOSH REL: TWA 100 ppm (525 mg/m^3)
	OSHA PEL: TWA 100 ppm (525 mg/m^3)
IDLH 1000 ppm See: 123922	**Conversion** 1 ppm = 5.33 mg/m^3

Physical Description
Colorless liquid with a banana-like odor.

MW: 130.2	BP: 288°F	FRZ: -109°F	Sol: 0.3%
VP: 4 mmHg	IP: ?		Sp.Gr: 0.87
Fl.P: 77°F	UEL: 7.5%	LEL(212°F): 1.0%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1450; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1000 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dermatitis; in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0356

NIOSH Pocket Guide to Chemical Hazards

Carbon dioxide	**CAS** 124-38-9
CO_2	**RTECS** FF6400000
Synonyms & Trade Names Carbonic acid gas, Dry ice [Note: Normal constituent of air (about 300 ppm)].	**DOT ID & Guide** 1013 120 1845 120 (dry ice) 2187 120 (liquid)

Exposure Limits	NIOSH REL: TWA 5000 ppm (9000 mg/m^3) ST 30,000 ppm (54,000 mg/m^3)
	OSHA PEL†: TWA 5000 ppm (9000 mg/m^3)
IDLH 40,000 ppm See: 124389	**Conversion** 1 ppm = 1.80 mg/m^3

Physical Description
Colorless, odorless gas. [Note: Shipped as a liquefied compressed gas. Solid form is utilized as dry ice.]

MW: 44.0	BP: Sublimes	MLT: -109°F (Sublimes)	Sol(77°F): 0.2%
VP: 56.5 atm	IP: 13.77 eV	RGasD: 1.53	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Dusts of various metals, such as magnesium, zirconium, titanium, aluminum, chromium & manganese are ignitable and explosive when suspended in carbon dioxide. Forms carbonic acid in water.

Measurement Methods
NIOSH 6603; OSHA ID172
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 40,000 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid/solid)

Symptoms Headache, dizziness, restlessness, paresthesia; dyspnea (breathing difficulty); sweating, malaise (vague feeling of discomfort); increased heart rate, cardiac output, blood pressure; coma; asphyxia; convulsions; frostbite (liquid, dry ice)

Target Organs respiratory system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0021

NIOSH Pocket Guide to Chemical Hazards

Dimethylamine	**CAS** 124-40-3
$(CH_3)_2NH$	**RTECS** IP8750000
Synonyms & Trade Names Dimethylamine (anhydrous), N-Methylmethanamine	**DOT ID & Guide** 1032 118 (anhydrous) 1160 129 (solution)

Exposure Limits	NIOSH REL: TWA 10 ppm (18 mg/m^3)
	OSHA PEL: TWA 10 ppm (18 mg/m^3)
IDLH 500 ppm See: 124403	**Conversion** 1 ppm = 1.85 mg/m^3

Physical Description
Colorless gas with an ammonia- or fish-like odor. [Note: A liquid below 44°F. Shipped as a liquefied compressed gas.]

MW: 45.1	BP: 44°F	FRZ: -134°F	Sol(140°F): 24%
VP: 1.7 atm	IP: 8.24 eV	RGasD: 1.56	Sp.Gr: 0.67 (Liquid at 44°F)
Fl.P: NA (Gas) 20°F (Liquid)	UEL: 14.4%	LEL: 2.8%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Strong oxidizers, chlorine, mercury, acraldehyde, fluorides, maleic anhydride, aluminum, brass, copper, zinc

Measurement Methods
NIOSH 2010; OSHA 34
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact (liquid)/Frostbite Eyes: Prevent eye contact (liquid)/Frostbite Wash skin: When contaminated (liquid) Remove: When wet (flammable) Change: No recommendation Provide: Eyewash (liquid), Quick drench (liquid), Frostbite	Eye: Irrigate immediately (liquid)/Frostbite Skin: Water flush immediately (liquid)/Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£
Up to 500 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Irritation nose, throat; sneezing, cough, dyspnea (breathing difficulty); pulmonary edema; conjunctivitis; dermatitis; liquid: frostbite

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0260

NIOSH Pocket Guide to Chemical Hazards

Tributyl phosphate	**CAS** 126-73-8
$(CH_3[CH_2]_3O)_3PO$	**RTECS** TC7700000
Synonyms & Trade Names Butyl phosphate, TBP, Tributyl ester of phosphoric acid, Tri-n-butyl phosphate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.2 ppm (2.5 mg/m^3)
	OSHA PEL†: TWA 5 mg/m^3
IDLH 30 ppm See: 126738	**Conversion** 1 ppm = 10.89 mg/m^3

Physical Description
Colorless to pale-yellow, odorless liquid.

MW: 266.3	BP: 552°F (Decomposes)	FRZ: -112°F	Sol: 0.6%
VP(77°F): 0.004 mmHg	IP: ?		Sp.Gr: 0.98
Fl.P(oc): 295°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Alkalis, oxidizers, water, moist air

Measurement Methods
NIOSH 5034
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 2 ppm: (APF = 10) Any supplied-air respirator
Up to 5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 10 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 30 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system, headache; nausea

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0584

NIOSH Pocket Guide to Chemical Hazards

Methylacrylonitrile	**CAS** 126-98-7
CH_2=C(CH_3)CN	**RTECS** UD1400000
Synonyms & Trade Names 2-Cyanopropene-1, 2-Cyano-1-propene, Isoprene cyanide, Isopropenylnitrile, Methacrylonitrile, alpha-Methylacrylonitrile, 2-Methylpropenenitrile	**DOT ID & Guide** 3079 131P (inhibited)

Exposure Limits	NIOSH REL: TWA 1 ppm (3 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.74 mg/m^3

Physical Description
Colorless liquid with an odor like bitter almonds.

MW: 67.1	BP: 195°F	FRZ: -32°F	Sol: 3%
VP(77°F): 71 mmHg	IP: ?		Sp.Gr: 0.80
Fl.P: 34°F	UEL: 6.8%	LEL: 2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong acids, strong oxidizers, alkali, light [Note: Polymerization may occur due to elevated temperature, visible light, or contact with a concentrated alkali.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin; lacrimation (discharge of tears); in animals: convulsions, loss of motor control in hind limbs	
Target Organs Eyes, skin, central nervous system	

See also: INTRODUCTION See ICSC CARD: 0652

NIOSH Pocket Guide to Chemical Hazards

beta-Chloroprene	**CAS** 126-99-8
CH_2=CClCH=CH_2	**RTECS** EI9625000
Synonyms & Trade Names 2-Chloro-1,3-butadiene; Chlorobutadiene; Chloroprene	**DOT ID & Guide** 1991 131P (inhibited)

Exposure Limits	NIOSH REL: Ca C 1 ppm (3.6 mg/m^3) [15-minute] See Appendix A
	OSHA PEL†: TWA 25 ppm (90 mg/m^3) [skin]
IDLH Ca [300 ppm] See: 126998	**Conversion** 1 ppm = 3.62 mg/m^3

Physical Description
Colorless liquid with a pungent, ether-like odor.

MW: 88.5	BP: 139°F	FRZ: -153°F	Sol: Slight
VP: 188 mmHg	IP: 8.79 eV		Sp.Gr: 0.96
Fl.P: -4°F	UEL: 11.3%	LEL: 1.9%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Peroxides & other oxidizers [Note: Polymerizes at room temperature unless inhibited with antioxidants.]

Measurement Methods
NIOSH 1002; OSHA 112
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; anxiety, irritability; dermatitis; alopecia; reproductive effects; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, reproductive system

Cancer Site [lung & skin cancer]

See also: INTRODUCTION See ICSC CARD: 0133 See MEDICAL TESTS: 0050

NIOSH Pocket Guide to Chemical Hazards

Tetrachloroethylene	**CAS** 127-18-4
$Cl_2C=CCl_2$	**RTECS** KX3850000
Synonyms & Trade Names Perchlorethylene, Perchloroethylene, Perk, Tetrachlorethylene	**DOT ID & Guide** 1897 160

Exposure Limits	NIOSH REL: Ca Minimize workplace exposure concentrations. See Appendix A
	OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours)
IDLH Ca [150 ppm] See: 127184	**Conversion** 1 ppm = 6.78 mg/m^3

Physical Description
Colorless liquid with a mild, chloroform-like odor.

MW: 165.8	BP: 250°F	FRZ: -2°F	Sol: 0.02%
VP: 14 mmHg	IP: 9.32 eV		Sp.Gr: 1.62
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene.

Incompatibilities & Reactivities
Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash

Measurement Methods
NIOSH 1003; OSHA 1001
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys, central nervous system

Cancer Site [in animals: liver tumors]

See also: INTRODUCTION See ICSC CARD: 0076 See MEDICAL TESTS: 0179

NIOSH Pocket Guide to Chemical Hazards

Dimethyl acetamide	**CAS** 127-19-5
$CH_3CON(CH_3)_2$	**RTECS** AB7700000
Synonyms & Trade Names N,N-Dimethyl acetamide; DMAC	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 ppm (35 mg/m^3) [skin]
	OSHA PEL: TWA 10 ppm (35 mg/m^3) [skin]
IDLH 300 ppm See: 127195	**Conversion** 1 ppm = 3.56 mg/m^3

Physical Description
Colorless liquid with a weak, ammonia- or fish-like odor.

MW: 87.1	BP: 329°F	FRZ: -4°F	Sol: Miscible
VP: 2 mmHg	IP: 8.81 eV		Sp.Gr: 0.94
Fl.P(oc): 158°F	UEL(320°F): 11.5%	LEL(212°F): 1.8%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Carbon tetrachloride, other halogenated compounds when in contact with iron, oxidizers

Measurement Methods
NIOSH 2004
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 100 ppm: (APF = 10) Any supplied-air respirator
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 300 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation skin; jaundice, liver damage; depression, drowsiness, hallucinations, delusions

Target Organs Skin, liver, central nervous system

See also: INTRODUCTION See ICSC CARD: 0259 See MEDICAL TESTS: 0080

NIOSH Pocket Guide to Chemical Hazards

2,6-Di-tert-butyl-p-cresol	**CAS** 128-37-0
$[C(CH_3)_3]_2CH_3C_6H_2OH$	**RTECS** GO7875000
Synonyms & Trade Names BHT; Butylated hydroxytoluene; Dibutylated hydroxytoluene; 4-Methyl-2,6-di-tert-butyl phenol	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White to pale-yellow, crystalline solid with a slight, phenolic odor. [food preservative]

MW: 220.4	BP: 509°F	MLT: 158°F	Sol: 0.00004%
VP: 0.01 mmHg	IP: ?		Sp.Gr: 1.05
Fl.P: 261°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
NIOSH P&CAM226 (II-1)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin; in animals: decreased growth rate, increased liver weight
Target Organs Eyes, skin

See also: INTRODUCTION See ICSC CARD: 0841

NIOSH Pocket Guide to Chemical Hazards

Dimethylphthalate	**CAS** 131-11-3
$C_6H_4(COOCH_3)_2$	**RTECS** TI1575000
Synonyms & Trade Names Dimethyl ester of 1,2-benzenedicarboxylic acid; DMP	**DOT ID & Guide** 9188 171 (hazardous substance, n.o.s.)

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL: TWA 5 mg/m^3
IDLH 2000 mg/m^3 See: 131113	**Conversion**

Physical Description
Colorless, oily liquid with a slight, aromatic odor. [Note: A solid below 42°F.]

MW: 194.2	BP: 543°F	FRZ: 42°F	Sol: 0.4%
VP: 0.01 mmHg	IP: 9.64 eV		Sp.Gr: 1.19
Fl.P: 295°F	UEL: ?	LEL(358°F): 0.9%	

Class IIIB Combustible Liquid; however, ignition is difficult.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
OSHA 104
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate promptly Skin: Wash regularly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 50 mg/m^3: (APF = 10) Any dust and mist respirator with a full facepiece
Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter£
Up to 250 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 2000 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, upper respiratory system; stomach pain

Target Organs Eyes, respiratory system, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 0261 See MEDICAL TESTS: 0086

NIOSH Pocket Guide to Chemical Hazards

Captan	**CAS** 133-06-2
$C_9H_8Cl_3NO_2S$	**RTECS** GW5075000
Synonyms & Trade Names Captane; N-Trichloromethylmercapto-4-cyclohexene-1,2-dicarboximide	**DOT ID & Guide** 9188 171

Exposure Limits	NIOSH REL: Ca TWA 5 mg/m^3 See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Odorless, white, crystalline powder. [fungicide] [Note: Commercial product is a yellow powder with a pungent odor.]

MW: 300.6	BP: Decomposes	MLT: 352°F (Decomposes)	Sol(77°F): 0.0003%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.74
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid; may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Strong alkaline materials (e.g., hydrated lime) [Note: Corrosive to metals.]

Measurement Methods
NIOSH 5601
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; blurred vision; dermatitis, skin sensitization; dyspnea (breathing difficulty); diarrhea, vomiting; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, gastrointestinal tract, liver, kidneys

Cancer Site [in animals: duodenal tumors]

See also: INTRODUCTION See ICSC CARD: 0120

NIOSH Pocket Guide to Chemical Hazards

alpha-Naphthylamine	**CAS** 134-32-7
$C_{10}H_7NH_2$	**RTECS** QM1400000
Synonyms & Trade Names 1-Aminonaphthalene, 1-Naphthylamine	**DOT ID & Guide** 2077 153

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1004] See Appendix B
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Colorless crystals with an ammonia-like odor. [Note: Darkens in air to a reddish-purple color.]

MW: 143.2	BP: 573°F	MLT: 122°F	Sol: 0.002%
VP(220°F): 1 mmHg	IP: 7.30 eV		Sp.Gr: 1.12
Fl.P: 315°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Oxidizes in air

Measurement Methods
NIOSH 5518; OSHA 93
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Dermatitis; hemorrhagic cystitis; dyspnea (breathing difficulty), ataxia, methemoglobinemia; hematuria (blood in the urine); dysuria; [potential occupational carcinogen]

Target Organs Bladder, skin

Cancer Site [bladder cancer]

See also: INTRODUCTION See ICSC CARD: 0518 See MEDICAL TESTS: 0153

NIOSH Pocket Guide to Chemical Hazards

N-Phenyl-beta-naphthylamine	**CAS** 135-88-6
$C_{10}H_7NHC_6H_5$	**RTECS** QM4550000
Synonyms & Trade Names 2-Anilinonaphthalene, beta-Naphthylphenylamine, PBNA, 2-Phenylaminonaphthalene, Phenyl-beta-naphthylamine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca* See Appendix A [*Note: Since metabolized to beta-Naphthylamine.]
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
White to yellow crystals or gray to tan flakes or powder. [Note: Commercial product may contain 20-30 ppm of beta-Naphthylamine.]

MW: 219.3	BP: 743°F	MLT: 226°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 1.24
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
OSHA 96
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation; leucoplakia; acne, hypersensitivity to sunlight; [potential occupational carcinogen]

Target Organs Eyes, skin, bladder

Cancer Site [bladder cancer]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Crag® herbicide	**CAS** 136-78-7
$C_6H_3Cl_2OCH_2CH_2OSO_3Na$	**RTECS** KK4900000
Synonyms & Trade Names Crag® herbicide No. 1; 2-(2,4-Dichlorophenoxy)ethyl sodium sulfate; Sesone	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH 500 mg/m^3 See: 136787	**Conversion**

Physical Description
Colorless to white crystalline, odorless solid. [herbicide]

MW: 309.1	BP: Decomposes	MLT: 473°F (Decomposes)	Sol(77°F): 26%
VP: 0.1 mmHg	IP: ?		Sp.Gr: 1.70
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers, acids

Measurement Methods
NIOSH S356 (II-5)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Water wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 50 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 100 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 250 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 500 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; liver, kidney damage; in animals: central nervous system effects, convulsions

Target Organs Eyes, skin, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 1142

NIOSH Pocket Guide to Chemical Hazards

Methyl-2-cyanoacrylate	**CAS** 137-05-3
CH_2=C(CN)$COOCH_3$	**RTECS** AS7000000
Synonyms & Trade Names Mecrylate, Methyl cyanoacrylate, Methyl alpha-cyanoacrylate, Methyl ester of 2-cyanoacrylic acid	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2 ppm (8 mg/m^3) ST 4 ppm (16 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.54 mg/m^3

Physical Description
Colorless liquid with a characteristic odor.

MW: 111.1	BP: ?	FRZ: ?	Sol: 30%
VP(77°F): 0.2 mmHg	IP: ?		Sp.Gr(81°F): 1.10
Fl.P: 174°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Moisture [Note: Contact with moisture causes rapid polymerization.]

Measurement Methods
OSHA 55
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: No recommendation Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, nose; blurred vision, lacrimation (discharge of tears); rhinitis
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 1272

NIOSH Pocket Guide to Chemical Hazards

Thiram	**CAS** 137-26-8
$C_6H_{12}N_2S_4$	**RTECS** JO1400000
Synonyms & Trade Names bis(Dimethylthiocarbamoyl) disulfide, Tetramethylthiuram disulfide	**DOT ID & Guide** 2771 151

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL: TWA 5 mg/m^3
IDLH 100 mg/m^3 See: 137268	**Conversion**

Physical Description
Colorless to yellow, crystalline solid with a characteristic odor. [Note: Commercial pesticide products may be dyed blue.]

MW: 240.4	BP: Decomposes	MLT: 312°F	Sol: 0.003%
VP: 0.000008 mmHg	IP: ?		Sp.Gr: 1.29
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, strong acids, oxidizable materials

Measurement Methods
NIOSH 5005
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter*/(APF = 10) Any supplied-air respirator*

Up to 100 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; dermatitis; Antabuse-like effects

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0757

NIOSH Pocket Guide to Chemical Hazards

n-Butyl lactate	**CAS** 138-22-7
$CH_3CH(OH)COOC_4H_9$	**RTECS** OD4025000
Synonyms & Trade Names Butyl ester of 2-hydroxypropanoic acid, Butyl ester of lactic acid, Butyl lactate	**DOT ID & Guide** 1993 128 (combustible liquid, n.o.s.)

Exposure Limits	NIOSH REL: TWA 5 ppm (25 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.98 mg/m^3

Physical Description
Clear, colorless to white liquid with a mild, transient odor.

MW: 146.2	BP: 370°F	FRZ: -45°F	Sol: Slight
VP: 0.4 mmHg	IP: ?		Sp.Gr: 0.98
Fl.P: 160°F	UEL: ?	LEL: 1.15%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong acids & bases, strong oxidizers, heat, sparks, open flames

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, nose, throat; drowsiness, headache, central nervous system depression; nausea, vomiting	
Target Organs Eyes, skin, respiratory system, central nervous system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Ethyl acrylate	**CAS** 140-88-5
CH_2=CHCOOC_2H_5	**RTECS** AT0700000
Synonyms & Trade Names Ethyl acrylate (inhibited), Ethyl ester of acrylic acid, Ethyl propenoate	**DOT ID & Guide** 1917 129P (inhibited)

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: TWA 25 ppm (100 mg/m^3) [skin]
IDLH Ca [300 ppm] See: 140885	**Conversion** 1 ppm = 4.09 mg/m^3

Physical Description
Colorless liquid with an acrid odor.

MW: 100.1	BP: 211°F	FRZ: -96°F	Sol: 2%
VP: 29 mmHg	IP: 10.30 eV		Sp.Gr: 0.92
Fl.P: 48°F	UEL: 14%	LEL: 1.4%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers, peroxides, polymerizers, strong alkalis, moisture, chlorosulfonic acid [Note: Polymerizes readily unless an inhibitor such as hydroquinone is added.]

Measurement Methods
NIOSH 1450; OSHA 92
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system

Cancer Site [in animals: tumors of the forestomach]

See also: INTRODUCTION See ICSC CARD: 0267

NIOSH Pocket Guide to Chemical Hazards

Butyl acrylate	**CAS** 141-32-2
CH_2=CHCOOC_4H_9	**RTECS** UD3150000
Synonyms & Trade Names n-Butyl acrylate, Butyl ester of acrylic acid, Butyl 2-propenoate	**DOT ID & Guide** 2348 129P

Exposure Limits	NIOSH REL: TWA 10 ppm (55 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.24 mg/m^3

Physical Description
Clear, colorless liquid with a strong, fruity odor. [Note: Highly reactive; may contain an inhibitor to prevent spontaneous polymerization.]

MW: 128.2	BP: 293°F	FRZ: -83°F	Sol: 0.1%
VP: 4 mmHg	IP: ?		Sp.Gr: 0.89
Fl.P: 103°F	UEL: 9.9%	LEL: 1.5%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong acids & alkalis, amines, halogens, hydrogen compounds, oxidizers, heat, flame, sunlight [Note: Polymerizes readily on heating.]

Measurement Methods
OSHA PV2011
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; sensitization dermatitis; dyspnea (breathing difficulty)	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0400

NIOSH Pocket Guide to Chemical Hazards

Ethanolamine	**CAS** 141-43-5
$NH_2CH_2CH_2OH$	**RTECS** KJ5775000
Synonyms & Trade Names 2-Aminoethanol, beta-Aminoethyl alcohol, Ethylolamine, 2-Hydroxyethylamine, Monoethanolamine	**DOT ID & Guide** 2491 153

Exposure Limits	NIOSH REL: TWA 3 ppm (8 mg/m^3) ST 6 ppm (15 mg/m^3)
	OSHA PEL†: TWA 3 ppm (6 mg/m^3)
IDLH 30 ppm See: 141435	**Conversion** 1 ppm = 2.50 mg/m^3

Physical Description
Colorless, viscous liquid or solid (below 51°F) with an unpleasant, ammonia-like odor.

MW: 61.1	BP: 339°F	FRZ: 51°F	Sol: Miscible
VP: 0.4 mmHg	IP: 8.96 eV		Sp.Gr: 1.02
Fl.P: 186°F	UEL: 23.5%	LEL(284°F): 3.0%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids, iron [Note: May attack copper, brass, and rubber.]

Measurement Methods
NIOSH 2007
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 30 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; drowsiness

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0152

NIOSH Pocket Guide to Chemical Hazards

Dicrotophos	**CAS** 141-66-2
$C_8H_{16}NO_5P$	**RTECS** TC3850000
Synonyms & Trade Names Bidrin®, Carbicron®, 2-Dimethyl cis-2-dimethylcarbamoyl-1-methylvinylphosphate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.25 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 9.70 mg/m^3

Physical Description
Yellow-brown liquid with a mild, ester odor. [insecticide]

MW: 237.2	BP: 752°F	FRZ: ?	Sol: Miscible
VP: 0.0001 mmHg	IP: ?		Sp.Gr(59°F): 1.22
Fl.P: >200°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Metals [Note: Corrosive to cast iron, mild steel, brass & stainless steel.]

Measurement Methods
NIOSH 5600
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Headache, nausea, dizziness, anxiety, restlessness, muscle twitching, lassitude (weakness, exhaustion), tremor, incoordination, vomiting, abdominal cramps, diarrhea; salivation, sweating, lacrimation (discharge of tears), rhinitis; anorexia, malaise (vague feeling of discomfort)
Target Organs central nervous system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0872

NIOSH Pocket Guide to Chemical Hazards

Ethyl acetate	**CAS** 141-78-6
$CH_3COOC_2H_5$	**RTECS** AH5425000
Synonyms & Trade Names Acetic ester, Acetic ether, Ethyl ester of acetic acid, Ethyl ethanoate	**DOT ID & Guide** 1173 129

Exposure Limits	NIOSH REL: TWA 400 ppm (1400 mg/m^3)
	OSHA PEL: TWA 400 ppm (1400 mg/m^3)
IDLH 2000 ppm [10%LEL] See: 141786	**Conversion** 1 ppm = 3.60 mg/m^3

Physical Description
Colorless liquid with an ether-like, fruity odor.

MW: 88.1	BP: 171°F	FRZ: -117°F	Sol(77°F): 10%
VP: 73 mmHg	IP: 10.01 eV		Sp.Gr: 0.90
Fl.P: 24°F	UEL: 11.5%	LEL: 2.0%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1457; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; narcosis; dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0367

NIOSH Pocket Guide to Chemical Hazards

Mesityl oxide	**CAS** 141-79-7
$(CH_3)_2C=CHCOCH_3$	**RTECS** SB4200000
Synonyms & Trade Names Isobutenyl methyl ketone, Isopropylideneacetone, Methyl isobutenyl ketone, 4-Methyl-3-penten-2-one	**DOT ID & Guide** 1229 129

Exposure Limits	NIOSH REL: TWA 10 ppm (40 mg/m^3)
	OSHA PEL†: TWA 25 ppm (100 mg/m^3)
IDLH 1400 ppm [10%LEL] See: 141797	**Conversion** 1 ppm = 4.02 mg/m^3

Physical Description
Oily, colorless to light-yellow liquid with a peppermint- or honey-like odor.

MW: 98.2	BP: 266°F	FRZ: -52°F	Sol: 3%
VP: 9 mmHg	IP: 9.08 eV		Sp.Gr(59°F): 0.86
Fl.P: 87°F	UEL: 7.2%	LEL: 1.4%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Oxidizers, acids

Measurement Methods
NIOSH 1301; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£
Up to 500 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1400 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; narcosis, coma; in animals: liver, kidney damage; central nervous system effects

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0814

NIOSH Pocket Guide to Chemical Hazards

Piperazine dihydrochloride	**CAS** 142-64-3
$C_4H_{10}N_2 \cdot 2HCl$	**RTECS** TL4025000
Synonyms & Trade Names Piperazine hydrochloride [Note: The monochloride, $C_4H_{10}N_2$ HCl, is also commercially available.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White to cream-colored needles or powder.

MW: 159.1	BP: ?	MLT: 635°F	Sol: 41%
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid, but does not ignite easily.

Incompatibilities & Reactivities
Water [Note: Slightly hygroscopic (i.e., absorbs moisture from the air).]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, respiratory system; skin burns, sensitization; asthma; gastrointestinal upset, headache, nausea, vomiting, incoordination, muscle weakness
Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

n-Heptane	**CAS** 142-82-5
$CH_3[CH_2]_5CH_3$	**RTECS** MI7700000
Synonyms & Trade Names Heptane, normal-Heptane	**DOT ID & Guide** 1206 128

Exposure Limits	NIOSH REL: TWA 85 ppm (350 mg/m^3) C 440 ppm (1800 mg/m^3) [15-minute]
	OSHA PEL†: TWA 500 ppm (2000 mg/m^3)
IDLH 750 ppm See: 142825	**Conversion** 1 ppm = 4.10 mg/m^3

Physical Description
Colorless liquid with a gasoline-like odor.

MW: 100.2	BP: 209°F	FRZ: -131°F	Sol: 0.0003%
VP(72°F): 40 mmHg	IP: 9.90 eV		Sp.Gr: 0.68
Fl.P: 25°F	UEL: 6.7%	LEL: 1.05%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 750 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Dizziness, stupor, incoordination; loss of appetite, nausea; dermatitis; chemical pneumonitis (aspiration liquid); unconsciousness

Target Organs Skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0657

NIOSH Pocket Guide to Chemical Hazards

1-Decanethiol	**CAS** 143-10-2
$CH_3(CH_2)_9SH$	**RTECS**
Synonyms & Trade Names Decylmercaptan, n-Decylmercaptan, 1-Mercaptodecane	**DOT ID & Guide** 1228 131

Exposure Limits	NIOSH REL: C 0.5 ppm (3.6 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 7.13 mg/m^3

Physical Description
Colorless liquid with a strong odor.

MW: 174.4	BP: 465°F	FRZ: -15°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.84
Fl.P: 209°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Oxidizers, strong acids & bases, alkali metals, nitric acid

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; confusion, dizziness, headache, drowsiness, nausea, vomiting, lassitude (weakness, exhaustion), convulsions

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0035

NIOSH Pocket Guide to Chemical Hazards

Sodium cyanide (as CN)	**CAS** 143-33-9
NaCN	**RTECS** VZ7530000
Synonyms & Trade Names Sodium salt of hydrocyanic acid	**DOT ID & Guide** 1689 157

Exposure Limits	NIOSH REL*: C 5 mg/m^3 (4.7 ppm) [10-minute] [*Note: The REL also applies to other cyanides (as CN) except Hydrogen cyanide.]
	OSHA PEL*: TWA 5 mg/m^3 [*Note: The PEL also applies to other cyanides (as CN) except Hydrogen cyanide.]
IDLH 25 mg/m^3 (as CN) See: cyanides	**Conversion**

Physical Description
White, granular or crystalline solid with a faint, almond-like odor.

MW: 49.0	BP: 2725°F	MLT: 1047°F	Sol(77°F): 58%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.60
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but contact with acids releases highly flammable hydrogen cyanide.

Incompatibilities & Reactivities
Strong oxidizers (such as acids, acid salts, chlorates & nitrates) [Note: Absorbs moisture from the air forming a syrup.]

Measurement Methods
NOISH 6010, 7904
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 25 mg/m^3: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; asphyxia; lassitude (weakness, exhaustion), headache, confusion; nausea, vomiting; increased respiratory rate; slow gasping respiration; thyroid, blood changes

Target Organs Eyes, skin, cardiovascular system, central nervous system, thyroid, blood

See also: INTRODUCTION See ICSC CARD: 1118

NIOSH Pocket Guide to Chemical Hazards

Kepone	**CAS** 143-50-0
$C_{10}Cl_{10}O$	**RTECS** PC8575000
Synonyms & Trade Names Chlordecone; Decachlorooctahydro-1,3,4-metheno-2H-cyclobuta(cd)-pentalen-2-one; Decachlorooctahydro-kepone-2-one; Decachlorotetrahydro-4,7-methanoindeneone	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 0.001 mg/m^3 See Appendix A
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Tan to white, crystalline, odorless solid. [insecticide]

MW: 490.6	BP: Sublimes	MLT: 662°F (Sublimes)	Sol(212°F): 0.5%
VP(77°F): 3 x 10-7 mmHg	IP: ?		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Acids, acid fumes

Measurement Methods
NIOSH 5508
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Headache, anxiety, tremor; liver, kidney damage; visual disturbance; ataxia, chest pain, skin erythema (skin redness); testicular atrophy, low sperm count; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys, reproductive system

Cancer Site [in animal: liver cancer]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Oxalic acid	**CAS** 144-62-7
HOOCCOOH • $2H_2O$	**RTECS** RO2450000
Synonyms & Trade Names Ethanedioic acid, Oxalic acid (aqueous), Oxalic acid dihydrate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 mg/m^3 ST 2 mg/m^3
	OSHA PEL†: TWA 1 mg/m^3
IDLH 500 mg/m^3 See: 144627	**Conversion**

Physical Description
Colorless, odorless powder or granular solid. [Note: The anhydrous form (COOH)2 is an odorless, white solid.]

MW: 126.1	BP: Sublimes	MLT: 215°F (Sublimes)	Sol: 14%
VP: <0.001 mmHg	IP: ?		Sp.Gr: 1.90
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, silver compounds, strong alkalis, chlorites [Note: Gives off water of crystallization at 215°F and begins to sublime.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter£

Up to 50 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 500 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; eye burns; localized pain, cyanosis; shock, collapse, convulsions; kidney damage

Target Organs Eyes, skin, respiratory system, kidneys

See also: INTRODUCTION See ICSC CARD: 0529 See MEDICAL TESTS: 0170

NIOSH Pocket Guide to Chemical Hazards

Dinitolmide	**CAS** 148-01-6
$(NO_2)_2C_6H_2(CH_3)CONH_2$	**RTECS** XS4200000
Synonyms & Trade Names 3,5-Dinitro-o-toluamide; 2-Methyl-3,5-dinitrobenzamide; Zoalene	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Yellowish, crystalline solid.

MW: 225.2	BP: ?	MLT: 351°F	Sol: Slight
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Contact eczema; in animals: methemoglobinemia, liver changes
Target Organs Skin, liver, blood

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

4-Methoxyphenol	**CAS** 150-76-5
$CH_3OC_6H_4OH$	**RTECS** SL7700000
Synonyms & Trade Names Hydroquinone monomethyl ether, p-Hydroxyanisole, Mequinol, p-Methoxyphenol, Monomethyl ether hydroquinone	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless to white, waxy solid with an odor of caramel & phenol.

MW: 124.2	BP: 469°F	MLT: 135°F	Sol(77°F): 4%
VP: <0.01 mmHg	IP: 7.50 eV		Sp.Gr: 1.55
Fl.P(oc): 270°F	UEL: ?	LEL: ?	

Combustible Solid; under certain conditions, a dust cloud can probably explode if ignited by a spark or flame.

Incompatibilities & Reactivities
Strong oxidizers, strong bases, acid chlorides, acid anhydrides

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, nose, throat, upper respiratory system; eye, skin burns; central nervous system depression	
Target Organs Eyes, skin, respiratory system, central nervous system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Potassium cyanide (as CN)	**CAS** 151-50-8
KCN	**RTECS** TS8750000
Synonyms & Trade Names Potassium salt of hydrocyanic acid	**DOT ID & Guide** 1680 157

Exposure Limits	NIOSH REL*: C 5 mg/m^3 (4.7 ppm) [10-minute] [*Note: The REL also applies to other cyanides (as CN) except Hydrogen cyanide.]
	OSHA PEL*: TWA 5 mg/m^3 [*Note: The PEL also applies to other cyanides (as CN) except Hydrogen cyanide.]
IDLH 25 mg/m^3 (as CN) See: cyanides	**Conversion**

Physical Description
White, granular or crystalline solid with a faint, almond-like odor.

MW: 65.1	BP: 2957°F	MLT: 1173°F	Sol(77°F): 72%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.55
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but contact with acids releases highly flammable hydrogen cyanide.

Incompatibilities & Reactivities
Strong oxidizers (such as acids, acid salts, chlorates & nitrates) [Note: Absorbs moisture from the air forming a syrup.]

Measurement Methods
NIOSH 6010, 7904
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 25 mg/m^3: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; asphyxia; lassitude (weakness, exhaustion), headache, confusion; nausea, vomiting; increased respiratory rate, slow gasping respiration; thyroid, blood changes

Target Organs Eyes, skin, respiratory system, cardiovascular system, central nervous system, thyroid, blood

See also: INTRODUCTION See ICSC CARD: 0671

NIOSH Pocket Guide to Chemical Hazards

Ethyleneimine	**CAS** 151-56-4
C_2H_5N	**RTECS** KX5075000
Synonyms & Trade Names Aminoethylene, Azirane, Aziridine, Dimethyleneimine, Dimethylenimine, Ethylenimine, Ethylimine	**DOT ID & Guide** 1185 131P (inhibited)

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1012] See Appendix B
IDLH Ca [100 ppm] See: 151564	**Conversion** 1 ppm = 1.76 mg/m^3

Physical Description
Colorless liquid with an ammonia-like odor. [Note: Usually contains inhibitors to prevent polymerization.]

MW: 43.1	BP: 133°F	FRZ: -97°F	Sol: Miscible
VP: 160 mmHg	IP: 9.20 eV		Sp.Gr: 0.83
Fl.P: 12°F	UEL: 54.8%	LEL: 3.3%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Polymerizes explosively in presence of acids [Note: Explosive silver derivatives may be formed with silver alloys (e.g., silver solder).]

Measurement Methods
NIOSH 3514
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; nausea, vomiting; headache, dizziness; pulmonary edema; liver, kidney damage; eye burns; skin sensitization; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys

Cancer Site [in animals: lung & liver tumors]

See also: INTRODUCTION See ICSC CARD: 0100 See MEDICAL TESTS: 0102

NIOSH Pocket Guide to Chemical Hazards

Halothane	**CAS** 151-67-7
$CF_3CHBrCl$	**RTECS** KH6550000
Synonyms & Trade Names 1-Bromo-1-chloro-2,2,2-trifluoroethane; 2-Bromo-2-chloro-1,1,1-trifluoroethane; 1,1,1-Trifluoro-2-bromo-2-chloroethane; 2,2,2-Trifluoro-1-bromo-1-chloroethane	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: C 2 ppm (16.2 mg/m^3) [60-minute] [*Note: REL for exposure to waste anesthetic gas.]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 8.07 mg/m^3

Physical Description
Clear, colorless liquid with a sweetish, pleasant odor. [inhalation anesthetic]

MW: 197.4	BP: 122°F	FRZ: -180°F	Sol: 0.3%
VP: 243 mmHg	IP: ?		Sp.Gr: 1.87
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
May attack rubber & some plastics; sensitive to light. [Note: Light causes decomposition. May be stabilized with 0.01% thymol.]

Measurement Methods
OSHA 29
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; confusion, drowsiness, dizziness, nausea, analgesia, anesthesia; cardiac arrhythmias; liver, kidney damage; decreased audio-visual performance; in animals: reproductive effects

Target Organs Eyes, skin, respiratory system, cardiovascular system, central nervous system, liver, kidneys, reproductive system

See also: INTRODUCTION See ICSC CARD: 0277

NIOSH Pocket Guide to Chemical Hazards

Calcium cyanamide	**CAS** 156-62-7
$CaCN_2$	**RTECS** GS6000000
Synonyms & Trade Names Calcium carbimide, Cyanamide, Lime nitrogen, Nitrogen lime [Note: Cyanamide is also a synonym for Hydrogen cyanamide, NH_2CN.]	**DOT ID & Guide** 1403 138 (with >0.1% calcium carbide)

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless, gray, or black crystals or powder. [fertilizer] [Note: Commercial grades may contain calcium carbide.]

MW: 80.1	BP: Sublimes	MLT: 2444°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.29
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but a fire risk if it contains calcium carbide.

Incompatibilities & Reactivities
Water [Note: May polymerize in water or alkaline solutions to dicyanamide. Decomposes in water to form acetylene & ammonia.]

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; headache, dizziness, rapid breathing, low blood pressure, nausea, vomiting; skin burns, sensitization; cough; Antabuse-like effects	
Target Organs Eyes, skin, respiratory system, vasomotor system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Cyclopentane	**CAS** 287-92-3
C_5H_{10}	**RTECS** GY2390000
Synonyms & Trade Names Pentamethylene	**DOT ID & Guide** 1146 128

Exposure Limits	NIOSH REL: TWA 600 ppm (1720 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.87 mg/m^3

Physical Description
Colorless liquid with a mild, sweet odor.

MW: 70.2	BP: 121°F	FRZ: -137°F	Sol: Insoluble
VP(88°F): 400 mmHg	IP: 10.52 eV		Sp.Gr: 0.75
Fl.P: -35°F	UEL: 8.7%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers (e.g., chlorine, bromine, fluorine)

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, nose, throat; dizziness, euphoria, incoordination, nausea, vomiting, stupor; dry, cracking skin
Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0353

NIOSH Pocket Guide to Chemical Hazards

Methyl parathion	**CAS** 298-00-0
$(CH_3O)_2P(S)OC_6H_4NO_2$	**RTECS** TG0175000
Synonyms & Trade Names Azophos®; O,O-Dimethyl-O-p-nitrophenylphosphorothioate; Parathion methyl	**DOT ID & Guide** 2783 152

Exposure Limits	NIOSH REL: TWA 0.2 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White to tan, crystalline solid or powder with a pungent, garlic-like odor. [pesticide] [Note: The commercial product in xylene is a tan liquid.]

MW: 263.2	BP: 289°F	MLT: 99°F	Sol(77°F): 0.006%
VP: 0.00001 mmHg	IP: ?		Sp.Gr: 1.36
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, water [Note: Explosive risk when heated above 122°F.]

Measurement Methods
NIOSH 5600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 2 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 10) Any supplied-air respirator

Up to 5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter

Up to 10 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 200 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; nausea, vomiting, abdominal cramps, diarrhea, salivation; headache, dizziness, lassitude (weakness, exhaustion); rhinorrhea (discharge of thin mucus), chest tightness; blurred vision, miosis; cardiac irregularities; muscle fasciculation; dyspnea (breathing difficulty)

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, blood cholinesterase
See also: INTRODUCTION See ICSC CARD: 0626

NIOSH Pocket Guide to Chemical Hazards

Phorate	**CAS** 298-02-2
$(C_2H_5O)_2P(S)SCH_2SC_2H_5$	**RTECS** TD9450000
Synonyms & Trade Names O,O-Diethyl S-(ethylthio)methylphosphorodithioate; O,O-Diethyl S-ethylthiomethylthiothionophosphate; Thimet; Timet	**DOT ID & Guide** 3018 152 (organophosphorus pesticide, liquid)

Exposure Limits	NIOSH REL: TWA 0.05 mg/m^3 ST 0.2 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Clear liquid with a skunk-like odor. [insecticide]

MW: 260.4	BP: ?	FRZ: -45°F	Sol: 0.005%
VP: 0.0008 mmHg	IP: ?		Sp.Gr(77°F): 1.16
Fl.P(oc): 320°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid, but does not readily ignite.

Incompatibilities & Reactivities
Water, alkalis [Note: Hydrolyzed in the presence of moisture and by alkalis.]

Measurement Methods
NIOSH 5600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; miosis; rhinorrhea (discharge of thin mucus); headache; chest tightness, wheezing, laryngeal spasm, salivation, cyanosis; anorexia, nausea, vomiting, abdominal cramps, diarrhea; sweating; muscle fasciculation, lassitude (weakness, exhaustion), paralysis; dizziness, confusion, ataxia; convulsions, coma; low blood pressure; cardiac irregularities

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 1060

NIOSH Pocket Guide to Chemical Hazards

Disulfoton	**CAS** 298-04-4
$C_8H_{19}O_2PS_3$	**RTECS** TD9275000
Synonyms & Trade Names O,O-Diethyl S-2-(ethylthio)-ethyl phosphorodithioate; Di-Syston®; Thiodemeton	**DOT ID & Guide** 2783 152

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Oily, colorless to yellow liquid with a characteristic, sulfur odor. [insecticide] [Note: Technical product is a brown liquid.]

MW: 274.4	BP: ?	FRZ: >-13°F	Sol(73°F): 0.003%
VP: 0.0002 mmHg	IP: ?		Sp.Gr: 1.14
Fl.P: >180°F	UEL: ?	LEL: ?	

Combustible Liquid, but will not ignite easily.

Incompatibilities & Reactivities
Alkalis

Measurement Methods
NIOSH 5600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; nausea, vomiting, abdominal cramps, diarrhea, salivation; headache, dizziness, lassitude (weakness, exhaustion); rhinorrhea (discharge of thin mucus), chest tightness; blurred vision, miosis; cardiac irregularities; muscle fasciculation; dyspnea (breathing difficulty); eye, skin burns

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Ronnel	**CAS** 299-84-3
$(CH_3O)_2P(S)OC_6H_2Cl_3$	**RTECS** TG0525000
Synonyms & Trade Names O,O-Dimethyl O-(2,4,5-trichlorophenyl) phosphorothioate; Fenchlorophos	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3
	OSHA PEL†: TWA 15 mg/m^3
IDLH 300 mg/m^3 See: 299843	**Conversion**

Physical Description
White to light-tan, crystalline solid. [insecticide] [Note: A liquid above 106°F.]

MW: 321.6	BP: Decomposes	MLT: 106°F	Sol(77°F): 0.004%
VP(77°F): 0.0008 mmHg	IP: ?		Sp.Gr(77°F): 1.49
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5600; OSHA PV2054
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 100 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter/(APF = 10) Any supplied-air respirator

Up to 250 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter

Up to 300 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes; cholinesterase inhibition; liver, kidney damage

Target Organs Eyes, liver, kidneys, blood plasma

See also: INTRODUCTION See ICSC CARD: 0975

NIOSH Pocket Guide to Chemical Hazards

Crufomate	**CAS** 299-86-5
$C_{12}H_{19}ClNO_3P$	**RTECS** TB3850000
Synonyms & Trade Names 4-t-Butyl-2-chlorophenylmethyl methylphosphoramidate, Dowco® 132, Ruelene®	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3 ST 20 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, crystalline solid in pure form. [pesticide] [Note: Commercial product is a yellow oil.]

MW: 291.7	BP: Decomposes	MLT: 140°F	Sol: Insoluble
VP(243°F): 0.01 mmHg	IP: ?		Sp.Gr: 1.16
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strongly alkaline & strongly acidic media [Note: Unstable over long periods in aqueous preparations or above 140°F.]

Measurement Methods
NIOSH 0500; OSHA PV2015
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; wheezing, dyspnea (breathing difficulty); blurred vision, lacrimation (discharge of tears); sweating; abdominal cramps, diarrhea, nausea, anorexia

Target Organs Eyes, skin, respiratory system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 1143

NIOSH Pocket Guide to Chemical Hazards

Dimethyl-1,2-dibromo-2,2-dichlorethyl phosphate	**CAS** 300-76-5
$(CH_3O)_2P(O)OCHBrCBrCl_2$	**RTECS** TB9450000
Synonyms & Trade Names Dibrom®; 1,2-Dibromo-2,2-dichloroethyl dimethyl phosphate; Naled	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 3 mg/m^3 [skin]
	OSHA PEL†: TWA 3 mg/m^3
IDLH 200 mg/m^3 See: 300765	**Conversion**

Physical Description
Colorless to white solid or straw-colored liquid (above 80°F) with a slightly pungent odor. [insecticide]

MW: 380.8	BP: Decomposes	MLT: 80°F	Sol: Insoluble
VP: 0.0002 mmHg	IP: ?		Sp.Gr(77°F): 1.96
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers, acids, sunlight, water [Note: Corrosive to metals. Hydrolyzed in presence of water.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 30 mg/m^3: (APF = 10) Any dust, mist, and fume respirator/(APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator

Up to 75 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter

Up to 150 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 200 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; miosis, lacrimation (discharge of tears); headache; chest tightness, wheezing, laryngeal spasm; salivation; cyanosis; anorexia, nausea, vomiting, abdominal cramp, diarrhea; lassitude (weakness, exhaustion), twitching, paralysis; dizziness, ataxia, convulsions; low blood pressure; cardiac irregularities

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0925 See MEDICAL TESTS: 0082

NIOSH Pocket Guide to Chemical Hazards

Hydrazine	**CAS** 302-01-2
H_2NNH_2	**RTECS** MU7175000
Synonyms & Trade Names Diamine, Hydrazine (anhydrous), Hydrazine base	**DOT ID & Guide** 2029 132 (anhydrous) 3293 152 (</=37% solution) 2030 153 (37-64% solution) 2029 132 (>64% solution)

Exposure Limits	NIOSH REL: Ca C 0.03 ppm (0.04 mg/m^3) [2-hour] See Appendix A
	OSHA PEL†: TWA 1 ppm (1.3 mg/m^3) [skin]
IDLH Ca [50 ppm] See: 302012	**Conversion** 1 ppm = 1.31 mg/m^3

Physical Description
Colorless, fuming, oily liquid with an ammonia-like odor. [Note: A solid below 36°F.]

MW: 32.1	BP: 236°F	FRZ: 36°F	Sol: Miscible
VP: 10 mmHg	IP: 8.93 eV		Sp.Gr: 1.01
Fl.P: 99°F	UEL: 98%	LEL: 2.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Oxidizers, hydrogen peroxide, nitric acid, metallic oxides, acids [Note: Can ignite SPONTANEOUSLY on contact with oxidizers or porous materials such as earth, wood & cloth.]

Measurement Methods
NIOSH 3503; OSHA 20, 108
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; temporary blindness; dizziness, nausea; dermatitis; eye, skin burns; in animals: bronchitis, pulmonary edema; liver, kidney damage; convulsions; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

Cancer Site [in animals: tumors of the lungs, liver, blood vessels & intestine]

See also: INTRODUCTION See ICSC CARD: 0281 See MEDICAL TESTS: 0115

NIOSH Pocket Guide to Chemical Hazards

Aldrin	**CAS** 309-00-2
$C_{12}H_8Cl_6$	**RTECS** IO2100000
Synonyms & Trade Names 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-endo-1,4-exo-5,8-dimethanonaphthalene; HHDN; Octalene	**DOT ID & Guide** 2761 151

Exposure Limits	NIOSH REL: Ca TWA 0.25 mg/m^3 [skin] See Appendix A
	OSHA PEL: TWA 0.25 mg/m^3 [skin]
IDLH Ca [25 mg/m^3] See: 309002	**Conversion**

Physical Description
Colorless to dark-brown crystalline solid with a mild chemical odor. [Note: Formerly used as an insecticide.]

MW: 364.9	BP: Decomposes	MLT: 219°F	Sol: 0.003%
VP: 0.00008 mmHg	IP: ?		Sp.Gr: 1.60
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Concentrated mineral acids, active metals, acid catalysts, acid oxidizing agents, phenol

Measurement Methods
NIOSH 5502
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort); myoclonic jerks of limbs; clonic, tonic convulsions; coma; hematuria (blood in the urine), azotemia; [potential occupational carcinogen]

Target Organs central nervous system, liver, kidneys, skin

Cancer Site [in animals: tumors of the lungs, liver, thyroid & adrenal glands]

See also: INTRODUCTION See ICSC CARD: 0774 See MEDICAL TESTS: 0009

NIOSH Pocket Guide to Chemical Hazards

Bromacil	**CAS** 314-40-9
$C_9H_{13}BrN_2O_2$	**RTECS** YQ9100000
Synonyms & Trade Names 5-Bromo-3-sec-butyl-6-methyluracil, 5-Bromo-6-methyl-3-(1-methylpropyl)uracil	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 ppm (10 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 10.68 mg/m^3

Physical Description
Odorless, colorless to white, crystalline solid. [herbicide] [Note: Commercially available as a wettable powder or in liquid formulations.]

MW: 261.2	BP: Sublimes	MLT: 317°F (Sublimes)	Sol(77°F): 0.08%
VP(212°F): 0.0008 mmHg	IP: ?		Sp.Gr: 1.55
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Strong acids (decomposes slowly), oxidizers, heat, sparks, open flames

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; in animals: thyroid injury	
Target Organs Eyes, skin, respiratory system, thyroid	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Diuron	**CAS** 330-54-1
$C_6H_3Cl_2NHCON(CH_3)_2$	**RTECS** YS8925000
Synonyms & Trade Names 3-(3,4-Dichlorophenyl)-1,1-dimethylurea; Direx®; Karmex®	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, odorless, crystalline solid. [herbicide]

MW: 233.1	BP: 356°F (Decomposes)	MLT: 316°F	Sol: 0.004%
VP: 0.000000002 mmHg	IP:?		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong acids

Measurement Methods
NIOSH 5601
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, nose, throat; in animals: anemia, methemoglobinemia	
Target Organs Eyes, skin, respiratory system, blood	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Diazinon®	**CAS** 333-41-5
$C_{12}H_{21}N_2O_3PS$	**RTECS** TF3325000
Synonyms & Trade Names Basudin®; Diazide®; O,O-Diethyl-O-2-isopropyl-4-methyl-6-pyrimidinyl-phosphorothioate; Spectracide®	**DOT ID & Guide** 2783 152

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless liquid with a faint ester-like odor. [insecticide] [Note: Technical grade is pale to dark brown.]

MW: 304.4	BP: Decomposes	FRZ: ?	Sol: 0.004%
VP: 0.0001 mmHg	IP: ?		Sp.Gr: 1.12
Fl.P: 180°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong acids & alkalis, copper-containing compounds [Note: Hydrolyzes slowly in water & dilute acid.]

Measurement Methods
NIOSH 5600; OSHA 62
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; miosis, blurred vision; dizziness, confusion, lassitude (weakness, exhaustion), convulsions; dyspnea (breathing difficulty); salivation, abdominal cramps, nausea, vomiting

Target Organs Eyes, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0137

NIOSH Pocket Guide to Chemical Hazards

Diazomethane	**CAS** 334-88-3
CH_2N_2	**RTECS** PA7000000
Synonyms & Trade Names Azimethylene, Azomethylene, Diazirine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.2 ppm (0.4 mg/m^3)
	OSHA PEL: TWA 0.2 ppm (0.4 mg/m^3)
IDLH 2 ppm See: 334883	**Conversion** 1 ppm = 1.72 mg/m^3

Physical Description
Yellow gas with a musty odor. [Note: Shipped as a liquefied compressed gas.]

MW: 42.1	BP: -9°F	FRZ: -229°F	Sol: Reacts
VP: >1 atm	IP: 9.00 eV	RGasD: 1.45	
Fl.P: NA (Gas)	UEL: ?	LEL: ?	

Flammable Gas [EXPLOSIVE!]

Incompatibilities & Reactivities
Alkali metals, water, drying agents such as calcium arsenate [Note: May explode violently on heating, exposure to sunlight, or contact with rough edges such as ground glass.]

Measurement Methods
NIOSH 2515
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	**First Aid** (See procedures) Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 2 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Irritation eyes; cough, shortness breath; headache, lassitude (weakness, exhaustion); flush skin, fever; chest pain, pulmonary edema, pneumonitis; asthma; liquid: frostbite

Target Organs Eyes, respiratory system

See also: INTRODUCTION See ICSC CARD: 1256 See MEDICAL TESTS: 0068

NIOSH Pocket Guide to Chemical Hazards

Carbonyl fluoride	**CAS** 353-50-4
COF_2	**RTECS** FG6125000
Synonyms & Trade Names Carbon difluoride oxide, Carbon fluoride oxide, Carbon oxyfluoride, Carbonyl difluoride, Fluoroformyl fluoride, Fluorophosgene	**DOT ID & Guide** 2417 125

Exposure Limits	NIOSH REL: TWA 2 ppm (5 mg/m^3) ST 5 ppm (15 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.70 mg/m^3

Physical Description
Colorless gas with a pungent and very irritating odor. [Note: Shipped as a liquefied compressed gas.]

MW: 66.0	BP: -118°F	FRZ: -173°F	Sol: Reacts
VP: 55.4 atm	IP: 13.02 eV	RGasD: 2.29	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Heat, moisture, hexafluoroisopropyl-ideneamino-lithium [Note: Reacts with water to form hydrogen fluoride & carbon dioxide.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations To be added later

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane, respiratory system; eye, skin burns; lacrimation (discharge of tears); cough, pulmonary edema, dyspnea (breathing difficulty); chronic exposure: gastrointestinal pain, muscle fibrosis, skeletal fluorosis; liquid: frostbite

Target Organs Eyes, skin, respiratory system, bone

See also: INTRODUCTION See ICSC CARD: 0633

NIOSH Pocket Guide to Chemical Hazards

Fluoroxene	**CAS** 406-90-6
$CF_3CH_2OCH{=}CH_2$	**RTECS** KO4250000
Synonyms & Trade Names 2,2,2-Trifluoroethoxyethene; 2,2,2-Trifluoroethyl vinyl ether	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: C 2 ppm (10.3 mg/m^3) [60-minute] [*Note: REL for exposure to waste anesthetic gas.]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.16 mg/m^3

Physical Description
Liquid. [inhalation anesthetic] [Note: A gas above 109°F.]

MW: 126.1	BP: 109°F	FRZ: ?	Sol: ?
VP: 286 mmHg	IP: ?		Sp.Gr: 1.14
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid [potentially EXPLOSIVE!]

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes; central nervous system depression, analgesia, anesthesia, convulsions, respiratory depression
Target Organs Eyes, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Silicon carbide	**CAS** 409-21-2
SiC	**RTECS** VW0450000
Synonyms & Trade Names Carbon silicide, Carborundum®, Silicon monocarbide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Yellow to green to bluish-black, iridescent crystals.

MW: 40.1	BP: Sublimes	MLT: 4892°F (Sublimes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: 9.30 eV		Sp.Gr: 3.23
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported [Note: Sublimes with decomposition at 4892°F.]

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; cough	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Cyanamide	**CAS** 420-04-2
NH_2CN	**RTECS** GS5950000
Synonyms & Trade Names Amidocyanogen, Carbimide, Carbodiimide, Cyanogen nitride, Hydrogen cyanamide [Note: Cyanamide is also a synonym for Calcium cyanamide.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Crystalline solid.

MW: 42.1	BP: 500°F (Decomposes)	MLT: 113°F	Sol(59°F): 78%
VP: ?	IP: 10.65 eV		Sp.Gr: 1.28
Fl.P: 286°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Above 104°F: Moisture, acids, or alkalis; 1,2-phenylene diamine salts [Note: Polymerization may occur on evaporation of aqueous solutions.]

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; eye, skin burns; miosis, salivation, lacrimation (discharge of tears), twitching; Antabuse-like effects	
Target Organs Eyes, skin, respiratory system, central nervous system	

See also: INTRODUCTION See ICSC CARD: 0424

NIOSH Pocket Guide to Chemical Hazards

Cyanogen	**CAS** 460-19-5
NCCN	**RTECS** GT1925000
Synonyms & Trade Names Carbon nitride, Dicyan, Dicyanogen, Ethanedinitrile, Oxalonitrile	**DOT ID & Guide** 1026 119

Exposure Limits	NIOSH REL: TWA 10 ppm (20 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.13 mg/m^3

Physical Description
Colorless gas with a pungent, almond-like odor. [Note: Shipped as a liquefied compressed gas. Forms cyanide in the body.]

MW: 52.0	BP: -6°F	FRZ: -18°F	Sol: 1%
VP(70°F): 5.1 atm	IP: 13.57 eV	RGasD: 1.82	Sp.Gr: 0.95 (Liquid at -6°F)
Fl.P: NA (Gas)	UEL: 32%	LEL: 6.6%	

Flammable Gas

Incompatibilities & Reactivities
Acids, water, strong oxidizers (e.g., dichlorine oxide, fluorine) [Note: Slowly hydrolyzed in water to form hydrogen cyanide, oxalic acid, or ammonia.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Prevent eye contact/Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations To be added later

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, nose, upper respiratory system; lacrimation (discharge of tears); cherry red lips, tachypnea, hypernea, bradycardia; headache, convulsions; dizziness, loss of appetite, weight loss; liquid: frostbite

Target Organs Eyes, respiratory system, central nervous system, cardiovascular system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Ketene	**CAS** 463-51-4
CH_2=CO	**RTECS** OA7700000
Synonyms & Trade Names Carbomethene, Ethenone, Keto-ethylene	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.5 ppm (0.9 mg/m^3) ST 1.5 ppm (3 mg/m^3)
	OSHA PEL†: TWA 0.5 ppm (0.9 mg/m^3)
IDLH 5 ppm See: 463514	**Conversion** 1 ppm = 1.72 mg/m^3

Physical Description
Colorless gas with a penetrating odor.

MW: 42.0	BP: -69°F	FRZ: -238°F	Sol: Reacts
VP: >1 atm	IP: 9.61 eV	RGasD: 1.45	
Fl.P: NA (Gas)	UEL: ?	LEL: ?	

Flammable Gas

Incompatibilities & Reactivities
Water, alcohols, ammonia [Note: Readily polymerizes. Reacts with water to form acetic acid.]

Measurement Methods
NIOSH S92 (II-2)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 5 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; pulmonary edema

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0812 See MEDICAL TESTS: 0126

NIOSH Pocket Guide to Chemical Hazards

Tetryl	**CAS** 479-45-8
$(NO_2)_3C_6H_2N(NO_2)CH_3$	**RTECS** BY6300000
Synonyms & Trade Names N-Methyl-N,2,4,6-tetranitroaniline; Nitramine; 2,4,6-Tetryl; 2,4,6-Trinitrophenyl-N-methylnitramine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1.5 mg/m^3 [skin]
	OSHA PEL: TWA 1.5 mg/m^3 [skin]
IDLH 750 mg/m^3 See: 479458	**Conversion**

Physical Description
Colorless to yellow, odorless, crystalline solid.

MW: 287.2	BP: 356-374°F (Explodes)	MLT: 268°F	Sol: 0.02%
VP: <1 mmHg	IP: ?		Sp.Gr: 1.57
Fl.P: Explodes	UEL: ?	LEL: ?	

Combustible Solid (Class A Explosive)

Incompatibilities & Reactivities
Oxidizable materials, hydrazine

Measurement Methods
NIOSH S225 (II-3)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 7.5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 15 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*/(APF = 10) Any supplied-air respirator*

Up to 37.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*

Up to 75 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 750 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Sensitization dermatitis, itch, erythema (skin redness); edema on nasal folds, cheeks, neck; keratitis (inflammation of the cornea); sneezing; anemia; cough, coryza; irritability; malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion), insomnia; nausea, vomiting; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0959 See MEDICAL TESTS: 0227

NIOSH Pocket Guide to Chemical Hazards

2-Aminopyridine	**CAS** 504-29-0
$NH_2C_5H_4N$	**RTECS** US1575000
Synonyms & Trade Names alpha-Aminopyridine, alpha-Pyridylamine	**DOT ID & Guide** 2671 153

Exposure Limits	NIOSH REL: TWA 0.5 ppm (2 mg/m^3)
	OSHA PEL: TWA 0.5 ppm (2 mg/m^3)
IDLH 5 ppm See: 504290	**Conversion** 1 ppm = 3.85 mg/m^3

Physical Description
White powder, leaflets, or crystals with a characteristic odor.

MW: 94.1	BP: 411°F	MLT: 137°F	Sol: >100%
VP(77°F): 0.8 mmHg	IP: 8.00 eV		Sp.Gr: ?
Fl.P: 154°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH S158 (II-4)
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 5 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; headache, dizziness; excitement; nausea; high blood pressure; respiratory distress; lassitude (weakness, exhaustion); convulsions; stupor

Target Organs central nervous system, respiratory system

See also: INTRODUCTION See ICSC CARD: 0214

NIOSH Pocket Guide to Chemical Hazards

Cyanogen chloride	**CAS** 506-77-4
ClCN	**RTECS** GT2275000
Synonyms & Trade Names Chlorcyan, Chlorine cyanide, Chlorocyanide, Chlorocyanogen	**DOT ID & Guide** 1589 125 (inhibited)

Exposure Limits	NIOSH REL: C 0.3 ppm (0.6 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.52 mg/m^3

Physical Description
Colorless gas or liquid (below 55°F) with an irritating odor. [Note: Shipped as a liquefied gas. A solid below 20°F. Forms cyanide in the body.]

MW: 61.5	BP: 55°F	FRZ: 20°F	Sol: 7%
VP: 1010 mmHg	IP: 12.49 eV	RGasD: 2.16	Sp.Gr: 1.22 (Liquid at 32°F)
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Water, acids, alkalis, ammonia, alcohols [Note: Can react very slowly with water to form hydrogen cyanide. May be stabilized to prevent polymerization.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (liquid) Eyes: Prevent eye contact (liquid) Wash skin: When contaminated (liquid) Remove: When wet or contaminated (liquid) Change: No recommendation Provide: Eyewash (liquid), Quick drench (liquid)	Eye: Irrigate immediately Skin: Water wash immediately (liquid) Breathing: Respiratory support Swallow: Medical attention immediately (liquid)

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption (liquid), ingestion (liquid), skin and/or eye contact (liquid)

Symptoms Irritation eyes, upper respiratory system; cough, delayed pulmonary edema; lassitude (weakness, exhaustion), headache, dizziness, confusion, nausea, vomiting; irregular heartbeat; irritation skin (liquid)

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 1053

NIOSH Pocket Guide to Chemical Hazards

Tetranitromethane	**CAS** 509-14-8
$C(NO_2)_4$	**RTECS** PB4025000
Synonyms & Trade Names Tetan, TNM	**DOT ID & Guide** 1510 143

Exposure Limits	NIOSH REL: TWA 1 ppm (8 mg/m^3)
	OSHA PEL: TWA 1 ppm (8 mg/m^3)
IDLH 4 ppm See: 509148	**Conversion** 1 ppm = 8.02 mg/m^3

Physical Description
Colorless to pale-yellow liquid or solid (below 57°F) with a pungent odor.

MW: 196.0	BP: 259°F	FRZ: 57°F	Sol: Insoluble
VP: 8 mmHg	IP: ?		Sp.Gr: 1.62
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid, but difficult to ignite.

Incompatibilities & Reactivities
Hydrocarbons, alkalis, metals, oxidizers, aluminum, toluene, cotton [Note: Combustible material wet with tetranitromethane may be highly explosive.]

Measurement Methods
NIOSH 3513
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: Daily
Provide: Eyewash

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 4 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern¿/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern¿£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, headache; chest pain, dyspnea (breathing difficulty); methemoglobinemia, cyanosis; skin burns

Target Organs Eyes, skin, respiratory system, blood, central nervous system

See also: INTRODUCTION See MEDICAL TESTS: 0226

NIOSH Pocket Guide to Chemical Hazards

1,2,3-Trimethylbenzene	**CAS** 526-73-8
$C_6H_3(CH_3)_3$	**RTECS** DC330000
Synonyms & Trade Names Hemellitol [Note: Hemimellite is a mixture of the 1,2,3-isomer with up to 10% of related aromatics such as the 1,2,4-isomer.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 25 ppm (125 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.92 mg/m^3

Physical Description
Clear, colorless liquid with a distinctive, aromatic odor.

MW: 120.2	BP: 349°F	FRZ: -14°F	Sol: Low
VP(62°F): 1 mmHg	IP: 8.48 eV		Sp.Gr: 0.89
Fl.P: ?	UEL: 6.6%	LEL: 0.8%	

Flammable Liquid

Incompatibilities & Reactivities
Oxidizers, nitric acid

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)
Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION See ICSC CARD: 1362

NIOSH Pocket Guide to Chemical Hazards

o-Dinitrobenzene	**CAS** 528-29-0
$C_6H_4(NO_2)_2$	**RTECS** CZ7450000
Synonyms & Trade Names ortho-Dinitrobenzene; 1,2-Dinitrobenzene	**DOT ID & Guide** 1597 152

Exposure Limits	NIOSH REL: TWA 1 mg/m^3 [skin]
	OSHA PEL: TWA 1 mg/m^3 [skin]
IDLH 50 mg/m^3 See: 528290	**Conversion**

Physical Description
Pale-white or yellow solid.

MW: 168.1	BP: 606°F	MLT: 244°F	Sol: 0.05%
VP: ?	IP: 10.71 eV		Sp.Gr: 1.57
Fl.P: 302°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, caustics, metals such as tin & zinc [Note: Prolonged exposure to fire and heat may result in an explosion due to SPONTANEOUS decomposition.]

Measurement Methods
NIOSH S214 (II-4)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 10 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 50 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Anoxia, cyanosis; visual disturbance, central scotomas; bad taste, burning mouth, dry throat, thirst; yellowing hair, eyes, skin; anemia; liver damage

Target Organs Eyes, skin, blood, liver, cardiovascular system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0460 See MEDICAL TESTS: 0088

NIOSH Pocket Guide to Chemical Hazards

alpha-Chloroacetophenone	**CAS** 532-27-4
$C_6H_5COCH_2Cl$	**RTECS** AM6300000
Synonyms & Trade Names 2-Chloroacetophenone, Chloromethyl phenyl ketone, Mace®, Phenacyl chloride, Phenyl chloromethyl ketone, Tear gas	**DOT ID & Guide** 1697 153

Exposure Limits	NIOSH REL: TWA 0.3 mg/m^3 (0.05 ppm)
	OSHA PEL: TWA 0.3 mg/m^3 (0.05 ppm)
IDLH 15 mg/m^3 See: 532274	**Conversion** 1 ppm = 6.32 mg/m^3

Physical Description
Colorless to gray crystalline solid with a sharp, irritating odor.

MW: 154.6	BP: 472°F	MLT: 134°F	Sol: Insoluble
VP: 0.005 mmHg	IP: 9.44 eV		Sp.Gr: 1.32
Fl.P: 244°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Water, steam, strong oxidizers [Note: Slowly corrodes metals.]

Measurement Methods
NIOSH P&CAM291 (II-5)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 3 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter/(APF = 10) Any supplied-air respirator

Up to 7.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter£

Up to 15 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; pulmonary edema

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0128

NIOSH Pocket Guide to Chemical Hazards

Dinitro-o-cresol	**CAS** 534-52-1
$CH_3C_6H_2OH(NO_2)_2$	**RTECS** GO9625000
Synonyms & Trade Names 4,6-Dinitro-o-cresol; 3,5-Dinitro-2-hydroxytoluene; 4,6-Dinitro-2-methyl phenol; DNC; DNOC	**DOT ID & Guide** 1598 153

Exposure Limits	NIOSH REL: TWA 0.2 mg/m^3 [skin]
	OSHA PEL: TWA 0.2 mg/m^3 [skin]
IDLH 5 mg/m^3 See: 534521	**Conversion**

Physical Description
Yellow, odorless solid. [insecticide]

MW: 198.1	BP: 594°F	MLT: 190°F	Sol: 0.01%
VP: 0.00005 mmHg	IP: ?		Sp.Gr: 1.1 (estimated)
Fl.P: NA	UEL: NA	LEL: NA	MEC: 30 g/m^3

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH S166 (II-5)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2 mg/m^3: (APF = 10) Any dust and mist respirator with a full facepiece
Up to 5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Sense of well being; headache, fever, lassitude (weakness, exhaustion), profuse sweating, excess thirst, tachycardia, hyperpnea, cough, shortness breath, coma

Target Organs cardiovascular system, endocrine system

See also: INTRODUCTION See MEDICAL TESTS: 0087

NIOSH Pocket Guide to Chemical Hazards

1,2-Dichloroethylene	**CAS** 540-59-0
ClCH=CHCl	**RTECS** KV9360000
Synonyms & Trade Names Acetylene dichloride, cis-Acetylene dichloride, trans-Acetylene dichloride, sym-Dichloroethylene	**DOT ID & Guide** 1150 132P

Exposure Limits	NIOSH REL: TWA 200 ppm (790 mg/m^3)
	OSHA PEL: TWA 200 ppm (790 mg/m^3)
IDLH 1000 ppm See: 540590	**Conversion** 1 ppm = 3.97 mg/m^3

Physical Description
Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.

MW: 97.0	BP: 118-140°F	FRZ: -57 to -115°F	Sol: 0.4%
VP: 180-265 mmHg	IP: 9.65 eV		Sp.Gr(77°F): 1.27
Fl.P: 36-39°F	UEL: 12.8%	LEL: 5.6%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong alkalis, potassium hydroxide, copper [Note: Usually contains inhibitors to prevent polymerization.]

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; central nervous system depression

Target Organs Eyes, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0436

NIOSH Pocket Guide to Chemical Hazards

tert-Butyl acetate	**CAS** 540-88-5
$CH_3COOC(CH_3)_3$	**RTECS** AF7400000
Synonyms & Trade Names tert-Butyl ester of acetic acid	**DOT ID & Guide** 1123 129

Exposure Limits	NIOSH REL: TWA 200 ppm (950 mg/m^3)
	OSHA PEL: TWA 200 ppm (950 mg/m^3)
IDLH 1500 ppm [10%LEL] See: 540885	**Conversion** 1 ppm = 4.75 mg/m^3

Physical Description
Colorless liquid with a fruity odor.

MW: 116.2	BP: 208°F	FRZ: ?	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.87
Fl.P: 72°F	UEL: ?	LEL: 1.5%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1450; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions. (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Itch, inflammation eyes; irritation upper respiratory tract; headache; narcosis; dermatitis

Target Organs respiratory system, eyes, skin, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

5-Methyl-3-heptanone	**CAS** 541-85-5
$C_2H_5COCH_2CH(CH_3)CH_2CH_3$	**RTECS** MJ7350000
Synonyms & Trade Names Amyl ethyl ketone, Ethyl amyl ketone, 3-Methyl-5-heptanone	**DOT ID & Guide** 2271 127

Exposure Limits	NIOSH REL: TWA 25 ppm (130 mg/m^3)
	OSHA PEL: TWA 25 ppm (130 mg/m^3)
IDLH 100 ppm See: 541855	**Conversion** 1 ppm = 5.24 mg/m^3

Physical Description
Colorless liquid with a pungent odor.

MW: 128.2	BP: 315°F	FRZ: -70°F	Sol: Insoluble
VP: 2 mmHg	IP: ?		Sp.Gr: 0.82
Fl.P: 138°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1301
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 100 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; headache; narcosis, coma; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 1391

NIOSH Pocket Guide to Chemical Hazards

1,3-Dichloropropene	**CAS** 542-75-6
ClHC=CHCH$_2$Cl	**RTECS** UC8310000
Synonyms & Trade Names 3-Chloroallyl chloride; DCP; 1,3-Dichloro-1-propene; 1,3-Dichloropropylene; Telone®	**DOT ID & Guide** 2047 132

Exposure Limits	NIOSH REL: Ca TWA 1 ppm (5 mg/m^3) [skin] See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion** 1 ppm = 4.54 mg/m^3

Physical Description
Colorless to straw-colored liquid with a sharp, sweet, irritating, chloroform-like odor. [insecticide] [Note: Exists as mixture of cis- & trans-isomers.]

MW: 111.0	BP: 226°F	FRZ: -119°F	Sol: 0.2%
VP: 28 mmHg	IP: ?		Sp.Gr: 1.21
Fl.P: 77°F	UEL: 14.5%	LEL: 5.3%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Aluminum, magnesium, halogens, oxidizers [Note: Epichlorohydrin may be added as a stabilizer.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; eye, skin burns; lacrimation (discharge of tears); headache, dizziness; in animals; liver, kidney damage; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

Cancer Site [in animals: cancer of the bladder, liver, lung & forestomach]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Malonaldehyde	**CAS** 542-78-9
$CHOCH_2CHO$	**RTECS** TX6475000
Synonyms & Trade Names Malonic aldehyde; Malonodialdehyde; Propanedial; 1,3-Propanedial [Note: Pure Malonaldehyde is unstable and may be used as its sodium salt.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A See Appendix C (Aldehydes)
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Solid (needles).

MW: 72.1	BP: ?	MLT: 161°F	Sol: ?
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
Proteins [Note: Pure compound is stable under neutral conditions, but not under acidic conditions.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; central nervous system depression; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system

Cancer Site [in animals: thyroid gland tumors]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

bis-Chloromethyl ether	**CAS** 542-88-1
$(CH_2Cl)_2O$	**RTECS** KN1575000
Synonyms & Trade Names BCME, bis-CME, Chloromethyl ether, Dichlorodimethyl ether, Dichloromethyl ether, Oxybis(chloromethane)	**DOT ID & Guide** 2249 153

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1008] See Appendix B
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Colorless liquid with a suffocating odor.

MW: 115.0	BP: 223°F	FRZ: -43°F	Sol: Reacts
VP(72°F): 30 mmHg	IP: ?		Sp.Gr: 1.32
Fl.P: <66°F	UEL: ?	LEL: ?	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Acids, water [Note: Reacts with water to form hydrochloric acid & formaldehyde.]

Measurement Methods
OSHA 10
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet (flammable) Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane, respiratory system; pulmonary congestion, edema; corneal damage, necrosis; decreased pulmonary function, cough, dyspnea (breathing difficulty), wheezing; blood-stained sputum, bronchial secretions; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system

Cancer Site [lung cancer]

See also: INTRODUCTION See ICSC CARD: 0237 See MEDICAL TESTS: 0026

NIOSH Pocket Guide to Chemical Hazards

Cyclopentadiene	**CAS** 542-92-7
C_5H_6	**RTECS** GY1000000
Synonyms & Trade Names 1,3-Cyclopentadiene	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 75 ppm (200 mg/m^3)
	OSHA PEL: TWA 75 ppm (200 mg/m^3)
IDLH 750 ppm See: 542927	**Conversion** 1 ppm = 2.70 mg/m^3

Physical Description
Colorless liquid with an irritating, terpene-like odor.

MW: 66.1	BP: 107°F	FRZ: -121°F	Sol: Insoluble
VP: 400 mmHg	IP: 8.56 eV		Sp.Gr: 0.80
Fl.P(oc): 77°F	UEL: ?	LEL: ?	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, fuming nitric acid, sulfuric acid [Note: Polymerizes to dicyclopentadiene upon standing.]

Measurement Methods
NIOSH 2523
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 750 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose

Target Organs Eyes, respiratory system

See also: INTRODUCTION See ICSC CARD: 0857

NIOSH Pocket Guide to Chemical Hazards

Magnesite	**CAS** 546-93-0
$MgCO_3$	**RTECS** OM2470000
Synonyms & Trade Names Carbonate magnesium, Hydromagnesite, Magnesium carbonate, Magnesium(II) carbonate [Note: Magnesite is a naturally-occurring form of magnesium carbonate.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, odorless, crystalline powder.

MW: 84.3	BP: Decomposes	MLT: 662°F (Decomposes)	Sol: 0.01%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.96
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Acids, formaldehyde

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; cough	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0969

NIOSH Pocket Guide to Chemical Hazards

Trimellitic anhydride	**CAS** 552-30-7
$C_9H_4O_5$	**RTECS** DC2050000
Synonyms & Trade Names 1,2,4-Benzenetricarboxylic anhydride; 4-Carboxyphthalic anhydride; TMA; TMAN; Trimellic acid anhydride [Note: TMA is also a synonym for Trimethylamine.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.005 ppm (0.04 mg/m^3) Should be handled in the workplace as an extremely toxic substance.
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 7.86 mg/m^3

Physical Description
Colorless solid.

MW: 192.1	BP: ?	MLT: 322°F	Sol: ?
VP: 0.000004 mmHg	IP: ?		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5036; OSHA 98
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, respiratory system; pulmonary edema, respiratory sensitization; rhinitis, asthma, cough, wheezing, dyspnea (breathing difficulty), malaise (vague feeling of discomfort), fever, muscle aches, sneezing

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0345

NIOSH Pocket Guide to Chemical Hazards

Glycidol	**CAS** 556-52-5
$C_3H_6O_2$	**RTECS** UB4375000
Synonyms & Trade Names 2,3-Epoxy-1-propanol; Epoxypropyl alcohol; Glycide; Hydroxymethyl ethylene oxide; 2-Hydroxymethyl oxiran; 3-Hydroxypropylene oxide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 25 ppm (75 mg/m^3)
	OSHA PEL†: TWA 50 ppm (150 mg/m^3)
IDLH 150 ppm See: 556525	**Conversion** 1 ppm = 3.03 mg/m^3

Physical Description
Colorless liquid.

MW: 74.1	BP: 320°F (Decomposes)	FRZ: -49°F	Sol: Miscible
VP(77°F): 0.9 mmHg	IP: ?		Sp.Gr: 1.12
Fl.P: 162°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, nitrates

Measurement Methods
NIOSH 1608; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Water wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 150 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0159

NIOSH Pocket Guide to Chemical Hazards

Zinc stearate	**CAS** 557-05-1
$Zn(C_{18}H_{35}O_2)_2$	**RTECS** ZH5200000
Synonyms & Trade Names Dibasic zinc stearate, Zinc salt of stearic acid, Zinc distearate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Soft, white powder with a slight, characteristic odor.

MW: 632.4	BP: ?	MLT: 266°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.10
Fl.P(oc): 530°F	UEL: ?	LEL: ?	MEC: 20 g/m^3

Combustible Solid

Incompatibilities & Reactivities
Oxidizers, dilute acids [Note: Hydrophobic (i.e., repels water).]

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, upper respiratory system; cough
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0987

NIOSH Pocket Guide to Chemical Hazards

Carbon tetrabromide	**CAS** 558-13-4
CBr_4	**RTECS** FG4725000
Synonyms & Trade Names Carbon bromide, Methane tetrabromide, Tetrabromomethane	**DOT ID & Guide** 2516 151

Exposure Limits	NIOSH REL: TWA 0.1 ppm (1.4 mg/m^3) ST 0.3 ppm (4 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 13.57 mg/m^3

Physical Description
Colorless to yellow-brown crystals with a slight odor.

MW: 331.7	BP: 374°F	MLT: 194°F	Sol: 0.02%
VP(205°F): 40 mmHg	IP: 10.31 eV		Sp.Gr: 3.42
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers, hexacyclohexyldilead, lithium

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, respiratory system; lacrimation (discharge of tears); lung, liver, kidney injury; in animals: corneal damage
Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0474

NIOSH Pocket Guide to Chemical Hazards

Ethion	**CAS** 563-12-2
$[(C_2H_5O)_2P(S)S]_2CH_2$	**RTECS** TE4550000
Synonyms & Trade Names O,O,O',O'-Tetraethyl S,S'-methylene di(phosphorodithioate)	**DOT ID & Guide** 2783 152

Exposure Limits	NIOSH REL: 0.4 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless to amber-colored, odorless liquid. [insecticide] [Note: A solid below 10°F. The technical product has a very disagreeable odor.]

MW: 384.5	BP: >302°F (Decomposes)	FRZ: 10°F	Sol: 0.0001%
VP: 0.0000015 mmHg	IP: ?		Sp.Gr: 1.22
Fl.P: 349°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Acids, alkalis

Measurement Methods
NIOSH 5600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; nausea, vomiting, abdominal cramps, diarrhea, salivation; headache, dizziness, lassitude (weakness, exhaustion); rhinorrhea (discharge of thin mucus), chest tightness; blurred vision, miosis; cardiac irregularities; muscle fasciculation; dyspnea (breathing difficulty)

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0888

NIOSH Pocket Guide to Chemical Hazards

Methyl isopropyl ketone	**CAS** 563-80-4
$CH_3COCH(CH_3)_2$	**RTECS** EL9100000
Synonyms & Trade Names 2-Acetyl propane, Isopropyl methyl ketone, 3-Methyl-2-butanone, 3-Methyl butan-2-one, MIPK	**DOT ID & Guide** 2397 127

Exposure Limits	NIOSH REL: TWA 200 ppm (705 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.53 mg/m^3

Physical Description
Colorless liquid with an acetone-like odor.

MW: 86.2	BP: 199°F	FRZ: -134°F	Sol: Very slight
VP: 42 mmHg	IP: 9.32 eV		Sp.Gr: 0.81
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, mucous membrane, respiratory system; cough
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0922

NIOSH Pocket Guide to Chemical Hazards

2-Nitronaphthalene	**CAS** 581-89-5
$C_{10}H_7NO_2$	**RTECS** QJ9760000
Synonyms & Trade Names beta-Nitronaphthalene	**DOT ID & Guide** 2538 133

Exposure Limits	NIOSH REL: Ca* See Appendix A [*Note: Since metabolized to beta-Naphthylamine.]
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Colorless solid.

MW: 178.2	BP: ?	MLT: 174°F	Sol: Insoluble
VP: ?	IP: 8.67 eV		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
For "Nitrates" in general: Aluminum, cyanides, esters, phosphorus, tin chlorides, thiocyanates, sodium hypophosphite

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation skin, respiratory system; dermatitis; [potential occupational carcinogen]

Target Organs Skin, respiratory system

Cancer Site [bladder cancer]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

o-Methylcyclohexanone	**CAS** 583-60-8
$CH_3C_6H_9O$	**RTECS** GW1750000
Synonyms & Trade Names 2-Methylcyclohexanone	**DOT ID & Guide** 2297 127

Exposure Limits	NIOSH REL: TWA 50 ppm (230 mg/m^3) ST 75 ppm (345 mg/m^3) [skin]
	OSHA PEL†: TWA 100 ppm (460 mg/m^3) [skin]
IDLH 600 ppm See: 583608	**Conversion** 1 ppm = 4.59 mg/m^3

Physical Description
Colorless liquid with a weak, peppermint-like odor.

MW: 112.2	BP: 325°F	FRZ: 7°F	Sol: Insoluble
VP: 1 mmHg	IP: ?		Sp.Gr: 0.93
Fl.P: 118°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 2521
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any supplied-air respirator*
Up to 600 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, mucous membrane; narcosis; dermatitis

Target Organs Skin, respiratory system, liver, kidneys, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Toluene-2,4-diisocyanate	**CAS** 584-84-9
$CH_3C_6H_3(NCO)_2$	**RTECS** CZ6300000
Synonyms & Trade Names TDI; 2,4-TDI; 2,4-Toluene diisocyanate	**DOT ID & Guide** 2078 156

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: C 0.02 ppm (0.14 mg/m^3)
IDLH Ca [2.5 ppm] See: 584849	**Conversion** 1 ppm = 7.13 mg/m^3

Physical Description
Colorless to pale-yellow solid or liquid (above 71°F) with a sharp, pungent odor.

MW: 174.2	BP: 484°F	MLT: 71°F	Sol: Insoluble
VP(77°F): 0.01 mmHg	IP: ?		Sp.Gr: 1.22
Fl.P: 260°F	UEL: 9.5%	LEL: 0.9%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, water, acids, bases & amines (may cause foam & spatter); alcohols [Note: Reacts slowly with water to form carbon dioxide and polyureas.]

Measurement Methods
NIOSH 2535, 5521, 5522;OSHA 18, 33, 42
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; choke, paroxysmal cough; chest pain, retrosternal (occurring behind the sternum) soreness; nausea, vomiting, abdominal pain; bronchitis, bronchospasm, pulmonary edema; dyspnea (breathing difficulty), asthma; conjunctivitis, lacrimation (discharge of tears); dermatitis, skin sensitization; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system

Cancer Site [in animals: pancreas, liver, mammary gland, circulatory system & skin tumors]

See also: INTRODUCTION See ICSC CARD: 0339 See MEDICAL TESTS: 0233

NIOSH Pocket Guide to Chemical Hazards

2-Hexanone	**CAS** 591-78-6
$CH_3CO[CH_2]_3CH_3$	**RTECS** MP1400000
Synonyms & Trade Names Butyl methyl ketone, MBK, Methyl butyl ketone, Methyl n-butyl ketone	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 ppm (4 mg/m^3)
	OSHA PEL†: TWA 100 ppm (410 mg/m^3)
IDLH 1600 ppm See: 591786	**Conversion** 1 ppm = 4.10 mg/m^3

Physical Description
Colorless liquid with an acetone-like odor.

MW: 100.2	BP: 262°F	FRZ: -71°F	Sol: 2%
VP: 11 mmHg	IP: 9.34 eV		Sp.Gr: 0.81
Fl.P: 77°F	UEL: 8%	LEL: ?	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1300; OSHA PV2031
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 10 ppm: (APF = 10) Any supplied-air respirator
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 50 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1600 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; peripheral neuropathy: lassitude (weakness, exhaustion), paresthesia; dermatitis; headache, drowsiness

Target Organs Eyes, skin, respiratory system, central nervous system, peripheral nervous system

See also: INTRODUCTION See ICSC CARD: 0489 See MEDICAL TESTS: 0132

NIOSH Pocket Guide to Chemical Hazards

Vinyl bromide	**CAS** 593-60-2
CH_2=CHBr	**RTECS** KU8400000
Synonyms & Trade Names Bromoethene, Bromoethylene, Monobromoethylene	**DOT ID & Guide** 1085 116P (inhibited)

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion** 1 ppm = 4.38 mg/m^3

Physical Description
Colorless gas or liquid (below 60°F) with a pleasant odor. [Note: Shipped as a liquefied compressed gas with 0.1% phenol added to prevent polymerization.]

MW: 107.0	BP: 60°F	FRZ: -219°F	Sol: Insoluble
VP: 1.4 atm	IP: 9.80 eV	RGasD: 3.79	Sp.Gr: 1.49 (Liquid at 60°F)
Fl.P: NA (Gas)	UEL: 15%	LEL: 9%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Strong oxidizers (e.g., perchlorates, peroxides, chlorates, permanganates & nitrates.] [Note: May polymerize in sunlight.]

Measurement Methods
NIOSH 1009; OSHA 8
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (liquid) Eyes: Prevent eye contact (liquid) Wash skin: When contaminated (liquid) Remove: When wet (flammable) Change: No recommendation	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support Swallow: Medical attention immediately (liquid)

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion (liquid), skin and/or eye contact

Symptoms Irritation eyes, skin; dizziness, confusion, incoordination, narcosis, nausea, vomiting; liquid: frostbite; [potential occupational carcinogen]

Target Organs Eyes, skin, central nervous system, liver

Cancer Site [in animals: liver & lymph node tumors]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Perchloromethyl mercaptan	**CAS** 594-42-3
Cl_3CSCl	**RTECS** PB0370000
Synonyms & Trade Names PCM, PMM, Trichloromethane sulfenyl chloride, Trichloromethyl sulfur chloride	**DOT ID & Guide** 1670 157

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.8 mg/m^3)
	OSHA PEL: TWA 0.1 ppm (0.8 mg/m^3)
IDLH 10 ppm See: 594423	**Conversion** 1 ppm = 7.60 mg/m^3

Physical Description
Pale-yellow, oily liquid with an unbearable, acrid odor.

MW: 185.9	BP: 297°F (Decomposes)	FRZ: ?	Sol: Insoluble
VP: 3 mmHg	IP: ?		Sp.Gr: 1.69
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but will support combustion.

Incompatibilities & Reactivities
Alkalis, amines, hot iron, water [Note: Corrosive to most metals. Forms HCl, sulfur & CO_2 on contact with water.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 5 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 10 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; lacrimation (discharge of tears); cough, dyspnea (breathing difficulty), deep breathing pain, coarse rales; vomiting; pallor, tachycardia; acidosis; anuria; liver, kidney damage

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0311 See MEDICAL TESTS: 0180

NIOSH Pocket Guide to Chemical Hazards

1,1-Dichloro-1-nitroethane	**CAS** 594-72-9
$CH_3CCl_2NO_2$	**RTECS** KI1050000
Synonyms & Trade Names Dichloronitroethane	**DOT ID & Guide** 2650 153

Exposure Limits	NIOSH REL: TWA 2 ppm (10 mg/m^3)
	OSHA PEL†: C 10 ppm (60 mg/m^3)
IDLH 25 ppm See: 594729	**Conversion** 1 ppm = 5.89 mg/m^3

Physical Description
Colorless liquid with an unpleasant odor. [fumigant]

MW: 143.9	BP: 255°F	FRZ: ?	Sol: 0.3%
VP: 15 mmHg	IP: ?		Sp.Gr: 1.43
Fl.P: 136°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers [Note: Corrosive to iron in presence of moisture.]

Measurement Methods
NIOSH 1601; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 20 ppm: (APF = 10) Any supplied-air respirator
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, skin; liver, heart, kidney damage; pulmonary edema, hemorrhage

Target Organs Eyes, skin, respiratory system, liver, kidneys, cardiovascular system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

1-Chloro-1-nitropropane	**CAS** 600-25-9
$CH_3CH_2CHClNO_2$	**RTECS** TX5075000
Synonyms & Trade Names Korax®, Lanstan®	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2 ppm (10 mg/m^3)
	OSHA PEL†: TWA 20 ppm (100 mg/m^3)
IDLH 100 ppm See: 600259	**Conversion** 1 ppm = 5.06 mg/m^3

Physical Description
Colorless liquid with an unpleasant odor. [fungicide]

MW: 123.6	BP: 289°F	FRZ: ?	Sol: 0.5%
VP(77°F): 6 mmHg	IP: 9.90 eV		Sp.Gr: 1.21
Fl.P(oc): 144°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, acids

Measurement Methods
NIOSH S211 (II-5)
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 20 ppm: (APF = 10) Any supplied-air respirator*
Up to 50 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 100 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes; pulmonary edema; liver, kidney, heart damage

Target Organs respiratory system, liver, kidneys, cardiovascular system, eyes

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Triphenylamine	**CAS** 603-34-9
$(C_6H_5)_3N$	**RTECS** YK2680000
Synonyms & Trade Names N,N-Diphenylaniline; N,N-Diphenylbenzenamine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless solid.

MW: 245.3	BP: 689°F	MLT: 261°F	Sol: Insoluble
VP: ?	IP: 7.60 eV		Sp.Gr: 0.77
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: Daily
Remove: No recommendation
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms In animals: irritation skin
Target Organs Skin

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

2,4-Diaminoanisole (and its salts)	**CAS** 615-05-4
$(NH_2)_2C_6H_3OCH_3$	**RTECS** BZ8580500
Synonyms & Trade Names 1,3-Diamino-4-methoxybenzene; 4-Methoxy-1,3-benzene-diamine; 4-Methoxy-m-phenylene-diamine Synonyms of salts vary depending upon the specific compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca Minimize occupational exposure (especially skin exposures) See Appendix A
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Colorless solid (needles). [Note: The primary use (including its salts such as 2,4-diaminoanisole sulfate) is a component of hair & fur dye formulations.]

MW: 138.2	BP: ?	MLT: 153°F	Sol: ?
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms In animals: irritation skin; thyroid, liver changes; teratogenic effects; [potential occupational carcinogen]

Target Organs Skin, thyroid, liver, reproductive system

Cancer Site [in animals: thyroid, liver, skin & lymphatic system tumors]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Methyl isocyanate	**CAS** 624-83-9
CH_3NCO	**RTECS** NQ9450000
Synonyms & Trade Names Methyl ester of isocyanic acid, MIC	**DOT ID & Guide** 2480 155

Exposure Limits	NIOSH REL: TWA 0.02 ppm (0.05 mg/m^3) [skin]
	OSHA PEL: TWA 0.02 ppm (0.05 mg/m^3) [skin]
IDLH 3 ppm See: 624839	**Conversion** 1 ppm = 2.34 mg/m^3

Physical Description
Colorless liquid with a sharp, pungent odor.

MW: 57.1	BP: 139°F	FRZ: -49°F	Sol(59°F): 10%
VP: 348 mmHg	IP: 10.67 eV		Sp.Gr: 0.96
Fl.P: 19°F	UEL: 26%	LEL: 5.3%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Water, oxidizers, acids, alkalis, amines, iron, tin, copper [Note: Usually contains inhibitors to prevent polymerization.]

Measurement Methods
OSHA 54
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 0.2 ppm: (APF = 10) Any supplied-air respirator*
Up to 0.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 1 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 3 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; respiratory sensitization, cough, pulmonary secretions, chest pain, dyspnea (breathing difficulty); asthma; eye, skin damage; in animals: pulmonary edema

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0004 See MEDICAL TESTS: 0143

NIOSH Pocket Guide to Chemical Hazards

m-Phthalodinitrile	**CAS** 626-17-5
$C_6H_4(CN)_2$	**RTECS** CZ1900000
Synonyms & Trade Names 1,3-Benzenedicarbonitrile; m-Dicyanobenzene; 1,3-Dicyanobenzene; Isophthalodinitrile; m-PDN	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Needle-like, colorless to white, crystalline, flaky solid with an almond-like odor.

MW: 128.1	BP: Sublimes	MLT: 324°F (Sublimes)	Sol: Slight
VP: 0.01 mmHg	IP: ?		Sp.Gr: 4.42
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid and a severe explosion hazard.

Incompatibilities & Reactivities
Strong oxidizers (e.g., chlorine, bromine, fluorine)

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Headache, nausea, confusion; in animals: irritation eyes, skin	
Target Organs Eyes, skin, central nervous system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

sec-Amyl acetate	**CAS** 626-38-0
$CH_3COOCH(CH_3)C_3H_7$	**RTECS** AJ2100000
Synonyms & Trade Names 1-Methylbutyl acetate, 2-Pentanol acetate, 2-Pentyl ester of acetic acid	**DOT ID & Guide** 1104 129

Exposure Limits	NIOSH REL: TWA 125 ppm (650 mg/m^3)
	OSHA PEL: TWA 125 ppm (650 mg/m^3)
IDLH 1000 ppm See: 626380	**Conversion** 1 ppm = 5.33 mg/m^3

Physical Description
Colorless liquid with a mild odor.

MW: 130.2	BP: 249°F	FRZ: -109°F	Sol: Slight
VP: 7 mmHg	IP: ?		Sp.Gr: 0.87
Fl.P: 89°F	UEL: 7.5%	LEL: 1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1450, 2549; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1000 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; narcosis; dermatitis; possible kidney, liver injury; possible central nervous system depression

Target Organs Eyes, skin, respiratory system, kidneys, liver, central nervous system

See also: INTRODUCTION See ICSC CARD: 0219

NIOSH Pocket Guide to Chemical Hazards

n-Propyl nitrate	**CAS** 627-13-4
$CH_3CH_2CH_2ONO_2$	**RTECS** UK0350000
Synonyms & Trade Names Propyl ester of nitric acid	**DOT ID & Guide** 1865 131

Exposure Limits	NIOSH REL: TWA 25 ppm (105 mg/m^3) ST 40 ppm (170 mg/m^3)
	OSHA PEL†: TWA 25 ppm (110 mg/m^3)
IDLH 500 ppm See: 627134	**Conversion** 1 ppm = 4.30 mg/m^3

Physical Description
Colorless to straw-colored liquid with an ether-like odor.

MW: 105.1	BP: 231°F	FRZ: -148°F	Sol: Slight
VP: 18 mmHg	IP: 11.07 eV		Sp.Gr: 1.07
Fl.P: 68°F	UEL: 100%	LEL: 2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, combustible materials [Note: Forms explosive mixtures with combustible materials.]

Measurement Methods
NIOSH S227 (II-3); OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 250 ppm: (APF = 10) Any supplied-air respirator
Up to 500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, skin; methemoglobinemia, anoxia, cyanosis; dyspnea (breathing difficulty), lassitude (weakness, exhaustion), dizziness, headache

Target Organs Eyes, skin, blood

See also: INTRODUCTION See MEDICAL TESTS: 0198

NIOSH Pocket Guide to Chemical Hazards

n-Amyl acetate	**CAS** 628-63-7
$CH_3COO[CH_2]_4CH_3$	**RTECS** AJ1925000
Synonyms & Trade Names Amyl acetic ester, Amyl acetic ether, 1-Pentanol acetate, Pentyl ester of acetic acid, Primary amyl acetate	**DOT ID & Guide** 1104 129

Exposure Limits	NIOSH REL: TWA 100 ppm (525 mg/m^3)
	OSHA PEL: TWA 100 ppm (525 mg/m^3)
IDLH 1000 ppm See: 628637	**Conversion** 1 ppm = 5.33 mg/m^3

Physical Description
Colorless liquid with a persistent banana-like odor.

MW: 130.2	BP: 301°F	FRZ: -95°F	Sol: 0.2%
VP: 4 mmHg	IP: ?		Sp.Gr: 0.88
Fl.P: 77°F	UEL: 7.5%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Methods
NIOSH 1450, 2549; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1000 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; dermatitis; possible central nervous system depression, narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0218

NIOSH Pocket Guide to Chemical Hazards

Ethylene glycol dinitrate	**CAS** 628-96-6
$O_2NOCH_2CH_2ONO_2$	**RTECS** KW5600000
Synonyms & Trade Names EGDN; 1,2-Ethanediol dinitrate; Ethylene dinitrate; Ethylene nitrate; Glycol dinitrate; Nitroglycol	**DOT ID & Guide**

Exposure Limits	NIOSH REL: ST 0.1 mg/m^3 [skin]
	OSHA PEL†: C 0.2 ppm (1 mg/m^3) [skin]
IDLH 75 mg/m^3 See: 628966	**Conversion** 1 ppm = 6.22 mg/m^3

Physical Description
Colorless to yellow, oily, odorless liquid. [Note: An explosive ingredient (60-80%) in dynamite along with nitroglycerine (40-20%).]

MW: 152.1	BP: 387°F	FRZ: -8°F	Sol: Insoluble
VP: 0.05 mmHg	IP: ?		Sp.Gr: 1.49
Fl.P: 419°F	UEL: ?	LEL: ?	

Explosive Liquid

Incompatibilities & Reactivities
Acids, alkalis

Measurement Methods
NIOSH 2507; OSHA 43
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: Daily Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 1 mg/m^3: (APF = 10) Any supplied-air respirator*

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

Up to 5 mg/m^3: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 75 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Throbbing headache; dizziness; nausea, vomiting, abdominal pain; hypotension, flush, palpitations, angina; methemoglobinemia; delirium, central nervous system depression; irritation skin; in animals: anemia; liver, kidney damage

Target Organs Skin, cardiovascular system, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 1056 See MEDICAL TESTS: 0105

NIOSH Pocket Guide to Chemical Hazards

Carbon monoxide	**CAS** 630-08-0
CO	**RTECS** FG3500000
Synonyms & Trade Names Carbon oxide, Flue gas, Monoxide	**DOT ID & Guide** 1016 119 9202 168 (cryogenic liquid)

Exposure Limits	NIOSH REL: TWA 35 ppm (40 mg/m^3) C 200 ppm (229 mg/m^3)
	OSHA PEL†: TWA 50 ppm (55 mg/m^3)
IDLH 1200 ppm See: 630080	**Conversion** 1 ppm = 1.15 mg/m^3

Physical Description
Colorless, odorless gas. [Note: Shipped as a nonliquefied or liquefied compressed gas.]

MW: 28.0	BP: -313°F	MLT: -337°F	Sol: 2%
VP: >35 atm	IP: 14.01 eV	RGasD: 0.97	
Fl.P: NA (Gas)	UEL: 74%	LEL: 12.5%	

Flammable Gas

Incompatibilities & Reactivities
Strong oxidizers, bromine trifluoride, chlorine trifluoride, lithium

Measurement Methods
NIOSH 6604; OSHA ID209, ID210
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH

Up to 350 ppm: (APF = 10) Any supplied-air respirator

Up to 875 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 1200 ppm: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Headache, tachypnea, nausea, lassitude (weakness, exhaustion), dizziness, confusion, hallucinations; cyanosis; depressed S-T segment of electrocardiogram, angina, syncope

Target Organs cardiovascular system, lungs, blood, central nervous system

See also: INTRODUCTION See ICSC CARD: 0023 See MEDICAL TESTS: 0040

NIOSH Pocket Guide to Chemical Hazards

1,1,1,2-Tetrachloroethane	**CAS** 630-20-6
CCl_3CH_2Cl	**RTECS** KI8450000
Synonyms & Trade Names None	**DOT ID & Guide** 1702 151

Exposure Limits	NIOSH REL: Handle with caution in the workplace. See Appendix C (Chloroethanes)
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Yellowish-red liquid.

MW: 167.9	BP: 267°F	FRZ: -94°F	Sol: 0.1%
VP(77°F): 14 mmHg	IP: ?		Sp.Gr: 1.54
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
Potassium; sodium; dinitrogen tetraoxide; potassium hydroxide; nitrogen tetroxide; sodium potassium alloy; 2,4-dinitrophenyl disulfide

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin; lassitude (weakness, exhaustion), restlessness, irregular respiration, muscle incoordination; in animals: liver changes
Target Organs Eyes, skin, central nervous system, liver

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Phenylphosphine	**CAS** 638-21-1
$C_6H_5PH_2$	**RTECS** SZ2100000
Synonyms & Trade Names Fenylfosfin, PF, Phosphaniline	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 0.05 ppm (0.25 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.50 mg/m^3

Physical Description
Clear, colorless liquid with a foul odor.

MW: 110.1	BP: 320°F	FRZ: ?	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr(59°F): 1.001
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
None reported [Note: Spontaneously combustible in high concentrations in air. Potential exposure to gaseous PF when polyphosphinates are heated above 392°F.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: Daily
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms In animals: blood changes, anemia, testicular degeneration; loss of appetite, diarrhea, lacrimation (discharge of tears), hind leg tremor; dermatitis
Target Organs Blood, central nervous system, skin, reproductive system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Hexamethyl phosphoramide	**CAS** 680-31-9
$[(CH_3)_2N]_3PO$	**RTECS** TD0875000
Synonyms & Trade Names Hexamethylphosphoric triamide, Hexamethylphosphorotriamide, HMPA, Tris(dimethylamino)phosphine oxide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Clear, colorless liquid with an aromatic or mild, amine-like odor. [Note: A solid below 43°F.]

MW: 179.2	BP: 451°F	FRZ: 43°F	Sol: Miscible
VP: 0.03 mmHg	IP: ?		Sp.Gr: 1.03
Fl.P: 220°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Oxidizers, strong acids, chemically-active metals (e.g., potassium, sodium, magnesium, zinc)

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; dyspnea (breathing difficulty); abdominal pain; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract

Cancer Site [in animals: cancer of the nasal cavity]

See also: INTRODUCTION See ICSC CARD: 0162

NIOSH Pocket Guide to Chemical Hazards

Methyl silicate	**CAS** 681-84-5
$(CH_3O)_4Si$	**RTECS** VV9800000
Synonyms & Trade Names Methyl orthosilicate, Tetramethoxysilane, Tetramethyl ester of silicic acid, Tetramethyl silicate	**DOT ID & Guide** 2606 155

Exposure Limits	NIOSH REL: TWA 1 ppm (6 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.23 mg/m^3

Physical Description
Clear, colorless liquid. [Note: A solid below 28°F.]

MW: 152.3	BP: 250°F	FRZ: 28°F	Sol: Soluble
VP(77°F): 12 mmHg	IP: ?		Sp.Gr: 1.02
Fl.P: 205°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Oxidizers; hexafluorides of rhenium, molybdenum & tungsten

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: No recommendation Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, corneal damage (following even short-term exposure to the vapor); lung, kidney injury; pulmonary edema
Target Organs Eyes, respiratory system, kidneys

See also: INTRODUCTION See ICSC CARD: 1188

NIOSH Pocket Guide to Chemical Hazards

Hexafluoroacetone	**CAS** 684-16-2
$(CF_3)_2CO$	**RTECS** UC2450000
Synonyms & Trade Names Hexafluoro-2-propanone; 1,1,1,3,3,3-Hexafluoro-2-propanone; HFA; Perfluoroacetone	**DOT ID & Guide** 2420 125

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.7 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.79 mg/m^3

Physical Description
Colorless gas with a musty odor. [Note: Shipped as a liquefied compressed gas.]

MW: 166.0	BP: -18°F	FRZ: -188°F	Sol: Reacts
VP: 5.8 atm	IP: 11.81 eV	RGasD: 5.76	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas, but highly reactive with water & other substances, releasing heat.

Incompatibilities & Reactivities
Water, acids [Note: Hygroscopic (i.e., absorbs moisture from the air); reacts with moisture to form a highly acidic sesquihydrate.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact/Frostbite Eyes: Prevent eye contact/Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, skin and/or eye contact	
Symptoms Irritation eyes, skin, mucous membrane, respiratory system; pulmonary edema; liquid: frostbite; in animals: teratogenic, reproductive effects; kidney injury	
Target Organs Eyes, skin, respiratory system, kidneys, reproductive system	

See also: INTRODUCTION See ICSC CARD: 1057

NIOSH Pocket Guide to Chemical Hazards

N-Isopropylaniline	**CAS** 768-52-5
$C_6H_5NHCH(CH_3)_2$	**RTECS** BY4190000
Synonyms & Trade Names N-IPA, Isopropylaniline, N-(1-Methylethyl)-benzenamine, N-Phenylisopropylamine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2 ppm (10 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.53 mg/m^3

Physical Description
Clear, yellowish liquid with a sweet, aromatic odor.

MW: 135.2	BP: 397°F	FRZ: -58°F	Sol: ?
VP(77°F): 0.03 mmHg	IP: ?		Sp.Gr(60°F): 0.93
Fl.P(oc): 190°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
None reported

Measurement Methods
OSHA 78
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin; headache, lassitude (weakness, exhaustion), dizziness; cyanosis; ataxia; dyspnea (breathing difficulty) on effort; tachycardia; methemoglobinemia	
Target Organs Eyes, skin, respiratory system, blood, cardiovascular system, liver, kidneys	

See also: INTRODUCTION See ICSC CARD: 0909

NIOSH Pocket Guide to Chemical Hazards

Hexamethylene diisocyanate	**CAS** 822-06-0
$OCN[CH_2]_6NCO$	**RTECS** MO1740000
Synonyms & Trade Names 1,6-Diisocyanatohexane; HDI; Hexamethylene-1,6-diisocyanate; 1,6-Hexamethylene diisocyanate; HMDI	**DOT ID & Guide** 2281 156

Exposure Limits	NIOSH REL: TWA 0.005 ppm (0.035 mg/m^3) C 0.020 ppm (0.140 mg/m^3) [10-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.88 mg/m^3

Physical Description
Clear, colorless to slightly yellow liquid with a sharp, pungent odor.

MW: 168.2	BP: 415°F	FRZ: -89°F	Sol: Low (Reacts)
VP(77°F): 0.5 mmHg	IP:?		Sp.Gr(77°F): 1.04
Fl.P: 284°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Water, alcohols, strong bases, amines, carboxylic acids, organotin catalysts [Note: Reacts slowly with water to form carbon dioxide. Avoid heating above 392°F (polymerizes).]

Measurement Methods
NIOSH 5521, 5522; OSHA 42
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 0.05 ppm: (APF = 10) Any supplied-air respirator*

Up to 0.125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

Up to 0.25 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; cough, dyspnea (breathing difficulty), bronchitis, wheezing, pulmonary edema, asthma; corneal damage, skin blisters

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0278

NIOSH Pocket Guide to Chemical Hazards

Fonofos	**CAS** 944-22-9
$C_{10}H_{15}OPS_2$	**RTECS** TA5950000
Synonyms & Trade Names Dyfonate®, Dyphonate, O-Ethyl-S-phenyl ethylphosphorothioate, Fonophos	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 10.07 mg/m^3

Physical Description
Light-yellow liquid with an aromatic odor. [insecticide]

MW: 246.3	BP: ?	FRZ: ?	Sol: 0.001%
VP(77°F): 0.0002 mmHg	IP: ?		Sp.Gr: 1.15
Fl.P: >201°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5600; OSHA PV2027
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Nausea, vomiting, abdominal cramps, diarrhea, salivation; headache, dizziness, lassitude (weakness, exhaustion); rhinorrhea (discharge of thin mucus), chest tightness; blurred vision, miosis; cardiac irregularities; muscle fasciculation; dyspnea (breathing difficulty)

Target Organs respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0708

NIOSH Pocket Guide to Chemical Hazards

2-Hydroxypropyl acrylate	**CAS** 999-61-1
CH_2=CHCOOCH$_2$CHOHCH$_3$	**RTECS** AT1925000
Synonyms & Trade Names HPA, beta-Hydroxypropyl acrylate, Propylene glycol monoacrylate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.5 ppm (3 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.33 mg/m^3

Physical Description
Clear to light-yellow liquid wiith a sweetish, solvent odor.

MW: 130.2	BP: 376°F	FRZ: ?	Sol: ?
VP: ?	IP: ?		Sp.Gr: 1.05
Fl.P: 149°F	UEL: ?	LEL: 1.8%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Water [Note: Can become unstable at high temperatures & pressures or may react with water with some release of energy, but not violently.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, respiratory system; eye, skin burns; cough, dyspnea (breathing difficulty)
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0899

NIOSH Pocket Guide to Chemical Hazards

Propane sultone	**CAS** 1120-71-4
$C_3H_6O_3S$	**RTECS** RP5425000
Synonyms & Trade Names 3-Hydroxy-1-propanesulphonic acid sultone; 1,3-Propane sultone	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
White, crystalline solid or a colorless liquid (above 86°F). [Note: Releases a foul odor as it melts.]

MW: 122.2	BP: ?	MLT: 86°F	Sol: 10%
VP: ?	IP: ?		Sp.Gr: 1.39
Fl.P: >235°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentrationd: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system

Cancer Site [in animals: skin tumors, leukemia, gliomas]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

tert-Butyl chromate	**CAS** 1189-85-1
$[(CH_3)_3CO]_2CrO_2$	**RTECS** GB2900000
Synonyms & Trade Names di-tert-Butyl ester of chromic acid	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 0.001 mg Cr(VI)/m^3 See Appendix A See Appendix C
	OSHA PEL: C 0.1 mg CrO_3/m^3 [skin] See Appendix C
IDLH Ca [15 mg/m^3 {as Cr(VI)}] See: 1189851	**Conversion**

Physical Description
Liquid. [Note: Solidifies at 32-23°F.]

MW: 230.3	BP: ?	FRZ: 32-23°F	Sol: ?
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
Reducing agents, moisture, acids, alcohols, hydrazine, combustible materials

Measurement Methods
NIOSH 7604; OSHA ID103, ID215
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; eye, skin burns; drowsiness, muscle weakness; skin ulcers; lung changes; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system

Cancer Site [lung cancer]

See also: INTRODUCTION See MEDICAL TESTS: 0031

NIOSH Pocket Guide to Chemical Hazards

Xylidine	**CAS** 1300-73-8
$(CH_3)_2C_6H_3NH_2$	**RTECS** ZE8575000
Synonyms & Trade Names Aminodimethylbenzene, Aminoxylene, Dimethylaminobenzene, Dimethylaniline, Xylidine isomers (e.g., 2,4-Dimethylaniline) [Note: Dimethylaniline is also used as a synonym for N,N-Dimethylaniline.]	**DOT ID & Guide** 1711 153

Exposure Limits	NIOSH REL: TWA 2 ppm (10 mg/m^3) [skin]
	OSHA PEL†: TWA 5 ppm (25 mg/m^3) [skin]
IDLH 50 ppm See: 1300738	**Conversion** 1 ppm = 4.96 mg/m^3

Physical Description
Pale-yellow to brown liquid with a weak, aromatic, amine-like odor.

MW: 121.2	BP: 415-439°F	FRZ: -33°F	Sol: Slight
VP: <1 mmHg	IP: 7.65 eV (2,4-) 7.30 eV (2,6-)		Sp.Gr: 0.98
Fl.P: 206°F (2,3-)	UEL: ?	LEL: 1.0% (o-isomer)	

Class IIIB Combustible Liquid (2,3-)

Incompatibilities & Reactivities
Strong oxidizers, hypochlorite salts

Measurement Methods
NIOSH 2002
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 20 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator

Up to 50 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Anoxia, cyanosis, methemoglobinemia; lung, liver, kidney damage

Target Organs respiratory system, blood, liver, kidneys, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0600 See MEDICAL TESTS: 0244

NIOSH Pocket Guide to Chemical Hazards

Emery	**CAS** 1302-74-5 (corundum)
Al_2O_3	**RTECS** GN0231000 (corundum)
Synonyms & Trade Names Aluminum oxide, Aluminum trioxide, Corundum, Impure corundum, Natural aluminum oxide [Note: Emery is an impure variety of Al_2O_3 which may contain small impurities of iron, magnesium & silica Corundum is natural Al_2O	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Odorless, white, crystalline powder.

See alpha-Alumina for physical & chemical properties.			

Incompatibilities & Reactivities

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Boron oxide	**CAS** 1303-86-2
B_2O_3	**RTECS** ED7900000
Synonyms & Trade Names Boric anhydride, Boric oxide, Boron trioxide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3
	OSHA PEL†: TWA 15 mg/m^3
IDLH 2000 mg/m^3 See: 1303862	**Conversion**

Physical Description
Colorless, semitransparent lumps or hard, white, odorless crystals.

MW: 69.6	BP: 3380°F	MLT: 842°F	Sol: 3%
VP: 0 mmHg (approx)	IP: 13.50 eV		Sp.Gr: 2.46
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Water [Note: Reacts slowly with water to form boric acid.]

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush promptly
Breathing: Fresh air
Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 50 mg/m^3: (APF = 5) Any dust and mist respirator*

Up to 100 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators^*/(APF = 10) Any supplied-air respirator*

Up to 250 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter^*

Up to 500 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 2000 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; cough; conjunctivitis; skin erythema (skin redness)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0836

NIOSH Pocket Guide to Chemical Hazards

Borates, tetra, sodium salts (Decahydrate)	**CAS** 1303-96-4
$Na_2B_4O_7 \cdot 10H_2O$	**RTECS** VZ2275000
Synonyms & Trade Names Borax, Borax decahydrate, Sodium borate decahydrate, Sodium tetraborate decahydrate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, odorless, crystalline solid. [herbicide] [Note: Becomes anhydrous at 608°F.]

MW: 381.4	BP: 608°F	MLT: 167°F	Sol: 6%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.73
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid (an inherent fire retardant).

Incompatibilities & Reactivities
Zirconium, strong acids, metallic salts

Measurement Methods
NIOSH 0500; OSHA ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; dermatitis; epistaxis (nosebleed); cough, dyspnea (breathing difficulty)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0567

NIOSH Pocket Guide to Chemical Hazards

Bismuth telluride, undoped	**CAS** 1304-82-1
Bi_2Te_3	**RTECS** EB3110000
Synonyms & Trade Names Bismuth sesquitelluride, Bismuth telluride, Bismuth tritelluride, Tellurobismuthite	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Gray, crystalline solid.

MW: 800.8	BP: ?	MLT: 1063°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 7.7
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers (e.g., bromine, chlorine, or fluorine), moisture, nitric acid (decomposes)

Measurement Methods
NIOSH 0500, 0600; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; garlic breath	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Calcium hydroxide	**CAS** 1305-62-0
$Ca(OH)_2$	**RTECS** EW2800000
Synonyms & Trade Names Calcium hydrate, Caustic lime, Hydrated lime, Slaked lime	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL: TWA 15 mg/m^3 (total) 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, odorless powder. [Note: Readily absorbs CO_2 from the air to form calcium carbonate.]

MW: 74.1	BP: Decomposes	MLT: 1076°F (Decomposes) (Loses H_2O)	Sol(32°F): 0.2%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.24
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Maleic anhydride, phosphorus, nitroethane, nitromethane, nitroparaffins, nitropropane [Note: Attacks some metals.]

Measurement Methods
NIOSH 7020; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; eye, skin burns; skin vesiculation; cough, bronchitis, pneumonitis	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0408

NIOSH Pocket Guide to Chemical Hazards

Calcium oxide	**CAS** 1305-78-8
CaO	**RTECS** EW3100000
Synonyms & Trade Names Burned lime, Burnt lime, Lime, Pebble lime, Quick lime, Unslaked lime	**DOT ID & Guide** 1910 157

Exposure Limits	NIOSH REL: TWA 2 mg/m^3
	OSHA PEL: TWA 5 mg/m^3
IDLH 25 mg/m^3 See: 1305788	**Conversion**

Physical Description
White or gray, odorless lumps or granular powder.

MW: 56.1	BP: 5162°F	MLT: 4662°F	Sol: Reacts
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 3.34
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but will support combustion by liberation of oxygen.

Incompatibilities & Reactivities
Water (liberates heat), fluorine, ethanol [Note: Reacts with water to form calcium hydroxide.]

Measurement Methods
NIOSH 7020; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 10 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 20 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory tract; ulcer, perforation nasal septum; pneumonitis; dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0409

NIOSH Pocket Guide to Chemical Hazards

Cadmium fume (as Cd)	**CAS** 1306-19-0 (CdO)
CdO/Cd	**RTECS** EV1930000 (CdO)
Synonyms & Trade Names CdO: Cadmium monoxide, Cadmium oxide fume Cd: Cadmium	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: Ca See Appendix A [*Note: The REL applies to all Cadmium compounds (as Cd).]
	OSHA PEL*: [1910.1027] TWA 0.005 mg/m^3 [*Note: The PEL applies to all Cadmium compounds (as Cd).]
IDLH Ca [9 mg/m^3 (as Cd)] See: IDLH INDEX	**Conversion**

Physical Description
Odorless, yellow-brown, finely divided particulate dispersed in air. [Note: See listing for Cadmium dust for properties of Cd.]

MW: 128.4	BP: Decomposes	MLT: 2599°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.15 (crystalline form)/6.95 (amorphous form)
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Not applicable

Measurement Methods
NIOSH 7048; OSHA ID121, ID125G, ID189, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: Daily Remove: No recommendation Change: Daily	Breathing: Respiratory support

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; emphysema, proteinuria, anosmia (loss of the sense of smell), mild anemia; [potential occupational carcinogen]

Target Organs respiratory system, kidneys, blood

Cancer Site [prostatic & lung cancer]

See also: INTRODUCTION See ICSC CARD: 0117

NIOSH Pocket Guide to Chemical Hazards

Iron oxide dust and fume (as Fe)	**CAS** 1309-37-1
Fe_2O_3	**RTECS** NO7400000 NO7525000 (fume)
Synonyms & Trade Names Ferric oxide, Iron(III) oxide	**DOT ID & Guide** 1376 135 (spent)

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL: TWA 10 mg/m^3
IDLH 2500 mg/m^3 (as Fe) See: 1309371	**Conversion**

Physical Description
Reddish-brown solid. [Note: Exposure to fume may occur during the arc-welding of iron.]

MW: 159.7	BP: ?	MLT: 2664°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.24
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Calcium hypochlorite

Measurement Methods
NIOSH 7300; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Breathing: Respiratory support

Respirator Recommendations NIOSH

Up to 50 mg/m^3: (APF = 10) Any dust, mist, and fume respirator/(APF = 10) Any supplied-air respirator

Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter

Up to 250 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 2500 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis (siderosis)

Target Organs respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0122

NIOSH Pocket Guide to Chemical Hazards

Rouge	**CAS** 1309-37-1
Fe_2O_3	**RTECS** NO7400000
Synonyms & Trade Names Iron(III)oxide, Iron oxide red, Red iron oxide, Red oxide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: 1309371	**Conversion**

Physical Description
A fine, red powder of ferric oxide. [Note: Usually used in cake form or impregnated in paper or cloth.]

MW: 159.7	BP: ?	MLT: 2849°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.24
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Calcium hypochlorite, carbon monoxide, hydrogen peroxide

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Breathing: Fresh air

Respirator Recommendations To be added later
Exposure Routes inhalation, skin and/or eye contact
Symptoms Irritation eyes, skin, respiratory system
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0122

NIOSH Pocket Guide to Chemical Hazards

Magnesium oxide fume	**CAS** 1309-48-4
MgO	**RTECS** OM3850000
Synonyms & Trade Names Magnesia fume	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 15 mg/m^3
IDLH 750 mg/m^3 See: 1309484	**Conversion**

Physical Description
Finely divided white particulate dispersed in air. [Note: Exposure may occur when magnesium is burned, thermally cut, or welded upon.]

MW: 40.3	BP: 6512°F	MLT: 5072°F	Sol(86°F): 0.009%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 3.58
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Chlorine trifluoride, phosphorus pentachloride

Measurement Methods
NIOSH 7300; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Breathing: Respiratory support

Respirator Recommendations OSHA

Up to 150 mg/m^3: (APF = 10) Any dust, mist, and fume respirator/(APF = 10) Any supplied-air respirator

Up to 375 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter

Up to 750 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, nose; metal fume fever: cough, chest pain, flu-like fever

Target Organs Eyes, respiratory system

See also: INTRODUCTION See ICSC CARD: 0504

NIOSH Pocket Guide to Chemical Hazards

Potassium hydroxide	**CAS** 1310-58-3
KOH	**RTECS** TT2100000
Synonyms & Trade Names Caustic potash, Lye, Potassium hydrate	**DOT ID & Guide** 1813 154 (dry, solid) 1814 154 (solution)

Exposure Limits	NIOSH REL: C 2 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Odorless, white or slightly yellow lumps, rods, flakes, sticks, or pellets. [Note: May be used as an aqueous solution.]

MW: 56.1	BP: 2415°F	MLT: 716°F	Sol(59°F): 107%
VP(1317°F): 1 mmHg	IP: ?		Sp.Gr: 2.04
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid; however, may react with H_2O & other substances and generate sufficient heat to ignite combustible materials.

Incompatibilities & Reactivities
Acids, water, metals (when wet), halogenated hydrocarbons, maleic anhydride [Note: Heat is generated if KOH comes in contact with H_2O & CO_2 from the air.]

Measurement Methods
NIOSH 7401
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; cough, sneezing; eye, skin burns; vomiting, diarrhea	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0357

NIOSH Pocket Guide to Chemical Hazards

Sodium hydroxide	**CAS** 1310-73-2
NaOH	**RTECS** WB4900000
Synonyms & Trade Names Caustic soda, Lye, Soda lye, Sodium hydrate	**DOT ID & Guide** 1823 154 (dry, solid) 1824 154 (solution)

Exposure Limits	NIOSH REL: C 2 mg/m^3
	OSHA PEL†: TWA 2 mg/m^3
IDLH 10 mg/m^3 See: 1310732	**Conversion**

Physical Description
Colorless to white, odorless solid (flakes, beads, granular form).

MW: 40.0	BP: 2534°F	MLT: 605°F	Sol: 111%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.13
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but when in contact with water may generate sufficient heat to ignite combustible materials.

Incompatibilities & Reactivities
Water; acids; flammable liquids; organic halogens; metals such as aluminum, tin & zinc; nitromethane [Note: Corrosive to metals.]

Measurement Methods
NIOSH 7401
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 10 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; pneumonitis; eye, skin burns; temporary loss of hair

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0360 See MEDICAL TESTS: 0210

NIOSH Pocket Guide to Chemical Hazards

Zinc oxide	**CAS** 1314-13-2
ZnO	**RTECS** ZH4810000
Synonyms & Trade Names Zinc peroxide	**DOT ID & Guide** 1516 143

Exposure Limits	NIOSH REL: Dust: TWA 5 mg/m^3 C 15 mg/m^3 Fume: TWA 5 mg/m^3 ST 10 mg/m^3
	OSHA PEL†: TWA 5 mg/m^3 (fume) TWA 15 mg/m^3 (total dust) TWA 5 mg/m^3 (resp dust)
IDLH 500 mg/m^3 See: 1314132	**Conversion**

Physical Description
White, odorless solid.

MW: 81.4	BP: ?	MLT: 3587°F	Sol(64°F): 0.0004%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.61
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Chlorinated rubber (at 419°F), water [Note: Slowly decomposed by water.]

Measurement Methods
NIOSH 7502; OSHA ID121, ID143
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m^3: (APF = 10) Any dust, mist, and fume respirator/(APF = 10) Any supplied-air respirator

Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter

Up to 250 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 500 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function

Target Organs respiratory system

See also: INTRODUCTION See ICSC CARD: 0208 See MEDICAL TESTS: 0246

NIOSH Pocket Guide to Chemical Hazards

Vanadium dust	**CAS** 1314-62-1
V_2O_5	**RTECS** YW2450000
Synonyms & Trade Names Divanadium pentoxide dust, Vanadic anhydride dust, Vanadium oxide dust, Vanadium pentaoxide dust Other synonyms vary depending upon the specific vanadium compound.	**DOT ID & Guide** 2862 151

Exposure Limits	NIOSH REL*: C 0.05 mg V/m^3 [15-minute] [*Note: The REL applies to all vanadium compounds except Vanadium metal and Vanadium carbide (see Ferrovanadium dust).]
	OSHA PEL†: C 0.5 mg V_2O_5/m^3 (resp)
IDLH 35 mg/m^3 (as V) See: vandust	**Conversion**

Physical Description
Yellow-orange powder or dark-gray, odorless flakes dispersed in air.

MW: 181.9	BP: 3182°F (Decomposes)	MLT: 1274°F	Sol: 0.8%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 3.36
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may increase intensity of fire when in contact with combustible materials.

Incompatibilities & Reactivities
Lithium, chlorine trifluoride

Measurement Methods
NIOSH 7300, 7504; OSHA ID185
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH (as V)

Up to 0.5 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter*/(APF = 10) Any supplied-air respirator*

Up to 1.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter*

Up to 2.5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 35 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, throat; green tongue, metallic taste, eczema; cough; fine rales, wheezing, bronchitis, dyspnea (breathing difficulty)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0596 See MEDICAL TESTS: 0240

NIOSH Pocket Guide to Chemical Hazards

Vanadium fume	**CAS** 1314-62-1
V_2O_5	**RTECS** YW2460000
Synonyms & Trade Names Divanadium pentoxide fume, Vanadic anhydride fume, Vanadium oxide fume, Vanadium pentaoxide fume Other synonyms vary depending upon the specific vanadium compound.	**DOT ID & Guide** 2862 151

Exposure Limits	NIOSH REL: C 0.05 mg V/m^3 [15-minute]
	OSHA PEL†: C 0.1 mg V_2O_5/m^3
IDLH 35 mg/m^3 (as V) See: vanfume	**Conversion**

Physical Description
Finely divided particulate dispersed in air.

MW: 181.9	BP: 3182°F (Decomposes)	MLT: 1274°F	Sol: 0.8%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 3.36
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Lithium, chlorine trifluoride

Measurement Methods
NIOSH 7300, 7504; OSHA ID185
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Breathing: Respiratory support

Respirator Recommendations NIOSH (as V)

Up to 0.5 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter*/(APF = 10) Any supplied-air respirator*

Up to 1.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter*

Up to 2.5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 35 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, throat; green tongue, metallic taste; cough, fine rales, wheezing, bronchitis, dyspnea (breathing difficulty); eczema

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0596 See MEDICAL TESTS: 0240

NIOSH Pocket Guide to Chemical Hazards

Phosphorus pentasulfide	**CAS** 1314-80-3
P_2S_5/P_4S_{10}	**RTECS** TH4375000
Synonyms & Trade Names Phosphorus persulfide, Phosphorus sulfide, Sulfur phosphide	**DOT ID & Guide** 1340 139

Exposure Limits	NIOSH REL: TWA 1 mg/m^3 ST 3 mg/m^3
	OSHA PEL†: TWA 1 mg/m^3
IDLH 250 mg/m^3 See: 1314803	**Conversion**

Physical Description
Greenish-gray to yellow, crystalline solid with an odor of rotten eggs.

MW: 222.3/444.6	BP: 957°F	MLT: 550°F	Sol: Reacts
VP(572°F): 1 mmHg	IP: ?		Sp.Gr: 2.09
Fl.P: ?	UEL: ?	LEL: ?	

Flammable Solid, which may SPONTANEOUSLY ignite in presence of moisture.

Incompatibilities & Reactivities
Water, alcohols, strong oxidizers, acids, alkalis [Note: Reacts with water to form hydrogen sulfide, sulfur dioxide, and phosphoric acid.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Dust off solid; water flush Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 10 mg/m^3: (APF = 10) Any supplied-air respirator*

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

Up to 50 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 250 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; apnea, coma, convulsions; conjunctivitis pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), kerato-conjunctivity, corneal vesiculation; dizziness; headache; lassitude (weakness, exhaustion); irritability, insomnia; gastrointestinal disturbance

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See MEDICAL TESTS: 0190

NIOSH Pocket Guide to Chemical Hazards

Manganese tetroxide (as Mn)	**CAS** 1317-35-7
Mn_3O_4	**RTECS** OP0895000
Synonyms & Trade Names Manganese oxide, Manganomanganic oxide, Trimanganese tetraoxide, Trimanganese tetroxide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: C 5 mg/m^3
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Brownish-black powder. [Note: Fumes are generated whenever manganese oxides are heated strongly in air.]

MW: 228.8	BP: ?	MLT: 2847°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 4.88
Fl.P: NA	UEL: NA	LEL: NA	

Incompatibilities & Reactivities
Soluble in hydrochloric acid (liberates chlorine gas)

Measurement Methods
NIOSH 7300; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Asthenia, insomnia, mental confusion; low-back pain; vomiting; malaise (vague feeling of discomfort), lassitude (weakness, exhaustion); kidney damage; pneumonitis

Target Organs respiratory system, central nervous system, blood, kidneys

See also: INTRODUCTION See MEDICAL TESTS: 0131

NIOSH Pocket Guide to Chemical Hazards

Copper fume (as Cu)	**CAS** 1317-38-0 (CuO)
CuO/Cu	**RTECS** GL7900000 (CuO)
Synonyms & Trade Names CuO: Black copper oxide fume, Copper monoxide fume, Copper(II) oxide fume, Cupric oxide fume Cu: Copper fume [Note: Also see specific listing for Copper (dusts and mists).]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3
	OSHA PEL: TWA 0.1 mg/m^3
IDLH 100 mg/m^3 (as Cu) See: IDLH INDEX	**Conversion**

Physical Description
Finely divided black particulate dispersed in air. [Note: Exposure may occur in copper & brass plants and during the welding of copper alloys.]

MW: 79.5	BP: Decomposes	MLT: 1879°F (Decomposes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 6.4 (CuO)
Fl.P: NA	UEL: NA	LEL: NA	

CuO: Noncombustible Solid

Incompatibilities & Reactivities
CuO: Acetylene, zirconium [Note: See Copper (dusts and mists) for properties of Copper metal.]

Measurement Methods
NIOSH 7029; OSHA ID121, ID125G, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA

Up to 1 mg/m^3: (APF = 10) Any dust, mist, and fume respirator/(APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter

Up to 5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 100 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, upper respiratory system; metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough, lassitude (weakness, exhaustion); metallic or sweet taste; discoloration skin, hair

Target Organs Eyes, skin, respiratory system (increase(d) risk with Wilson's disease)

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Calcium carbonate	**CAS** 1317-65-3
$CaCO_3$	**RTECS** EV9580000
Synonyms & Trade Names Calcium salt of carbonic acid [Note: Occurs in nature as as limestone, chalk, marble, dolomite, aragonite, calcite & oyster shells.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, odorless powder or colorless crystals.

MW: 100.1	BP: Decomposes	MLT: 1517-2442°F (Decomposes)	Sol: 0.001%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.7-2.95
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Acids, alum, ammonium salts, mercury & hydrogen, fluorine, magnesium

Measurement Methods
NIOSH 7020; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; cough	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0503

NIOSH Pocket Guide to Chemical Hazards

Limestone	**CAS** 1317-65-3
$CaCO_3$	**RTECS** EV9580000
Synonyms & Trade Names Calcium carbonate, Natural calcium carbonate [Note: Calcite & aragonite are commercially important natural calcium carbonates.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Odorless, white to tan powder.

MW: 100.1	BP: Decomposes	MLT: 1517-2442°F (Decomposes)	Sol: 0.001%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.7-2.9
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Fluorine, magnesium, acids, alum, ammonium salts

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air

Respirator Recommendations To be added later

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; cough, sneezing, rhinorrhea (discharge of thin mucus); lacrimation (discharge of tears)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0503

NIOSH Pocket Guide to Chemical Hazards

Marble	**CAS** 1317-65-3
$CaCO_3$	**RTECS** EV9580000
Synonyms & Trade Names Calcium carbonate, Natural calcium carbonate [Note: Marble is a metamorphic form of calcium carbonate.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Odorless, white powder.

MW: 100.1	BP: Decomposes	MLT: 1517-2442°F (Decomposes)	Sol: 0.001%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.7-2.9
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Fluorine, magnesium, acids, alum, ammonium salts

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air

Respirator Recommendations To be added later

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane, upper respiratory system; cough, sneezing, rhinorrhea (discharge of thin mucus); lacrimation (discharge of tears)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0503

NIOSH Pocket Guide to Chemical Hazards

Pentachloronaphthalene	**CAS** 1321-64-8
$C_{10}H_3Cl_5$	**RTECS** QK0300000
Synonyms & Trade Names Halowax® 1013; 1,2,3,4,5-Pentachloronaphthalene	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 [skin]
	OSHA PEL: TWA 0.5 mg/m^3 [skin]
IDLH Unknown See: 1321648	**Conversion**

Physical Description
Pale-yellow or white solid or powder with an aromatic odor.

MW: 300.4	BP: 636°F	MLT: 248°F	Sol: Insoluble
VP: <1 mmHg	IP: ?		Sp.Gr: 1.67
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH S96 (II-2)
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap promptly/molten flush immediately
Breathing: Respiratory support
Swallow: Medical Attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Headache, lassitude (weakness, exhaustion), dizziness, anorexia; pruritus, acne-form skin eruptions; jaundice, liver necrosis

Target Organs Skin, liver, central nervous system

See also: INTRODUCTION See ICSC CARD: 0935 See MEDICAL TESTS: 0177

NIOSH Pocket Guide to Chemical Hazards

Trichloronaphthalene	**CAS** 1321-65-9
$C_{10}H_5Cl_3$	**RTECS** QK4025000
Synonyms & Trade Names Halowax®, Nibren wax, Seekay wax	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3 [skin]
	OSHA PEL: TWA 5 mg/m^3 [skin]
IDLH Unknown See: 1321659	**Conversion**

Physical Description
Colorless to pale-yellow solid with an aromatic odor.

MW: 231.5	BP: 579-669°F	MLT: 199°F	Sol: Insoluble
VP: <1 mmHg	IP: ?		Sp.Gr: 1.58
Fl.P(oc): 392°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH S128 (II-2)
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Anorexia, nausea; dizziness; jaundice, liver injury

Target Organs Liver

See also: INTRODUCTION See ICSC CARD: 0962 See MEDICAL TESTS: 0237

NIOSH Pocket Guide to Chemical Hazards

Divinyl benzene	**CAS** 1321-74-0 (mixed isomers)
$C_6H_4(HC{=}CH_2)_2$	**RTECS** CZ9370000
Synonyms & Trade Names Diethyl benzene, DVB, Vinylstyrene [Note: Commercial product contains all 3 isomers, but m-isomer predominates. Usually contains an inhibitor to prevent polymerization.]	**DOT ID & Guide** 2049 130

Exposure Limits	NIOSH REL: TWA 10 ppm (50 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.33 mg/m^3

Physical Description
Pale, straw-colored liquid.

MW: 130.2	BP: 392°F	FRZ: -88°F	Sol: 0.005%
VP: 0.7 mmHg	IP: ?		Sp.Gr: 0.93
Fl.P(oc): 169°F	UEL: 6.2%	LEL: 1.1%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
None reported

Measurement Methods
OSHA 89
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; skin burns; in animals: central nervous system depression	
Target Organs Eyes, skin, respiratory system, central nervous system	

See also: INTRODUCTION See ICSC CARD: 0885

NIOSH Pocket Guide to Chemical Hazards

Borates, tetra, sodium salts (Anhydrous)	**CAS** 1330-43-4
$Na_2B_4O_7$	**RTECS** ED4588000
Synonyms & Trade Names Anhydrous borax, Borax dehydrated, Disodium salt of boric acid, Disodium tetrabromate, Fused borax, Sodium borate (anhydrous), Sodium tetraborate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White to gray, odorless powder. [herbicide] [Note: Becomes opaque on exposure to air.]

MW: 201.2	BP: 2867°F (Decomposes)	MLT: 1366°F	Sol: 4%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.37
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Moisture [Note: Forms partial hydrate in moist air.]

Measurement Methods
NIOSH 0500; OSHA ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; dermatitis; epistaxis (nosebleed); cough, dyspnea (breathing difficulty)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 1229

NIOSH Pocket Guide to Chemical Hazards

Asbestos	**CAS** 1332-21-4
Hydrated mineral silicates	**RTECS** CI6475000
Synonyms & Trade Names Actinolite, Actinolite asbestos, Amosite (cummingtonite-grunerite), Anthophyllite, Anthophyllite asbestos, Chrysotile, Crocidolite (Riebeckite), Tremolite, Tremolite asbestos	**DOT ID & Guide** 2212 171 (blue, brown) 2590 171 (white)

Exposure Limits	NIOSH REL: Ca See Appendix A See Appendix C
	OSHA PEL: [1910.1001] [1910.1101] See Appendix C
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite) fibrous, odorless solids.

MW: Varies	BP: Decomposes	MLT: 1112°F (Decomposes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solids

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 7400, 7402; OSHA ID160, ID191
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Breathing: Fresh air

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Asbestosis (chronic exposure): dyspnea (breathing difficulty), interstitial fibrosis, restricted pulmonary function, finger clubbing; irritation eyes; [potential occupational carcinogen]

Target Organs respiratory system, eyes

Cancer Site [lung cancer]

See also: INTRODUCTION See MEDICAL TESTS: 0019

NIOSH Pocket Guide to Chemical Hazards

Kaolin	**CAS** 1332-58-7
	RTECS GF1670500
Synonyms & Trade Names China clay, Clay, Hydrated aluminum silicate, Hydrite, Porcelain clay [Note: Main constituent of Kaolin is Kaolinite ($Al_2Si_2O_5(OH)_4$).]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White to yellowish or grayish powder. [Note: When moistened, darkens & develops a clay-like odor.]

MW: varies	BP: ?	MLT: ?	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.8-2.6
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Chronic pulmonary fibrosis, stomach granuloma	
Target Organs respiratory system, stomach	

See also: INTRODUCTION See ICSC CARD: 1144

NIOSH Pocket Guide to Chemical Hazards

Chromic acid and chromates	**CAS** 1333-82-0 (CrO_3)
CrO_3 (acid)	**RTECS** GB6650000 (CrO_3)
Synonyms & Trade Names Chromic acid (CrO_3): Chromic anhydride, Chromic oxide, Chromium(VI) oxide (1:3), Chromium trioxide Synonyms of chromates (i.e., chromium(VI) compounds) such as zinc chromate vary depending upon the specific compound.	**DOT ID & Guide** 1755 154 (acid solution) 1463 141 (acid, solid)

Exposure Limits	NIOSH REL (as Cr): Ca TWA 0.001 mg/m^3 See Appendix A See Appendix C
	OSHA PEL (as CrO_3): C 0.1 mg/m^3 See Appendix C
IDLH Ca [15 mg/m^3 {as Cr(VI)}] See: 1333820	**Conversion**

Physical Description
CrO_3: Dark-red, odorless flakes or powder. [Note: Often used in an aqueous solution (H_2CrO_4).]

MW: 100.0	BP: 482°F (Decomposes)	MLT: 387°F (Decomposes)	Sol: 63%
VP: Very low	IP: NA		Sp.Gr: 2.70 (CrO_3)
Fl.P: NA	UEL: NA	LEL: NA	

CrO_3: Noncombustible Solid, but will accelerate the burning of combustible materials.

Incompatibilities & Reactivities
Combustible, organic, or other readily oxidizable materials (paper, wood, sulfur, aluminum, plastics, etc.); corrosive to metals

Measurement Methods
NIOSH 7600, 7604; OSHA ID103, ID215
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation respiratory system; nasal septum perforation; liver, kidney damage; leukocytosis (increased blood leukocytes), leukopenia (reduced blood leukocytes), eosinophilia; eye injury, conjunctivitis; skin ulcer, sensitization dermatitis; [potential occupational carcinogen]

Target Organs Blood, respiratory system, liver, kidneys, eyes, skin

Cancer Site [lung cancer]

See also: INTRODUCTION See ICSC CARD: 1194 See MEDICAL TESTS: 0051

NIOSH Pocket Guide to Chemical Hazards

Carbon black	**CAS** 1333-86-4
C	**RTECS** FF5800000
Synonyms & Trade Names Acetylene black, Channel black, Furnace black, Lamp black, Thermal black	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 3.5 mg/m^3 Ca TWA 0.1 mg PAHs/m^3 [Carbon black in presence of polycyclic aromatic hydrocarbons (PAHs)] See Appendix A See Appendix C
	OSHA PEL: TWA 3.5 mg/m^3
IDLH 1750 mg/m^3 See: 1333864	**Conversion**

Physical Description
Black, odorless solid.

MW: 12.0	BP: Sublimes	MLT: Sublimes	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.8-2.1
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid that may contain flammable hydrocarbons.

Incompatibilities & Reactivities
Strong oxidizers such as chlorates, bromates & nitrates

Measurement Methods
NIOSH 5000; OSHA ID196
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: No recommendation	Eye: Irrigate promptly Breathing: Fresh air

Respirator Recommendations NIOSH/OSHA

Up to 17.5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 35 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 87.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 175 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1750 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

In presence of polycyclicaromatic hydrocarbons:

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Cough; irritation eyes; in presence of polycyclic aromatic hydrocarbons: [potential occupational carcinogen]
Target Organs respiratory system, eyes **Cancer Site** [lymphatic cancer (in presence of PAHs)]

See also: INTRODUCTION See ICSC CARD: 0471 See MEDICAL TESTS: 0038

NIOSH Pocket Guide to Chemical Hazards

Hexachloronaphthalene	**CAS** 1335-87-1
$C_{10}H_2Cl_6$	**RTECS** QJ7350000
Synonyms & Trade Names Halowax® 1014	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.2 mg/m^3 [skin]
	OSHA PEL: TWA 0.2 mg/m^3 [skin]
IDLH 2 mg/m^3 See: 1335871	**Conversion**

Physical Description
White to light-yellow solid with an aromatic odor.

MW: 334.9	BP: 650-730°F	MLT: 279°F	Sol: Insoluble
VP: <1 mmHg	IP: ?		Sp.Gr: 1.78
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH S100 (II-2)
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2 mg/m^3: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Acne-form dermatitis, nausea, confusion, jaundice, coma

Target Organs Skin, liver

See also: INTRODUCTION See ICSC CARD: 0997 See MEDICAL TESTS: 0113

NIOSH Pocket Guide to Chemical Hazards

Tetrachloronaphthalene	**CAS** 1335-88-2
$C_{10}H_4Cl_4$	**RTECS** QK3700000
Synonyms & Trade Names Halowax®, Nibren wax, Seekay wax	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2 mg/m^3 [skin]
	OSHA PEL: TWA 2 mg/m^3 [skin]
IDLH Unknown See: 1335882	**Conversion**

Physical Description
Colorless to pale-yellow solid with an aromatic odor.

MW: 265.9	BP: 599-680°F	MLT: 360°F	Sol: Insoluble
VP: <1 mmHg	IP: ?		Sp.Gr: 1.59-1.65
Fl.P(oc): 410°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH S130 (II-2)
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 20 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Acne-form dermatitis; headache, lassitude (weakness, exhaustion), anorexia, dizziness; jaundice, liver injury

Target Organs Liver, skin, central nervous system

See also: INTRODUCTION See ICSC CARD: 1387 See MEDICAL TESTS: 0223

NIOSH Pocket Guide to Chemical Hazards

Methyl ethyl ketone peroxide	**CAS** 1338-23-4
$C_8H_{16}O_4$	**RTECS** EL9450000
Synonyms & Trade Names 2-Butanone peroxide, Ethyl methyl ketone peroxide, MEKP, MEK peroxide, Methyl ethyl ketone hydroperoxide	**DOT ID & Guide** 2550 147

Exposure Limits	NIOSH REL: C 0.2 ppm (1.5 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 7.21 mg/m^3

Physical Description
Colorless liquid with a characteristic odor. [Note: Explosive decomposition occurs at 230°F.]

MW: 176.2	BP: 244°F (Decomposes)	FRZ: ?	Sol: Soluble
VP: ?	IP: ?		Sp.Gr(59°F): 1.12
Fl.P(oc): 125-200°F (60% MEKP)	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Organic materials, heat, flames, sunlight, trace contaminants [Note: A strong oxidizing agent. Pure MEKP is shock sensitive. Commercial product is diluted with 40% dimethyl phthalate, cyclohexane peroxide, or diallyl phthalate to reduce sensitivity to shock.]

Measurement Methods
NIOSH 3508; OSHA 77
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, nose, throat; cough, dyspnea (breathing difficulty), pulmonary edema; blurred vision; blisters, scars skin; abdominal pain, vomiting, diarrhea; dermatitis; in animals: liver, kidney damage	
Target Organs Eyes, skin, respiratory system, liver, kidneys	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

alpha-Alumina	**CAS** 1344-28-1
Al_2O_3	**RTECS** BD1200000
Synonyms & Trade Names Alumina, Aluminum oxide, Aluminum trioxide [Note: alpha-Alumina is the main component of technical grade alumina. Corundum is natural Al_2O_3. Emery is an impure crystalline variety of Al_2O_3.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, odorless, crystalline powder.

MW: 101.9	BP: 5396°F	MLT: 3632°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 4.0
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible solid, but dusts may form explosive mixtures in air.

Incompatibilities & Reactivities
Chlorine trifluoride, hot chlorinated rubber, acids, oxidizers [Note: Hydrogen gas may be formed when finely divided iron contacts moisture during crushing & milling operations.]

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Blot/brush away Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes Irritation eyes, skin, respiratory system

Symptoms irritation eyes, skin, respiratory system

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0351

NIOSH Pocket Guide to Chemical Hazards

Calcium silicate	**CAS** 1344-95-2
$CaSiO_3$	**RTECS** VV9150000
Synonyms & Trade Names Calcium hydrosilicate, Calcium metasilicate, Calcium monosilicate, Calcium salt of silicic acid, Wollastonite (mineral)	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White or cream-colored, free-flowing powder. [Note: The commercial product is prepared from diatomaceous earth & lime.]

MW: 116.2	BP: ?	MLT: 2804°F	Sol: 0.01%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.9
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported [Note: After prolonged contact with water, solution reverts to soluble calcium salts & amorphous silica.]

Measurement Methods
NIOSH 7020; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Subtilisins	**CAS** 1395-21-7 (BPN) 9014-01-1 (Carlsburg)
	RTECS CO9450000 (BPN) CO9550000 (Carlsburg)
Synonyms & Trade Names Bacillus subtilis, Bacillus subtilis BPN, Bacillus subtilis Carlsburg, Proteolytic enzymes, Subtilisin BPN, Subtilisin Carlsburg [Note: Commercial proteolytic enzymes are used in laundry detergents.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: ST 0.00006 mg/m^3 [60-minute]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Light-colored, free-flowing powders. [Note: A protein containing numerous amino acids.]

MW: 28,000 (approx)	BP: ?	MLT: ?	Sol: ?
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; respiratory sensitization (enzyme asthma): sweating, headache, chest pain, flu-like symptoms, cough, breathlessness, wheezing

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

1-Nonanethiol	**CAS** 1455-21-6
$CH_3(CH_2)_8SH$	**RTECS**
Synonyms & Trade Names 1-Mercaptononane, n-Nonyl mercaptan, Nonylthiol	**DOT ID & Guide** 1228 131

Exposure Limits	NIOSH REL: C 0.5 ppm (3.3 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.56 mg/m^3

Physical Description
Liquid.

MW: 160.3	BP: ?	FRZ: ?	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Oxidizers, reducing agents, strong acids & bases, alkali metals

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; lassitude (weakness, exhaustion), cyanosis, increased respiration, nausea, drowsiness, headache, vomiting

Target Organs Eyes, skin, respiratory system, blood, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

m-Xylene-alpha,alpha'-diamine	**CAS** 1477-55-0
$C_6H_4(CH_2NH_2)_2$	**RTECS** PF8970000
Synonyms & Trade Names 1,3-bis(Aminomethyl)benzene; 1,3-Benzenedimethanamine; MXDA; m-Phenylenebis(methylamine); m-Xylylenediamine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 0.1 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless liquid.

MW: 136.2	BP: 477°F	FRZ: 58°F	Sol: Miscible
VP(77°F): 0.03 mmHg	IP: ?		Sp.Gr: 1.032
Fl.P: 243°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
None reported

Measurement Methods
OSHA 105
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms In animals: irritation eyes, skin; liver, kidney, lung damage	
Target Organs Eyes, skin, respiratory system, liver, kidneys	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Carbofuran	**CAS** 1563-66-2
$C_{12}H_{15}NO_3$	**RTECS** FB9450000
Synonyms & Trade Names 2,3-Dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate; Furacarb®; Furadan®	**DOT ID & Guide** 2757 151

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Odorless, white or grayish, crystalline solid. [insecticide] [Note: May be dissolved in a liquid carrier.]

MW: 221.3	BP: ?	MLT: 304°F	Sol(77°F): 0.07%
VP(77°F): 0.000003 mmHg	IP: NA		Sp.Gr: 1.18
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Alkaline substances, acid, strong oxidizers (e.g., perchlorates, peroxides, chlorates, nitrates, permanganates)

Measurement Methods
NIOSH 5006, 5601; OSHA 63
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Miosis, blurred vision; sweating, salivation, abdominal cramps, diarrhea, headache, nausea, vomiting; lassitude (weakness, exhaustion), muscle twitching, incoordination, convulsions

Target Organs central nervous system, peripheral nervous system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0122

NIOSH Pocket Guide to Chemical Hazards

Cyclohexanethiol	**CAS** 1569-69-3
$C_6H_{11}SH$	**RTECS** GV7525000
Synonyms & Trade Names Cyclohexylmercaptan, Cyclohexylthiol	**DOT ID & Guide** 3054 131

Exposure Limits	NIOSH REL: C 0.5 ppm (2.4 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.75 mg/m^3

Physical Description
Colorless liquid with a strong, offensive odor.

MW: 116.2	BP: 316°F	FRZ: -181°F	Sol: Insoluble
VP: 10 mmHg	IP: ?		Sp.Gr: 0.98
Fl.P: 110°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Oxidizers, reducing agents, strong acids, alkali metals

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; headache, dizziness, lassitude (weakness, exhaustion), nausea, vomiting, convulsions; cough, wheezing, laryngitis, dyspnea (breathing difficulty)

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0032

NIOSH Pocket Guide to Chemical Hazards

1-Heptanethiol	**CAS** 1639-09-4
$CH_3[CH_2]_6SH$	**RTECS** MJ1400000
Synonyms & Trade Names Heptyl mercaptan, n-Heptyl mercaptan	**DOT ID & Guide** 1228 131

Exposure Limits	NIOSH REL: C 0.5 ppm (2.7 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.41 mg/m^3

Physical Description
Colorless liquid with a strong odor.

MW: 132.3	BP: 351°F	FRZ: -46°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.84
Fl.P: 115°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Oxidizers, reducing agents, strong acids & bases, alkali metals

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; lassitude (weakness, exhaustion), cyanosis, increased respiration, nausea, drowsiness, headache, vomiting

Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Dimethylaminopropionitrile	**CAS** 1738-25-6
$(CH_3)_2NCH_2CH_2CN$	**RTECS** UG1575000
Synonyms & Trade Names 3-(Dimethylamino)propionitrile; N,N-Dimethylamino-3-propionitrile [Note: A component (95%) of NIAX® Catalyst ESN, along with bis(2-(dimethylamino)ethyl) ether (5%).]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix C (NIAX® Catalyst ESN)
	OSHA PEL: See Appendix C (NIAX® Catalyst ESN)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless liquid.

MW: 98.2	BP: 342°F	FRZ: -48°F	Sol: Miscible
VP(135°F): 10 mmHg	IP: ?		Sp.Gr(86°F): 0.86
Fl.P: 147°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Oxidizers [Note: Emits toxic oxides of nitrogen and cyanide fumes when heated to decomposition.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; urinary disturbance; neurological disorders; pins & needles in hands & feet; muscle weakness, lassitude (weakness, exhaustion), nausea, vomiting; decreased nerve conduction in lower legs

Target Organs Eyes, skin, central nervous system, urinary tract

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

2,3,7,8-Tetrachloro-dibenzo-p-dioxin	**CAS** 1746-01-6
$C_{12}H_4Cl_4O_2$	**RTECS** HP3500000
Synonyms & Trade Names Dioxin; Dioxine; TCDBD; TCDD; 2,3,7,8-TCDD [Note: Formed during past production of 2,4,5-trichlorophenol, 2,4,5-T & 2(2,4,5-trichlorophenoxy)propionic acid.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Colorless to white, crystalline solid. [Note: Exposure may occur through contact at previously contaminated worksites.]

MW: 322.0	BP: Decomposes	MLT: 581°F	Sol: 0.00000002%
VP(77°F): 0.000002 mmHg	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
UV light (decomposes)

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; allergic dermatitis, chloracne; porphyria; gastrointestinal disturbance; possible reproductive, teratogenic effects; in animals: liver, kidney damage; hemorrhage; [potential occupational carcinogen]

Target Organs Eyes, skin, liver, kidneys, reproductive system

Cancer Site [in animals: tumors at many sites]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Paraquat (Paraquat dichloride)	**CAS** 1910-42-5
$CH_3(C_5H_4N)_2CH_3 \cdot 2Cl$	**RTECS** DW2275000
Synonyms & Trade Names 1,1'-Dimethyl-4,4'-bipyridinium dichloride; N,N'-Dimethyl-4,4'-bipyridinium dichloride; Paraquat chloride; Paraquat dichloride [Note: Paraquat is a cation ($C_{12}H_{14}N_2$++; 1,1-Dimethyl-4,4-bipyridinium ion); the commercial product is the dichloride salt of paraquat.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 (resp) [skin]
	OSHA PEL†: TWA 0.5 mg/m^3 (resp) [skin]
IDLH 1 mg/m^3 See: 1910425	**Conversion**

Physical Description
Yellow solid with a faint, ammonia-like odor. [herbicide] [Note: Paraquat may also be found commercially as a methyl sulfate salt $C_{12}H_{14}N_2 \cdot 2CH_3SO_4$.]

MW: 257.2	BP: Decomposes	MLT: 572°F (Decomposes)	Sol: Miscible
VP: <0.0000001 mmHg	IP: ?		Sp.Gr: 1.24
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers, alkylaryl-sulfonate wetting agents [Note: Corrosive to metals. Decomposes in presence of ultraviolet light.]

Measurement Methods
NIOSH 5003
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 1 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; epistaxis (nosebleed); dermatitis; fingernail damage; irritation gastrointestinal tract; heart, liver, kidney damage

Target Organs Eyes, skin, respiratory system, heart, liver, kidneys, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 0005

NIOSH Pocket Guide to Chemical Hazards

Atrazine	**CAS** 1912-24-9
$C_8H_{14}ClN_5$	**RTECS** XY5600000
Synonyms & Trade Names 2-Chloro-4-ethylamino-6-isopropylamino-s-triazine; 6-Chloro-N-ethyl-N'- (1-methylethyl)-1,3,5-triazine-2,4-diamine	**DOT ID & Guide** 2763 151 (triazine pesticide)

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless or white, odorless, crystalline powder. [herbicide]

MW: 215.7	BP: Decomposes	MLT: 340°F	Sol: 0.003%
VP: 0.0000003 mmHg	IP: NA		Sp.Gr: 1.19
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be mixed with flammable liquids.

Incompatibilities & Reactivities
Strong acids, strong bases

Measurement Methods
NIOSH 5602
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin; dermatitis, sensitization skin; dyspnea (breathing difficulty), lassitude (weakness, exhaustion), incoordination, salivation; hypothermia; liver injury	
Target Organs Eyes, skin, respiratory system, central nervous system, liver	

See also: INTRODUCTION See ICSC CARD: 0099

NIOSH Pocket Guide to Chemical Hazards

Picloram	**CAS** 1918-02-1
$C_6H_3Cl_3O_2N_2$	**RTECS** TJ7525000
Synonyms & Trade Names 4-Amino-3,5,6-trichloropicolinic acid; 4-Amino-3,5,6-trichloro-2-picolinic acid; ATCP; Tordon®	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless to white crystals with a chlorine-like odor. [herbicide]

MW: 241.5	BP: Decomposes	MLT: 424°F (Decomposes)	Sol: 0.04%
VP(95°F): 0.0000006 mmHg	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Hot concentrated alkali (hydrolyzes)

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: No recommendation Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; nausea; in animals: liver, kidney changes

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 1246

NIOSH Pocket Guide to Chemical Hazards

2-Chloro-6-trichloromethyl pyridine	**CAS** 1929-82-4
$ClC_5H_3NCCl_3$	**RTECS** US7525000
Synonyms & Trade Names 2-Chloro-6-(trichloro-methyl)pyridine; Nitrapyrin; N-serve®; 2,2,2,6-Tetrachloro-2-picoline	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) ST 20 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless or white, crystalline solid with a mild, sweet odor.

MW: 230.9	BP: ?	MLT: 145°F	Sol: Insoluble
VP(73°F): 0.003 mmHg	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid [Explosive]

Incompatibilities & Reactivities
Aluminum, magnesium [Note: Emits oxides of nitrogen and chloride ion when heated to decomposition.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms No adverse effects noted in ingestion studies with animals.	
Target Organs Eyes, skin	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

o-Chlorostyrene	**CAS** 2039-87-4
$ClC_6H_4CH{=}CH_2$	**RTECS** WL4160000
Synonyms & Trade Names 2-Chlorostyrene, ortho-Chlorostyrene, 1-Chloro-2-ethenylbenzene	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 50 ppm (285 mg/m^3) ST 75 ppm (428 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.67 mg/m^3

Physical Description
Colorless liquid.

MW: 138.6	BP: 372°F	FRZ: -82°F	Sol: Insoluble
VP(77°F): 0.96 mmHg	IP: ?		Sp.Gr: 1.10
Fl.P: 138°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms In animals: irritation eyes, skin; hematuria (blood in the urine), proteinuria, acidosis; enlarged liver, jaundice
Target Organs Eyes, skin, liver, kidneys, central nervous system, peripheral nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

EPN	**CAS** 2104-64-5
$C_{14}H_{14}O_4NSP$	**RTECS** TB1925000
Synonyms & Trade Names Ethyl p-nitrophenyl benzenethionophosphonate, O-Ethyl O-(4-nitrophenyl) phenylphosphonothioate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 [skin]
	OSHA PEL: TWA 0.5 mg/m^3 [skin]
IDLH 5 mg/m^3 See: 2104645	**Conversion**

Physical Description
Yellow solid with an aromatic odor. [pesticide] [Note: A brown liquid above 97°F.]

MW: 323.3	BP: ?	MLT: 97°F	Sol: Insoluble
VP(212°F): 0.0003 mmHg	IP: ?		Sp.Gr(77°F): 1.27
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5012
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; miosis, lacrimation (discharge of tears); rhinorrhea (discharge of thin mucus); headache; chest tightness, wheezing, laryngeal spasm; salivation; cyanosis; anorexia, nausea, abdominal cramps, diarrhea; paralysis, convulsions; low blood pressure, cardiac irregularities

Target Organs Eyes, skin, respiratory system, cardiovascular system, central nervous system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0753 See MEDICAL TESTS: 0094

NIOSH Pocket Guide to Chemical Hazards

Allyl propyl disulfide	**CAS** 2179-59-1
$H_2C{=}CHCH_2S_2CH_2CH_2CH_3$	**RTECS** JO0350000
Synonyms & Trade Names 4,5-Dithia-1-octene; Onion oil; 2-Propenyl propyl disulfide; Propyl allyl disulfide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2 ppm (12 mg/m^3) ST 3 ppm (18 mg/m^3)
	OSHA PEL†: TWA 2 ppm (12 mg/m^3)
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.07 mg/m^3

Physical Description
Pale-yellow liquid with a strong & irritating onion-like odor. [Note: The chief volatile component of onion oil.]

MW: 148.3	BP: ?	FRZ: 5°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr(59°F): 0.93
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, nose, respiratory system; lacrimation (discharge of tears)	
Target Organs Eyes, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Octachloronaphthalene	**CAS** 2234-13-1
$C_{10}Cl_8$	**RTECS** QK0250000
Synonyms & Trade Names Halowax® 1051; 1,2,3,4,5,6,7,8-Octachloronaphthalene; Perchloronaphthalene	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 ST 0.3 mg/m^3 [skin]
	OSHA PEL†: TWA 0.1 mg/m^3 [skin]
IDLH Unknown See: 2234131	**Conversion**

Physical Description
Waxy, pale-yellow solid with an aromatic odor.

MW: 403.7	BP: 770°F	MLT: 365°F	Sol: Insoluble
VP: <1 mmHg	IP: ?		Sp.Gr: 2.00
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH S97 (II-2)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 1 mg/m^3: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Acne-form dermatitis; liver damage, jaundice

Target Organs Skin, liver

See also: INTRODUCTION See ICSC CARD: 1059 See MEDICAL TESTS: 0169

NIOSH Pocket Guide to Chemical Hazards

Diglycidyl ether	**CAS** 2238-07-5
$C_6H_{10}O_3$	**RTECS** KN2350000
Synonyms & Trade Names Diallyl ether dioxide; DGE; Di(2,3-epoxypropyl) ether; 2-Epoxypropyl ether; bis(2,3-Epoxypropyl) ether	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 0.1 ppm (0.5 mg/m^3) See Appendix A
	OSHA PEL†: C 0.5 ppm (2.8 mg/m^3)
IDLH Ca [10 ppm] See: 2238075	**Conversion** 1 ppm = 5.33 mg/m^3

Physical Description
Colorless liquid with a strong, irritating odor.

MW: 130.2	BP: 500°F	FRZ: ?	Sol: ?
VP(77°F): 0.09 mmHg	IP: ?		Sp.Gr: 1.12
Fl.P: 147°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; skin burns; in animals: hematopoietic system, lung, liver, kidney damage; reproductive effects; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, reproductive system

Cancer Site [in animals: skin tumors]

See also: INTRODUCTION See ICSC CARD: 0145 See MEDICAL TESTS: 0078

NIOSH Pocket Guide to Chemical Hazards

Captafol	**CAS** 2425-06-1
$C_{10}H_9Cl_{14}NO_2S$	**RTECS** GS4900000
Synonyms & Trade Names Captofol; Difolatan®; N-((1,1,2,2-Tetrachloroethyl)thio)-4-cyclohexene-1,2-dicarboximide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 0.1 mg/m^3 [skin] See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
White, crystalline solid with a slight, characteristic pungent odor. [fungicide] [Note: Available commercially as a wettable powder or in liquid form.]

MW: 349.1	BP: Decomposes	MLT: 321°F (Decomposes)	Sol: 0.0001%
VP: 0.000008 mmHg	IP: NA	Sp.Gr: ?	
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Acids, acid vapors, strong oxidizers

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; dermatitis, skin sensitization; conjunctivitis; bronchitis, wheezing; diarrhea, vomiting; liver, kidney injury; high blood pressure; in animals: teratogenic effects; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys, cardiovascular system

Cancer Site [in animals: tumors at many sites]

See also: INTRODUCTION See ICSC CARD: 0119

NIOSH Pocket Guide to Chemical Hazards

n-Butyl glycidyl ether	**CAS** 2426-08-6
$C_7H_{14}O_2$	**RTECS** TX4200000
Synonyms & Trade Names BGE; 1,2-Epoxy-3-butoxypropane	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 5.6 ppm (30 mg/m^3) [15-minute]
	OSHA PEL†: TWA 50 ppm (270 mg/m^3)
IDLH 250 ppm See: 2426086	**Conversion** 1 ppm = 5.33 mg/m^3

Physical Description
Colorless liquid with an irritating odor.

MW: 130.2	BP: 327°F	FRZ: ?	Sol: 2%
VP(77°F): 3 mmHg	IP: ?		Sp.Gr: 0.91
Fl.P: 130°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers, strong caustics

Measurement Methods
NIOSH 1616; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 56 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 140 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 250 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; skin sensitization; narcosis; possible hematopoietic effects; central nervous system depression

Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION See ICSC CARD: 0115 See MEDICAL TESTS: 0032

NIOSH Pocket Guide to Chemical Hazards

Sulfur hexafluoride	**CAS** 2551-62-4
SF_6	**RTECS** WS4900000
Synonyms & Trade Names Sulfur fluoride [Note: May contain highly toxic sulfur pentafluoride as an impurity.]	**DOT ID & Guide** 1080 126

Exposure Limits	NIOSH REL: TWA 1000 ppm (6000 mg/m^3)
	OSHA PEL: TWA 1000 ppm (6000 mg/m^3)
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.98 mg/m^3

Physical Description
Colorless, odorless gas. [Note: Shipped as a liquefied compressed gas. Condenses directly to a solid upon cooling.]

MW: 146.1	BP: Sublimes	FRZ: -83°F (Sublimes)	Sol(77°F): 0.003%
VP: 21.5 atm	IP: 19.30 eV	RGasD: 5.11	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Disilane

Measurement Methods
NIOSH 6602
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations To be added later

Exposure Routes inhalation

Symptoms Asphyxia: increased breathing rate, pulse rate; slight muscle incoordination, emotional upset; lassitude (weakness, exhaustion), nausea, vomiting, convulsions; liquid: frostbite

Target Organs respiratory system

See also: INTRODUCTION See ICSC CARD: 0571

NIOSH Pocket Guide to Chemical Hazards

o-Chlorobenzylidene malononitrile	**CAS** 2698-41-1
$ClC_6H_4CH=C(CN)_2$	**RTECS** OO3675000
Synonyms & Trade Names 2-Chlorobenzalmalonitrile, CS, OCBM	**DOT ID & Guide** 2810 153

Exposure Limits	NIOSH REL: C 0.05 ppm (0.4 mg/m^3) [skin]
	OSHA PEL†: TWA 0.05 ppm (0.4 mg/m^3)
IDLH 2 mg/m^3 See: 2698411	**Conversion** 1 ppm = 7.71 mg/m^3

Physical Description
White crystalline solid with a pepper-like odor.

MW: 188.6	BP: 590-599°F	MLT: 203-205°F	Sol: Insoluble
VP: 0.00003 mmHg	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	MEC: 25 g/m^3

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH P&CAM304 (II-5)
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Pain, burn eyes, lacrimation (discharge of tears), conjunctivitis; erythema (skin redness) eyelids, blepharospasm; irritation throat, cough, chest tightness; headache; erythema (skin redness), skin vesiculation

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Sulfuryl fluoride	**CAS** 2699-79-8
SO_2F_2	**RTECS** WT5075000
Synonyms & Trade Names Sulfur difluoride dioxide, Vikane®	**DOT ID & Guide** 2191 123

Exposure Limits	NIOSH REL: TWA 5 ppm (20 mg/m^3) ST 10 ppm (40 mg/m^3)
	OSHA PEL†: TWA 5 ppm (20 mg/m^3)
IDLH 200 ppm See: 2699798	**Conversion** 1 ppm = 4.18 mg/m^3

Physical Description
Colorless, odorless gas. [insecticide/fumigant] [Note: Shipped as a liquefied compressed gas.]

MW: 102.1	BP: -68°F	FRZ: -212°F	Sol(32°F): 0.2%
VP(70°F): 15.8 atm	IP: 13.04 eV	RGasD: 3.72	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 6012
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 50 ppm: (APF = 10) Any supplied-air respirator*
Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 200 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Conjunctivitis, rhinitis, pharyngitis, paresthesia; liquid: frostbite: in animals: narcosis, tremor, convulsions; pulmonary edema; kidney injury

Target Organs Eyes, skin, respiratory system, central nervous system, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

1-Octadecanethiol	**CAS** 2885-00-9
$CH_3(CH_2)_{17}SH$	**RTECS**
Synonyms & Trade Names 1-Mercaptooctadecane, Octadecyl mercaptan, Stearyl mercaptan	**DOT ID & Guide** 1228 131 (liquid)

Exposure Limits	NIOSH REL: C 0.5 ppm (5.9 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 11.72 mg/m^3

Physical Description
Solid or liquid (above 77°F).

MW: 286.6	BP: ?	MLT: 77°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.85
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid
Combustible Liquid

Incompatibilities & Reactivities
Oxidizers, reducing agents, strong acids & bases, alkali metals

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; headache, dizziness, lassitude (weakness, exhaustion), cyanosis, nausea, convulsions

Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

1-Hexadecanethiol	**CAS** 2917-26-2
$CH_3[CH_2]_{15}SH$	**RTECS**
Synonyms & Trade Names Cetyl mercaptan, Hexadecanethiol-1, n-Hexadecanethiol, Hexadecyl mercaptan	**DOT ID & Guide** 1228 131 (liquid)

Exposure Limits	NIOSH REL: C 0.5 ppm (5.3 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 10.59 mg/m^3

Physical Description
Colorless liquid or solid (below 64-68°F) with a strong odor.

MW: 258.5	BP: ?	FRZ: 64-68°F	Sol: Insoluble
VP: 0.1 mmHg	IP: ?		Sp.Gr: 0.85
Fl.P: 215°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Oxidizers, strong acids & bases, alkali metals, reducing agents

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; headache, dizziness, lassitude (weakness, exhaustion), cyanosis, nausea, convulsions

Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION See ICSC CARD: 0025

NIOSH Pocket Guide to Chemical Hazards

Chlorpyrifos	**CAS** 2921-88-2
$C_9H_{11}Cl_3NO_3PS$	**RTECS** TF6300000
Synonyms & Trade Names Chlorpyrifos-ethyl; O,O-Diethyl O-3,5,6-trichloro-2-pyridyl phosphorothioate; Dursban®	**DOT ID & Guide** 2783 152

Exposure Limits	NIOSH REL: TWA 0.2 mg/m^3 ST 0.6 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless to white, crystalline solid with a mild, mercaptan-like odor. [pesticide] [Note: Commercial formulations may be combined with combustible liquids.]

MW: 350.6	BP: 320°F (Decomposes)	MLT: 108°F	Sol: 0.0002%
VP: 0.00002 mmHg	IP: ?		Sp.Gr: 1.40 (Liquid at 110°F)
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong acids, caustics, amines [Note: Corrosive to copper & brass.]

Measurement Methods
NIOSH 5600; OSHA 62
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Wheezing, laryngeal spasms, salivation; bluish lips, skin; miosis, blurred vision; nausea, vomiting, abdominal cramps, diarrhea

Target Organs respiratory system, central nervous system, peripheral nervous system, plasma cholinesterase

See also: INTRODUCTION See ICSC CARD: 0851

NIOSH Pocket Guide to Chemical Hazards

Clopidol	**CAS** 2971-90-6
$C_7H_7Cl_2NO$	**RTECS** UU7711500
Synonyms & Trade Names Coyden®; 3,5-Dichloro-2,6-dimethyl-4-pyridinol	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) ST 20 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White to light-brown, crystalline solid.

MW: 192.1	BP: ?	MLT: >608°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but dust may explode in cloud form.

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: No recommendation
Eyes: No recommendation
Wash skin: No recommendation
Remove: No recommendation
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Fresh air

Respirator Recommendations To be added later
Exposure Routes inhalation, skin and/or eye contact
Symptoms Irritation eyes, skin, nose, throat; cough
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

bis(2-(Dimethylamino)ethyl)ether	**CAS** 3033-62-3
$C_8H_{20}N_2O$	**RTECS** KR9460000
Synonyms & Trade Names NIAX® A99; NIAX® Catalyst A1; 2,2'-Oxybis(N,N-dimethyl ethylamine) [Note: A component (5%) of NIAX® Catalyst ESN, along with dimethylaminopropionitrile (95%).]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix C (NIAX® Catalyst ESN)
	OSHA PEL: See Appendix C (NIAX® Catalyst ESN)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Liquid.

MW: 160.3	BP: 372°F	FRZ: ?	Sol: ?
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Possible urinary disturbance, neurological disorders; in animals: irritation eyes, skin

Target Organs Eyes, skin, urinary tract, peripheral nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Naphthalene diisocyanate	**CAS** 3173-72-6
$C_{10}H_6(NCO)_2$	**RTECS** NQ9600000
Synonyms & Trade Names 1,5-Diisocyanatonaphthalene; 1,5-Naphthalene diisocyanate; 1,5-Naphthalene ester of isocyanic acid; NDI	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.040 mg/m^3 (0.005 ppm) C 0.170 mg/m^3 (0.020 ppm) [10-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 8.60 mg/m^3

Physical Description
White to light-yellow, crystalline flakes.

MW: 210.2	BP: 505°F	MLT: 261°F	Sol: ?
VP(75°F): 0.003 mmHg	IP: ?		Sp.Gr: ?
Fl.P(oc): 311°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
OSHA PV2046
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 0.05 ppm: (APF = 10) Any supplied-air respirator*
Up to 0.125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 0.25 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; respiratory sensitization, cough, pulmonary secretions, chest pain, dyspnea (breathing difficulty); asthma

Target Organs Eyes, respiratory system

See also: INTRODUCTION See ICSC CARD: 0653

NIOSH Pocket Guide to Chemical Hazards

Tetramethyl succinonitrile	**CAS** 3333-52-6
$(CH_3)_2C(CN)C(CN)(CH_3)_2$	**RTECS** WN4025000
Synonyms & Trade Names Tetramethyl succinodinitrile, TMSN	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 3 mg/m^3 (0.5 ppm) [skin]
	OSHA PEL: TWA 3 mg/m^3 (0.5 ppm) [skin]
IDLH 5 ppm See: 3333526	**Conversion** 1 ppm = 5.57 mg/m^3

Physical Description
Colorless, odorless solid. [Note: Forms cyanide in the body.]

MW: 136.2	BP: Sublimes	MLT: 338°F (Sublimes)	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 1.07
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH S155 (II-3); OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 28 mg/m^3: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Headache, nausea; convulsions, coma; liver, kidney, gastrointestinal effects

Target Organs central nervous system, liver, kidneys, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 1121

NIOSH Pocket Guide to Chemical Hazards

Temephos	**CAS** 3383-96-8
$S[C_6H_4OP(S)(OCH_3)_2]_2$	**RTECS** TF6890000
Synonyms & Trade Names Abate®; Temefos; O,O,O'O'-Tetramethyl O,O'-thiodi-p-phenylene phosphorothioate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, crystalline solid or liquid (above 87°F). [insecticide] [Note: Technical grade is a viscous, brown liquid.]

MW: 466.5	BP: 248-257°F (Decomposes)	MLT: 87°F	Sol: Insoluble
VP(77°F): 0.00000007 mmHg	IP: ?		Sp.Gr: 1.32
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0500, 0600; OSHA PV2056
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, blurred vision; dizziness; dyspnea (breathing difficulty); salivation; abdominal cramps, nausea, diarrhea, vomiting

Target Organs Eyes, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0199

NIOSH Pocket Guide to Chemical Hazards

TEDP	**CAS** 3689-24-5
$[(CH_3CH_2O)_2PS]_2O$	**RTECS** XN4375000
Synonyms & Trade Names Bladafum®, Dithion®, Sulfotep, Tetraethyl dithionopyrophosphate, Tetraethyl dithiopyrophosphate, Thiotepp®	**DOT ID & Guide** 1704 153

Exposure Limits	NIOSH REL: TWA 0.2 mg/m^3 [skin]
	OSHA PEL: TWA 0.2 mg/m^3 [skin]
IDLH 10 mg/m^3 See: IDLH INDEX	**Conversion** 1 ppm = 13.18 mg/m^3

Physical Description
Pale-yellow liquid with a garlic-like odor. [Note: A pesticide that may be absorbed on a solid carrier or mixed in a more flammable liquid.]

MW: 322.3	BP: Decomposes	FRZ: ?	Sol: 0.0007%
VP: 0.0002 mmHg	IP: ?		Sp.Gr(77°F): 1.20
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Strong oxidizers, iron [Note: Corrosive to iron.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2 mg/m^3: (APF = 10) Any supplied-air respirator

Up to 5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 10 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; eye pain, blurred vision, lacrimation (discharge of tears); rhinorrhea (discharge of thin mucus); headache; cyanosis; anorexia, nausea, vomiting, diarrhea; localized sweating, lassitude (weakness, exhaustion), twitching, paralysis, Cheyne-Stokes respiration, convulsions, low blood pressure, cardiac irregularities

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0985 See MEDICAL TESTS: 0219

NIOSH Pocket Guide to Chemical Hazards

Isopropyl glycidyl ether	**CAS** 4016-14-2
$C_6H_{12}O_2$	**RTECS** TZ3500000
Synonyms & Trade Names 1,2-Epoxy-3-isopropoxypropane; IGE; Isopropoxymethyl oxirane	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 50 ppm (240 mg/m^3) [15-minute]
	OSHA PEL†: TWA 50 ppm (240 mg/m^3)
IDLH 400 ppm See: 4016142	**Conversion** 1 ppm = 4.75 mg/m^3

Physical Description
Colorless liquid.

MW: 116.2	BP: 279°F	FRZ: ?	Sol: 19%
VP(77°F): 9 mmHg	IP: ?		Sp.Gr: 0.92
Fl.P: 92°F	UEL: ?	LEL: ?	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong caustics [Note: May form explosive peroxides upon exposure to air or light.]

Measurement Methods
NIOSH 1620; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 400 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; skin sensitization; possible hematopoietic, reproductive effects

Target Organs Eyes, skin, respiratory system, blood, reproductive system

See also: INTRODUCTION See ICSC CARD: 0171 See MEDICAL TESTS: 0125

NIOSH Pocket Guide to Chemical Hazards

Isophorone diisocyanate	**CAS** 4098-71-9
$C_{12}H_{18}N_2O_2$	**RTECS** NQ9370000
Synonyms & Trade Names IPDI; 3-Isocyanatomethyl-3,5,5-trimethylcyclohexyl-isocyanate; Isophorone diamine diisocyanate	**DOT ID & Guide** 2290 156

Exposure Limits	NIOSH REL: TWA 0.005 ppm (0.045 mg/m^3) ST 0.02 ppm (0.180 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 9.09 mg/m^3

Physical Description
Colorless to slightly yellow liquid with a pungent odor.

MW: 222.3	BP: ?	FRZ: -76°F	Sol: Decomposes
VP: 0.0003 mmHg	IP: ?		Sp.Gr: 1.06
Fl.P: 311°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Water, alcohols, phenols, amines, mercaptans, amides, urethanes, ureas [Note: Reacts with water to form carbon dioxide.]

Measurement Methods
OSHA PV2034
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 0.05 ppm: (APF = 10) Any supplied-air respirator*
Up to 0.125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 0.25 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; chest tightness, dyspnea (breathing difficulty), cough, sore throat; bronchitis, wheezing, pulmonary edema; possible respiratory sensitization, asthma

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0499

NIOSH Pocket Guide to Chemical Hazards

Crotonaldehyde	**CAS** 4170-30-3
$CH_3CH=CHCHO$	**RTECS** GP9499000
Synonyms & Trade Names 2-Butenal, beta-Methyl acrolein, Propylene aldehyde	**DOT ID & Guide** 1143 131P (inhibited)

Exposure Limits	NIOSH REL: TWA 2 ppm (6 mg/m^3) See Appendix C (Aldehydes)
	OSHA PEL: TWA 2 ppm (6 mg/m^3)
IDLH 50 ppm See: IDLH INDEX	**Conversion** 1 ppm = 2.87 mg/m^3

Physical Description
Water-white liquid with a suffocating odor. [Note: Turns pale-yellow on contact with air.]

MW: 70.1	BP: 219°F	FRZ: -101°F	Sol: 18%
VP: 19 mmHg	IP: 9.73 eV		Sp.Gr: 0.87
Fl.P: 45°F	UEL: 15.5%	LEL: 2.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Caustics, ammonia, strong oxidizers, nitric acid, amines [Note: Polymerization may occur at elevated temperatures, such as in fire conditions.]

Measurement Methods
NIOSH 3516; OSHA 81
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 20 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*

Up to 50 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; in animals: dyspnea (breathing difficulty), pulmonary edema, irritation skin

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0241

NIOSH Pocket Guide to Chemical Hazards

Methylene bis(4-cyclohexylisocyanate)	**CAS** 5124-30-1
$CH_2[(C_6H_{10})NCO]_2$	**RTECS** NQ9250000
Synonyms & Trade Names Dicyclohexylmethane 4,4'-diisocyanate; DMDI; bis(4-Isocyanatocyclohexyl)methane; HMDI; Hydrogenated MDI; Reduced MDI; Saturated MDI	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 0.01 ppm (0.11 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 10.73 mg/m^3

Physical Description
Clear, colorless to light-yellow liquid.

MW: 262.4	BP: ?	FRZ: <14°F	Sol: Reacts
VP(77°F): 0.001 mmHg	IP: ?		Sp.Gr(77°F): 1.07
Fl.P: >395°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Water, ethanol, alcohols, amines, bases, acids, organotin catalysts [Note: May slowly polymerize if heated above 122°F.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 0.1 ppm: (APF = 10) Any supplied-air respirator*
Up to 0.25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 0.5 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; skin, respiratory sensitization; chest tightness, dyspnea (breathing difficulty), cough, dry throat, wheezing, pulmonary edema; skin blisters

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

1-Undecanethiol	**CAS** 5332-52-5
$CH_3(CH_2)_{10}SH$	**RTECS**
Synonyms & Trade Names Undecyl mercaptan	**DOT ID & Guide** 1228 131

Exposure Limits	NIOSH REL: C 0.5 ppm (3.9 mg/m^3) [15-minute]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 7.71 mg/m^3

Physical Description
Liquid.

MW: 188.4	BP: 495°F	FRZ: 27°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.84
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Oxidizers, reducing agents, strong acids & bases, alkali metals

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)
Up to 25 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; confusion, dizziness, headache, drowsiness, nausea, vomiting, lassitude (weakness, exhaustion), convulsions

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Sulfur pentafluoride	**CAS** 5714-22-7
S_2F_{10}	**RTECS** WS4480000
Synonyms & Trade Names Disulfur decafluoride, Sulfur decafluoride	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 0.01 ppm (0.1 mg/m^3)
	OSHA PEL†: TWA 0.025 ppm (0.25 mg/m^3)
IDLH 1 ppm See: 5714227	**Conversion** 1 ppm = 10.39 mg/m^3

Physical Description
Colorless liquid or gas (above 84°F) with an odor like sulfur dioxide.

MW: 254.1	BP: 84°F	FRZ: -134°F	Sol: Insoluble
VP: 561 mmHg	IP: ?	RGasD: 8.77	Sp.Gr(32°F): 2.08
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid Nonflammable Gas

Incompatibilities & Reactivities
None reported

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: No recommendation
Remove: When wet or contaminated
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 0.1 ppm: (APF = 10) Any supplied-air respirator
Up to 0.25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 0.5 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; in animals: pulmonary edema, hemorrhage

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See MEDICAL TESTS: 0217

NIOSH Pocket Guide to Chemical Hazards

Isoamyl alcohol (secondary)	**CAS** 6032-29-7
$(CH_3)_2CHCH(OH)CH_3$	**RTECS**
Synonyms & Trade Names 3-Methyl-2-butanol, Secondary isoamyl alcohol	**DOT ID & Guide** 1105 129

Exposure Limits	NIOSH REL: TWA 100 ppm (360 mg/m^3) ST 125 ppm (450 mg/m^3)
	OSHA PEL†: TWA 100 ppm (360 mg/m^3)
IDLH 500 ppm See: IDLH INDEX	**Conversion** 1 ppm = 3.61 mg/m^3

Physical Description
Colorless liquid with a disagreeable odor.

MW: 88.2	BP: 234°F	FRZ: ?	Sol: ?
VP: 1 mmHg	IP: ?		Sp.Gr: 0.82
Fl.P(oc): 95°F	UEL: ?	LEL: ?	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1402
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£]/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)[£]/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache, dizziness; cough, dyspnea (breathing difficulty), nausea, vomiting, diarrhea; skin cracking; in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Propylene glycol dinitrate	**CAS** 6423-43-4
$CH_3CNO_2OHCHNO_2OH$	**RTECS** TY6300000
Synonyms & Trade Names PGDN; Propylene glycol-1,2-dinitrate; 1,2-Propylene glycol dinitrate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.05 ppm (0.3 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.79 mg/m^3

Physical Description
Colorless liquid with a disagreeable odor. [Note: A solid below 18°F.]

MW: 166.1	BP: ?	FRZ: 18°F	Sol: 0.1%
VP(72°F): 0.07 mmHg	IP: ?		Sp.Gr(77°F): 1.23
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Ammonia compounds, amines, oxidizers, reducing agents, combustible materials [Note: Similar to Ethylene glycol dinitrate in explosion potential.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; conjunctivitis; methemoglobinemia; headache, impaired balance, visual disturbance; in animals: liver, kidney damage

Target Organs Eyes, central nervous system, blood, liver, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Monocrotophos	**CAS** 6923-22-4
$C_7H_{14}NO_5P$	**RTECS** TC4375000
Synonyms & Trade Names 3-Hydroxy-N-methylcrotonamide dimethylphosphate, Monocron	**DOT ID & Guide** 2783 152 (organophosphorus pesticide, solid)

Exposure Limits	NIOSH REL: TWA 0.25 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless to reddish-brown solid with a mild, ester odor. [insecticide]

MW: 223.2	BP: 257°F	MLT: 129°F	Sol: Miscible
VP: 0.000007 mmHg	IP: ?		Sp.Gr: ?
Fl.P: >200°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Metals, low molecular weight alcohols & glycols [Note: Corrosive to black iron, drum steel, stainless steel 304 & brass. Should be stored at 70-80°F.]

Measurement Methods
NIOSH 5600; OSHA PV2045
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, miosis, blurred vision; dizziness, convulsions; dyspnea (breathing difficulty); salivation, abdominal cramps, nausea, diarrhea, vomiting; in animals: possible teratogenic effects

Target Organs Eyes, respiratory system, central nervous system, cardiovascular system, blood cholinesterase, reproductive system

See also: INTRODUCTION See ICSC CARD: 0181

NIOSH Pocket Guide to Chemical Hazards

Aluminum	**CAS** 7429-90-5
Al	**RTECS** BD0330000
Synonyms & Trade Names Aluminium, Aluminum metal, Aluminum powder, Elemental aluminum	**DOT ID & Guide** 1309 170 (powder, coated) 1396 138 (powder, uncoated) 9260 169 (molten)

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Silvery-white, malleable, ductile, odorless metal.

MW: 27.0	BP: 4221°F	MLT: 1220°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.70
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid, finely divided dust is easily ignited; may cause explosions.

Incompatibilities & Reactivities
Strong oxidizers & acids, halogenated hydrocarbons [Note: Corrodes in contact with acids & other metals. Ignition may occur if powders are mixed with halogens, carbon disulfide, or methyl chloride.]

Measurement Methods
NIOSH 7013, 7300; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0988 See MEDICAL TESTS: 0011

NIOSH Pocket Guide to Chemical Hazards

Lead	**CAS** 7439-92-1
Pb	**RTECS** OF7525000
Synonyms & Trade Names Lead metal, Plumbum	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C [*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.]
	OSHA PEL*: [1910.1025] TWA 0.050 mg/m^3 See Appendix C [*Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.]
IDLH 100 mg/m^3 (as Pb) See: 7439921	**Conversion**

Physical Description
A heavy, ductile, soft, gray solid.

MW: 207.2	BP: 3164°F	MLT: 621°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 11.34
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form.

Incompatibilities & Reactivities
Strong oxidizers, hydrogen peroxide, acids

Measurement Methods
NIOSH 7082, 7105, 7300, 7700, 7701, 7702; OSHA ID121, ID125G, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.5 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter

Up to 2.5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Up to 100 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension

Target Organs Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue

See also: INTRODUCTION See ICSC CARD: 0052 See MEDICAL TESTS: 0127

NIOSH Pocket Guide to Chemical Hazards

Manganese compounds and fume (as Mn)	**CAS** 7439-96-5 (metal)
Mn (metal)	**RTECS** OO9275000 (metal)
Synonyms & Trade Names Manganese metal: Colloidal manganese, Manganese-55 Synonyms of other compounds vary depending upon the specific manganese compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 1 mg/m^3 ST 3 mg/m^3 [*Note: Also see specific listings for Manganese cyclopentadienyl tricarbonyl, Methyl cyclopentadienyl manganese tricarbonyl, and Manganese tetroxide.]
	OSHA PEL*: C 5 mg/m^3 [*Note: Also see specific listings for Manganese cyclopentadienyl tricarbonyl and Methyl cyclopentadienyl manganese tricarbonyl.]
IDLH 500 mg/m^3 (as Mn) See: IDLH INDEX	**Conversion**

Physical Description
A lustrous, brittle, silvery solid.

MW: 54.9	BP: 3564°F	MLT: 2271°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 7.20 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Combustible Solid

Incompatibilities & Reactivities
Oxidizers [Note: Will react with water or steam to produce hydrogen.]

Measurement Methods
NIOSH 7300; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: No recommendation
Eyes: No recommendation
Wash skin: No recommendation
Remove: No recommendation
Change: No recommendation

First Aid (See procedures)

Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 10 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators^/(APF = 10) Any supplied-air respirator
Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter^
Up to 50 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 500 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion

Symptoms Parkinson's; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage

Target Organs respiratory system, central nervous system, blood, kidneys

See also: INTRODUCTION See ICSC CARD: 0174 See MEDICAL TESTS: 0131

NIOSH Pocket Guide to Chemical Hazards

Mercury compounds [except (organo) alkyls] (as Hg)	**CAS** 7439-97-6 (metal)
Hg (metal)	**RTECS** OV4550000 (metal)
Synonyms & Trade Names Mercury metal: Colloidal mercury, Metallic mercury, Quicksilver Synonyms of "other" Hg compounds vary depending upon the specific compound.	**DOT ID & Guide** 2809 172 (metal)

Exposure Limits	NIOSH REL: Hg Vapor: TWA 0.05 mg/m^3 [skin] Other: C 0.1 mg/m^3 [skin]
	OSHA PEL†: C 0.1 mg/m^3
IDLH 10 mg/m^3 (as Hg) See: IDLH INDEX	**Conversion**

Physical Description
Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.]

MW: 200.6	BP: 674°F	FRZ: -38°F	Sol: Insoluble
VP: 0.0012 mmHg	IP: ?		Sp.Gr: 13.6 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Liquid

Incompatibilities & Reactivities
Acetylene, ammonia, chlorine dioxide, azides, calcium (amalgam formation), sodium carbide, lithium, rubidium, copper

Measurement Methods
NIOSH 6009; OSHA ID140
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations Mercury vapor:
NIOSH
Up to 0.5 mg/m^3: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern†/(APF = 10) Any supplied-air respirator
Up to 1.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†(canister)
Up to 2.5 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern†/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/PAPRTS(canister)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 10 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus
Other mercury compounds:
NIOSH/OSHA
Up to 1 mg/m^3: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern†/(APF = 10) Any supplied-air respirator
Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†(canister)
Up to 5 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern†/(APF = 50) Any air-

purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/PAPRTS(canister)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 10 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria

Target Organs Eyes, skin, respiratory system, central nervous system, kidneys

See also: INTRODUCTION See ICSC CARD: 0056 See MEDICAL TESTS: 0136

NIOSH Pocket Guide to Chemical Hazards

Molybdenum	**CAS** 7439-98-7
Mo	**RTECS** QA4680000
Synonyms & Trade Names Molybdenum metal	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: See Appendix D [*Note: The REL also applies to other insoluble molybdenum compounds (as Mo).]
	OSHA PEL*†: TWA 15 mg/m^3 [*Note: The PEL also applies to other insoluble molybdenum compounds (as Mo).]
IDLH 5000 mg/m^3 (as Mo) See: 7439987	**Conversion**

Physical Description
Dark gray or black powder with a metallic luster.

MW: 95.9	BP: 8717°F	MLT: 4752°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 10.28
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid in form of dust or powder.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 7300; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations OSHA

Up to 75 mg/m^3: (APF = 5) Any dust and mist respirator^

Up to 150 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators^/(APF = 10) Any supplied-air respirator

Up to 375 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter^

Up to 750 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 5000 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, nose, throat; anorexia, diarrhea, weight loss; listlessness; liver, kidney damage

Target Organs Eyes, respiratory system, liver, kidneys

See also: INTRODUCTION See MEDICAL TESTS: 0150

NIOSH Pocket Guide to Chemical Hazards

Nickel metal and other compounds (as Ni)	**CAS** 7440-02-0 (Metal)
Ni (Metal)	**RTECS** QR5950000 (Metal)
Synonyms & Trade Names Nickel metal: Elemental nickel, Nickel catalyst Synonyms of other nickel compounds vary depending upon the specific compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: Ca TWA 0.015 mg/m^3 See Appendix A [*Note: The REL does not apply to Nickel carbonyl.]
	OSHA PEL*†: TWA 1 mg/m^3 [*Note: The PEL does not apply to Nickel carbonyl.]
IDLH Ca [10 mg/m^3 (as Ni)] See: IDLH INDEX	**Conversion**

Physical Description
Metal: Lustrous, silvery, odorless solid.

MW: 58.7	BP: 5139°F	MLT: 2831°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.90 (Metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Combustible Solid; nickel sponge catalyst may ignite SPONTANEOUSLY in air.

Incompatibilities & Reactivities
Strong acids, sulfur, selenium, wood & other combustibles, nickel nitrate

Measurement Methods
NIOSH 7300; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily	Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]

Target Organs Nasal cavities, lungs, skin

Cancer Site [lung and nasal cancer]

See also: INTRODUCTION See ICSC CARD: 0062 See MEDICAL TESTS: 0156

NIOSH Pocket Guide to Chemical Hazards

Platinum	**CAS** 7440-06-4
Pt	**RTECS** TP2160000
Synonyms & Trade Names Platinum black, Platinum metal, Platinum sponge	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Silvery, whitish-gray, malleable, ductile metal.

MW: 195.1	BP: 6921°F	MLT: 3222°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 21.45
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but finely divided powder can be dangerous to handle.

Incompatibilities & Reactivities
Aluminum, acetone, arsenic, ethane, hydrazine, hydrogen peroxide, lithium, phosphorus, selenium, tellurium, various fluorides

Measurement Methods
NIOSH 7300; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation skin, respiratory system; dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0195

NIOSH Pocket Guide to Chemical Hazards

Rhodium (metal fume and insoluble compounds, as Rh)	**CAS** 7440-16-6 (metal)
Rh (metal)	**RTECS** VI9069000 (metal)
Synonyms & Trade Names Rhodium metal: Elemental rhodium Synonyms of other insoluble rhodium compounds vary depending upon the specific compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3
	OSHA PEL: TWA 0.1 mg/m^3
IDLH 100 mg/m^3 (as Rh) See: rhodium	**Conversion**

Physical Description
Metal: White, hard, ductile, malleable solid with a bluish-gray luster.

MW: 102.9	BP: 6741°F	MLT: 3571°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 12.41 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid in bulk form, but flammable as dust or powder.

Incompatibilities & Reactivities
Chlorine trifluoride, oxygen difluoride

Measurement Methods
NIOSH S188 (II-3)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.5 mg/m^3: (APF = 5) Any dust and mist respirator^

Up to 1 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators^/(APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter

Up to 5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 100 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms Possible respiratory sensitization

Target Organs respiratory system

See also: INTRODUCTION See ICSC CARD: 1247

NIOSH Pocket Guide to Chemical Hazards

Silicon	**CAS** 7440-21-3
Si	**RTECS** VW0400000
Synonyms & Trade Names Elemental silicon [Note: Does not occur free in nature, but is found in silicon dioxide (silica) & in various silicates.]	**DOT ID & Guide** 1346 170 (amorphous powder)

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Black to gray, lustrous, needle-like crystals. [Note: The amorphous form is a dark-brown powder.]

MW: 28.1	BP: 4271°F	MLT: 2570°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr(77°F): 2.33
Fl.P: NA	UEL: NA	LEL: NA	MEC: 160 g/m^3

Combustible Solid in powder form.

Incompatibilities & Reactivities
Chlorine, fluorine, oxidizers, calcium, cesium carbide, alkaline carbonates

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; cough	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Silver (metal dust and soluble compounds, as Ag)	**CAS** 7440-22-4 (metal)
Ag (metal)	**RTECS** VW3500000 (metal)
Synonyms & Trade Names Silver metal: Argentum Synonyms of soluble silver compounds such as Silver nitrate ($AgNO_3$) vary depending upon the specific compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.01 mg/m^3
	OSHA PEL: TWA 0.01 mg/m^3
IDLH 10 mg/m^3 (as Ag) See: IDLH INDEX	**Conversion**

Physical Description
Metal: White, lustrous solid.

MW: 107.9	BP: 3632°F	MLT: 1761°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 10.49 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid, but flammable in form of dust or powder.

Incompatibilities & Reactivities
Acetylene, ammonia, hydrogen peroxide, bromoazide, chlorine trifluoride, ethyleneimine, oxalic acid, tartaric acid

Measurement Methods
NIOSH 7300; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated ($AgNO_3$) Change: Daily Provide: Eyewash	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter£

Up to 0.5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 10 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance

Target Organs Nasal septum, skin, eyes

See also: INTRODUCTION See ICSC CARD: 0810 See MEDICAL TESTS: 0208

NIOSH Pocket Guide to Chemical Hazards

Tantalum (metal and oxide dust, as Ta)	**CAS** 7440-25-7 (metal)
Ta (metal)	**RTECS** WW5505000 (metal)
Synonyms & Trade Names Tantalum metal: Tantalum-181 Synonyms of other tantalum dusts (including oxide dusts) vary depending upon the specific compound.	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3 ST 10 mg/m^3
	OSHA PEL: TWA 5 mg/m^3
IDLH 2500 mg/m^3 (as Ta) See: IDLH INDEX	**Conversion**

Physical Description
Metal: Steel-blue to gray solid or black, odorless powder.

MW: 180.9	BP: 9797°F	MLT: 5425°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 16.65 (metal) 14.40 (powder)
Fl.P: NA	UEL: NA	LEL: NA	MEC: <200 g/m^3

Metal: Combustible Solid; powder ignites SPONTANEOUSLY in air.

Incompatibilities & Reactivities
Strong oxidizers, bromine trifluoride, fluorine

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA

Up to 25 mg/m^3: (APF = 5) Any dust and mist respirator^

Up to 50 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators^/(APF = 10) Any dust, mist, and fume respirator/(APF = 10) Any supplied-air respirator

Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter^

Up to 250 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 2500 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin; in animals: pulmonary irritation

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Tin	**CAS** 7440-31-5
Sn	**RTECS** XP7320000
Synonyms & Trade Names Metallic tin, Tin flake, Tin metal, Tin powder	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 2 mg/m^3 [*Note: The REL also applies to other inorganic tin compounds (as Sn) except tin oxides.]
	OSHA PEL*: TWA 2 mg/m^3 [*Note: The PEL also applies to other inorganic tin compounds (as Sn) except tin oxides.]
IDLH 100 mg/m^3 (as Sn) See: 7440315	**Conversion**

Physical Description
Gray to almost silver-white, ductile, malleable, lustrous solid.

MW: 118.7	BP: 4545°F	MLT: 449°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 7.28
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but powdered form may ignite.

Incompatibilities & Reactivities
Chlorine, turpentine, acids, alkalis

Measurement Methods
NIOSH 7300; OSHA ID121, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 10 mg/m^3: (APF = 5) Any dust and mist respirator*

Up to 20 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators^*/(APF = 10) Any supplied-air respirator*

Up to 50 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter^*

Up to 100 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; in animals: vomiting, diarrhea, paralysis with muscle twitching

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0229

NIOSH Pocket Guide to Chemical Hazards

Tungsten	**CAS** 7440-33-7
W	**RTECS** YO7175000
Synonyms & Trade Names Tungsten metal, Wolfram	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 5 mg/m^3 ST 10 mg/m^3 [*Note: The REL also applies to other insoluble tungsten compounds (as W).]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Hard, brittle, steel-gray to tin-white solid.

MW: 183.9	BP: 10,701°F	MLT: 6170°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 19.3
Fl.P: NA	UEL: NA	LEL: NA	

Combustible in the form of finely divided powder; may ignite spontaneously.

Incompatibilities & Reactivities
Bromine trifluoride, chlorine trifluoride, fluorine, iodine pentafluoride

Measurement Methods
NIOSH 7074, 7300; OSHA ID213
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 50 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; diffuse pulmonary fibrosis; loss of appetite, nausea, cough; blood changes

Target Organs Eyes, skin, respiratory system, blood

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Antimony	**CAS** 7440-36-0
Sb	**RTECS** CC4025000
Synonyms & Trade Names Antimony metal, Antimony powder, Stibium	**DOT ID & Guide** 1549 157 (inorganic compounds, n.o.s.) 2871 170 (powder) 3141 157 (inorganic liquid compounds, n.o.s.)

Exposure Limits	NIOSH REL*: TWA 0.5 mg/m^3 [*Note: The REL also applies to other antimony compounds (as Sb).]
	OSHA PEL*: TWA 0.5 mg/m^3 [*Note: The PEL also applies to other antimony compounds (as Sb).]
IDLH 50 mg/m^3 (as Sb) See: 7440360	**Conversion**

Physical Description
Silver-white, lustrous, hard, brittle solid; scale-like crystals; or a dark-gray, lustrous powder.

MW: 121.8	BP: 2975°F	MLT: 1166°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 6.69
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but a moderate explosion hazard in the form of dust when exposed to flame.

Incompatibilities & Reactivities
Strong oxidizers, acids, halogenated acids [Note: Stibine is formed when antimony is exposed to nascent (freshly formed) hydrogen.]

Measurement Methods
NIOSH P&CAM261 (II-4); OSHA ID121, ID125G, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators^/(APF = 10) Any supplied-air respirator
Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter^
Up to 25 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 50 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly

Target Organs Eyes, skin, respiratory system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0775 See MEDICAL TESTS: 0016

NIOSH Pocket Guide to Chemical Hazards

Arsenic (inorganic compounds, as As)	**CAS** 7440-38-2 (metal)
As (metal)	**RTECS** CG0525000 (metal)
Synonyms & Trade Names Arsenic metal: Arsenia Other synonyms vary depending upon the specific As compound. [Note: OSHA considers "Inorganic Arsenic" to mean copper acetoarsenite & all inorganic compounds containing arsenic except ARSINE.]	**DOT ID & Guide** 1558 152 (metal) 1562 152 (dust)

Exposure Limits	NIOSH REL: Ca C 0.002 mg/m^3 [15-minute] See Appendix A
	OSHA PEL: [1910.1018] TWA 0.010 mg/m^3
IDLH Ca [5 mg/m^3 (as As)] See: IDLH INDEX	**Conversion**

Physical Description
Metal: Silver-gray or tin-white, brittle, odorless solid.

MW: 74.9	BP: Sublimes	MLT: 1135°F (Sublimes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.73 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame.

Incompatibilities & Reactivities
Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.]

Measurement Methods
NIOSH 7300, 7900; OSHA ID105
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, skin and/or eye contact ingestion

Symptoms Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, [potential occupational carcinogen]

Target Organs Liver, kidneys, skin, lungs, lymphatic system

Cancer Site [lung & lymphatic cancer]

See also: INTRODUCTION See ICSC CARD: 0013 See MEDICAL TESTS: 0017

NIOSH Pocket Guide to Chemical Hazards

Beryllium & beryllium compounds (as Be)	**CAS** 7440-41-7 (metal)
Be (metal)	**RTECS** DS1750000 (metal)
Synonyms & Trade Names Beryllium metal: Beryllium Other synonyms vary depending upon the specific beryllium compound.	**DOT ID & Guide** 1566 154 (compounds) 1567 134 (powder)

Exposure Limits	NIOSH REL: Ca Not to exceed 0.0005 mg/m^3 See Appendix A
	OSHA PEL: TWA 0.002 mg/m^3 C 0.005 mg/m^3 0.025 mg/m^3 [30-minute maximum peak]
IDLH Ca [4 mg/m^3 (as Be)] See: IDLH INDEX	**Conversion**

Physical Description
Metal: A hard, brittle, gray-white solid.

MW: 9.0	BP: 4532°F	MLT: 2349°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.85 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of a powder or dust.

Incompatibilities & Reactivities
Acids, caustics, chlorinated hydrocarbons, oxidizers, molten lithium

Measurement Methods
NIOSH 7102, 7300; OSHA ID125G, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash	Eye: Irrigate immediately Breathing: Fresh air

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system

Cancer Site [lung cancer]

See also: INTRODUCTION See ICSC CARD: 0226 See MEDICAL TESTS: 0025

NIOSH Pocket Guide to Chemical Hazards

Cadmium dust (as Cd)	**CAS** 7440-43-9 (metal)
Cd (metal)	**RTECS** EU9800000 (metal)
Synonyms & Trade Names Cadmium metal: Cadmium Other synonyms vary depending upon the specific cadmium compound.	**DOT ID & Guide** 2570 154 (compounds)

Exposure Limits	NIOSH REL*: Ca See Appendix A [*Note: The REL applies to all Cadmium compounds (as Cd).]
	OSHA PEL*: [1910.1027] TWA 0.005 mg/m^3 [*Note: The PEL applies to all Cadmium compounds (as Cd).]
IDLH Ca [9 mg/m^3 (as Cd)] See: IDLH INDEX	**Conversion**

Physical Description
Metal: Silver-white, blue-tinged lustrous, odorless solid.

MW: 112.4	BP: 1409°F	MLT: 610°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.65 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid in bulk form, but will burn in powder form.

Incompatibilities & Reactivities
Strong oxidizers; elemental sulfur, selenium & tellurium

Measurement Methods
NIOSH 7048; OSHA ID121, ID125G, ID189, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion

Symptoms Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]

Target Organs respiratory system, kidneys, prostate, blood

Cancer Site [prostatic & lung cancer]

See also: INTRODUCTION See ICSC CARD: 0020

NIOSH Pocket Guide to Chemical Hazards

Graphite (synthetic)	**CAS** 7440-44-0 (synthetic)
C	**RTECS** FF5250100 (synthetic)
Synonyms & Trade Names Activated carbon [Note: Also see specific listing for Graphite (natural).]	**DOT ID & Guide** 1362 133 (activated carbon)

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Steel gray to black, greasy feeling, odorless solid.

MW: 12.0	BP: Sublimes	MLT: 6602°F (Sublimes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.5-1.8
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid

Incompatibilities & Reactivities
Very strong oxidizers such as fluorine, chlorine trifluoride & potassium peroxide

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Cough, dyspnea (breathing difficulty), black sputum, decreased pulmonary function, lung fibrosis	
Target Organs respiratory system, cardiovascular system	

See also: INTRODUCTION See ICSC CARD: 0702

NIOSH Pocket Guide to Chemical Hazards

Chromium metal	**CAS** 7440-47-3
Cr	**RTECS** GB4200000
Synonyms & Trade Names Chrome, Chromium	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 See Appendix C
	OSHA PEL*: TWA 1 mg/m^3 See Appendix C [*Note: The PEL also applies to insoluble chromium salts.]
IDLH 250 mg/m^3 (as Cr) See: 7440473	**Conversion**

Physical Description
Blue-white to steel-gray, lustrous, brittle, hard, odorless solid.

MW: 52.0	BP: 4788°F	MLT: 3452°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 7.14
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but finely divided dust burns rapidly if heated in a flame.

Incompatibilities & Reactivities
Strong oxidizers (such as hydrogen peroxide), alkalis

Measurement Methods
NIOSH 7024; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 2.5 mg/m^3: (APF = 5) Any dust and mist respirator*

Up to 5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*/(APF = 10) Any supplied-air respirator*

Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*

Up to 25 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 250 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; lung fibrosis (histologic)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0029 See MEDICAL TESTS: 0052

NIOSH Pocket Guide to Chemical Hazards

Cobalt metal dust and fume (as Co)	**CAS** 7440-48-4
Co	**RTECS** GF8750000
Synonyms & Trade Names Cobalt metal dust, Cobalt metal fume	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.05 mg/m^3
	OSHA PEL†: TWA 0.1 mg/m^3
IDLH 20 mg/m^3 (as Co) See: 7440484	**Conversion**

Physical Description
Odorless, silver-gray to black solid.

MW: 58.9	BP: 5612°F	MLT: 2719°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.92
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but finely divided dust will burn at high temperatures.

Incompatibilities & Reactivities
Strong oxidizers, ammonium nitrate

Measurement Methods
NIOSH 7027, 7300; OSHA ID121, ID125G, ID213
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: No recommendation
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 0.25 mg/m^3: (APF = 5) Any dust and mist respirator^

Up to 0.5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*^/(APF = 10) Any dust, mist, and fume respirator*/(APF = 10) Any supplied-air respirator*

Up to 1.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*^/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter*

Up to 2.5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 20 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Cough, dyspnea (breathing difficulty), wheezing, decreased pulmonary function; weight loss; dermatitis; diffuse nodular fibrosis; respiratory hypersensitivity, asthma

Target Organs Skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0782 See MEDICAL TESTS: 0055

NIOSH Pocket Guide to Chemical Hazards

Copper (dusts and mists, as Cu)	**CAS** 7440-50-8
Cu	**RTECS** GL5325000
Synonyms & Trade Names Copper metal dusts, Copper metal fumes	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 1 mg/m^3 [*Note: The REL also applies to other copper compounds (as Cu) except Copper fume.]
	OSHA PEL*: TWA 1 mg/m^3 [*Note: The PEL also applies to other copper compounds (as Cu) except copper fume.]
IDLH 100 mg/m^3 (as Cu) See: 7440508	**Conversion**

Physical Description
Reddish, lustrous, malleable, odorless solid.

MW: 63.5	BP: 4703°F	MLT: 1981°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.94
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but powdered form may ignite.

Incompatibilities & Reactivities
Oxidizers, alkalis, sodium azide, acetylene

Measurement Methods
NIOSH 7029; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 5) Any dust and mist respirator*

Up to 10 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*^/(APF = 10) Any supplied-air respirator*

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*

Up to 50 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 100 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys (increase(d) risk with Wilson's disease)

See also: INTRODUCTION See ICSC CARD: 0240 See MEDICAL TESTS: 0057

NIOSH Pocket Guide to Chemical Hazards

Hafnium	**CAS** 7440-58-6
Hf	**RTECS** MG4600000
Synonyms & Trade Names Celtium, Elemental hafnium, Hafnium metal	**DOT ID & Guide** 1326 170 (powder, wet) 2545 135 (powder, dry)

Exposure Limits	NIOSH REL*: TWA 0.5 mg/m^3 [*Note: The REL also applies to other hafnium compounds (as Hf).]
	OSHA PEL*: TWA 0.5 mg/m^3 [*Note: The PEL also applies to other hafnium compounds (as Hf).]
IDLH 50 mg/m^3 (as Hf) See: 7440586	**Conversion**

Physical Description
Highly lustrous, ductile, grayish solid.

MW: 178.5	BP: 8316°F	MLT: 4041°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 13.31
Fl.P: NA	UEL: NA	LEL: NA	

Explosive in powder form (either dry or with <25% water); finely divided powder can be ignited by static electricity or even SPONTANEOUSLY.

Incompatibilities & Reactivities
Strong oxidizers, chlorine

Measurement Methods
NIOSH S194 (II-5); OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 2.5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*

Up to 25 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, skin, mucous membrane; liver damage

Target Organs Eyes, skin, mucous membrane, liver

See also: INTRODUCTION See ICSC CARD: 0847

NIOSH Pocket Guide to Chemical Hazards

Uranium (insoluble compounds, as U)	**CAS** 7440-61-1 (metal)
U (metal)	**RTECS** YR3490000 (metal)
Synonyms & Trade Names Uranium metal: Uranium I Synonyms of other insoluble uranium compounds vary depending upon the specific compound.	**DOT ID & Guide** 2979 162 (metal, pyrophoric)

Exposure Limits	NIOSH REL: Ca TWA 0.2 mg/m^3 ST 0.6 mg/m^3 See Appendix A
	OSHA PEL†: TWA 0.25 mg/m^3
IDLH Ca [10 mg/m^3 (as U)] See: 7440611	**Conversion**

Physical Description
Metal: Silver-white, malleable, ductile, lustrous solid. [Note: Weakly radioactive.]

MW: 238.0	BP: 6895°F	MLT: 2097°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 19.05 (metal)
Fl.P: NA	UEL: NA	LEL: NA	MEC: 60 g/m^3

Metal: Combustible Solid, especially turnings and powder.

Incompatibilities & Reactivities
Carbon dioxide, carbon tetrachloride, nitric acid, fluorine [Note: Complete coverage of uranium metal scrap with oil is essential for prevention of fire.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Dermatitis; kidney damage; blood changes; [potential occupational carcinogen]; in animals: lung, lymph node damage [Potential for cancer is a result of alpha-emitting properties & radioactive decay products (e.g., radon).]

Target Organs Skin, kidneys, bone marrow, lymphatic system

Cancer Site [lung cancer]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Yttrium	**CAS** 7440-65-5
Y	**RTECS** ZG2980000
Synonyms & Trade Names Yttrium metal	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 1 mg/m^3 [*Note: The REL also applies to other yttrium compounds (as Y).]
	OSHA PEL*: TWA 1 mg/m^3 [*Note: The PEL also applies to other yttrium compounds (as Y).]
IDLH 500 mg/m^3 (as Y) See: 7440655	**Conversion**

Physical Description
Dark-gray to black, odorless solid.

MW: 88.9	BP: 5301°F	MLT: 2732°F	Sol: Soluble in hot H_2O
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 4.47
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form.

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
NIOSH 7300; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 10 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 50 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 500 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes; in animals: pulmonary irritation; eye injury; possible liver damage

Target Organs Eyes, respiratory system, liver

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Zirconium compounds (as Zr)	**CAS** 7440-67-7 (Metal)
Zr (Metal)	**RTECS** ZH7070000 (Metal)
Synonyms & Trade Names Zirconium metal: Zirconium Synonyms of other zirconium compounds vary depending upon the specific compound.	**DOT ID & Guide** 1358 170 (powder, wet) 1932 135 (scrap) 2008 135 (powder, dry)

Exposure Limits	NIOSH REL*: TWA 5 mg/m^3 ST 10 mg/m^3 [*Note: The REL applies to all zirconium compounds (as Zr) except Zirconium tetrachloride.]
	OSHA PEL†: TWA 5 mg/m^3
IDLH 50 mg/m^3 (as Zr) See: IDLH INDEX	**Conversion**

Physical Description
Metal: Soft, malleable, ductile, solid or gray to gold, amorphous powder.

MW: 91.2	BP: 6471°F	MLT: 3375°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 6.51 (Metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Combustible, but solid form is difficult to ignite; however, powder form may ignite SPONTANEOUSLY and can continue burning under water.

Incompatibilities & Reactivities
Potassium nitrate, oxidizers [Note: Fine powder may be stored completely immersed in water.]

Measurement Methods
NIOSH 7300; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Recommendations regarding personal protective clothing vary depending upon the specific compound.
Recommendations regarding eye protection vary depending upon the specific compound.
Recommendations regarding washing the skin vary depending upon the specific compound.
Recommendations regarding the removal of personal protective clothing that becomes wet or contaminated vary depending upon the specific compound.
Recommendations regarding the daily changing of personal protective clothing vary depending upon the specific compound.
Recommendations regarding the need for eyewash or quick drench facilities vary depending upon the specific compound.

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 25 mg/m^3: (APF = 5) Any dust and mist respirator
Up to 50 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter/(APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Skin, lung granulomas; in animals: irritation skin, mucous membrane; X-ray evidence of retention in lungs
Target Organs Skin, respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0247

NIOSH Pocket Guide to Chemical Hazards

Indium	**CAS** 7440-74-6
In	**RTECS** NL1050000
Synonyms & Trade Names Indium metal	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 0.1 mg/m^3 [*Note: The REL also applies to other indium compounds (as In).]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Ductile, shiny, silver-white metal that is softer than lead.

MW: 114.8	BP: 3767°F	MLT: 314°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 7.31
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but may ignite in powdered or dust form.

Incompatibilities & Reactivities
(Dinitrogen tetraoxide + acetonitrile), mercury(II) bromide (at 662°F), sulfur (mixtures ignite when heated) [Note: oxidizes readily at higher temperatures.]

Measurement Methods
NIOSH P&CAM173 (II-5); OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; possible liver, kidney, heart, blood effects; pulmonary edema

Target Organs Eyes, skin, respiratory system, liver, kidneys, heart, blood

See also: INTRODUCTION See ICSC CARD: 1293

NIOSH Pocket Guide to Chemical Hazards

Sulfur dioxide	**CAS** 7446-09-5
SO_2	**RTECS** WS4550000
Synonyms & Trade Names Sulfurous acid anhydride, Sulfurous oxide, Sulfur oxide	**DOT ID & Guide** 1079 125

Exposure Limits	NIOSH REL: TWA 2 ppm (5 mg/m^3) ST 5 ppm (13 mg/m^3)
	OSHA PEL†: TWA 5 ppm (13 mg/m^3)
IDLH 100 ppm See: 7446095	**Conversion** 1 ppm = 2.62 mg/m^3

Physical Description
Colorless gas with a characteristic, irritating, pungent odor. [Note: A liquid below 14°F. Shipped as a liquefied compressed gas.]

MW: 64.1	BP: 14°F	FRZ: -104°F	Sol: 10%
VP: 3.2 atm	IP: 12.30 eV	RGasD: 2.26	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Powdered alkali metals (such as sodium & potassium), water, ammonia, zinc, aluminum, brass, copper [Note: Reacts with water to form sulfurous acid (H_2SO_3).]

Measurement Methods
NIOSH 6004; OSHA ID104, ID200
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet or contaminated (liquid) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH

Up to 20 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern*/(APF = 10) Any supplied-air respirator*

Up to 50 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*

Up to 100 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern*/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; rhinorrhea (discharge of thin mucus); choking, cough; reflex bronchoconstriction; liquid: frostbite

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0074 See MEDICAL TESTS: 0215

NIOSH Pocket Guide to Chemical Hazards

Iodine	**CAS** 7553-56-2
I_2	**RTECS** NN1575000
Synonyms & Trade Names Iodine crystals, Molecular iodine	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 0.1 ppm (1 mg/m^3)
	OSHA PEL: C 0.1 ppm (1 mg/m^3)
IDLH 2 ppm See: 7553562	**Conversion** 1 ppm = 10.38 mg/m^3

Physical Description
Violet solid with a sharp, characteristic odor.

MW: 253.8	BP: 365°F	MLT: 236°F	Sol: 0.01%
VP(77°F): 0.3 mmHg	IP: 9.31 eV		Sp.Gr: 4.93
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Ammonia, acetylene, acetaldehyde, powdered aluminum, active metals, liquid chlorine

Measurement Methods
NIOSH 6005; OSHA ID212
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash (>7%), Quick drench (>7%)

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1 ppm: (APF = 10) Any supplied-air respirator*
Up to 2 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; lacrimation (discharge of tears); headache; chest tightness; skin burns, rash; cutaneous hypersensitivity

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0167 See MEDICAL TESTS: 0121

NIOSH Pocket Guide to Chemical Hazards

Dichloroacetylene	**CAS** 7572-29-4
C_2Cl_2	**RTECS** AP1080000
Synonyms & Trade Names DCA, Dichloroethyne [Note: DCA is a possible decomposition product of trichloroethylene or trichloroethane.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca C 0.1 ppm (0.4 mg/m^3) See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion** 1 ppm = 3.88 mg/m^3

Physical Description
Volatile oil with a disagreeable, sweetish odor. [Note: A gas above 90°F. DCA is not produced commercially.]

MW: 94.9	BP: 90°F (Explodes)	FRZ: -58 to -87°F	Sol: ?
VP: ?	IP: ?		Sp.Gr: 1.26
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Oxidizers, heat, shock

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Headache, loss of appetite, nausea, vomiting, intense jaw pain, cranial nerve palsy; in animals: kidney, liver, brain injury; weight loss; [potential occupational carcinogen]

Target Organs central nervous system

Cancer Site [in animals: kidney tumors]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Lithium hydride	**CAS** 7580-67-8
LiH	**RTECS** OJ6300000
Synonyms & Trade Names Lithium monohydride	**DOT ID & Guide** 1414 138 2805 138 (fused, solid)

Exposure Limits	NIOSH REL: TWA 0.025 mg/m^3
	OSHA PEL: TWA 0.025 mg/m^3
IDLH 0.5 mg/m^3 See: 7580678	**Conversion**

Physical Description
Odorless, off-white to gray, translucent, crystalline mass or white powder.

MW: 7.95	BP: Decomposes	MLT: 1256°F	Sol: Reacts
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 0.78
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid that can form airborne dust clouds which may explode on contact with flame, heat, or oxidizers.

Incompatibilities & Reactivities
Strong oxidizers, halogenated hydrocarbons, acids, water [Note: May ignite SPONTANEOUSLY in air and may reignite after fire is extinguished. Reacts with water to form hydrogen & lithium hydroxide.]

Measurement Methods
OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Brush (DO NOT WASH) Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench (>0.5 mg/m^3)	Eye: Irrigate immediately Skin: Brush (DO NOT WASH) Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.25 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator

Up to 0.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; eye, skin burns; mouth, esophagus burns (if ingested); nausea; muscle twitches; mental confusion; blurred vision

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0813 See MEDICAL TESTS: 0129

NIOSH Pocket Guide to Chemical Hazards

Perchloryl fluoride	**CAS** 7616-94-6
ClO_3F	**RTECS** SD1925000
Synonyms & Trade Names Chlorine fluoride oxide, Chlorine oxyfluoride, Trioxychlorofluoride	**DOT ID & Guide** 3083 124

Exposure Limits	NIOSH REL: TWA 3 ppm (14 mg/m^3) ST 6 ppm (28 mg/m^3)
	OSHA PEL†: TWA 3 ppm (13.5 mg/m^3)
IDLH 100 ppm See: 7616946	**Conversion** 1 ppm = 4.19 mg/m^3

Physical Description
Colorless gas with a characteristic, sweet odor. [Note: Shipped as a liquefied compressed gas.]

MW: 102.5	BP: -52°F	FRZ: -234°F	Sol: 0.06%
VP: 10.5 atm	IP: 13.60 eV	RGasD: 3.64	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas, but will support combustion.

Incompatibilities & Reactivities
Combustibles, strong bases, amines, finely divided metals, reducing agents, alcohols

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	**First Aid** (See procedures) Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 30 ppm: (APF = 10) Any supplied-air respirator
Up to 75 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 100 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Irritation respiratory system; liquid: frostbite; in animals: methemoglobinemia; cyanosis; lassitude (weakness, exhaustion), dizziness, headache; pulmonary edema; pneumonitis; anoxia

Target Organs Skin, respiratory system, blood

See also: INTRODUCTION See ICSC CARD: 1114 See MEDICAL TESTS: 0181

NIOSH Pocket Guide to Chemical Hazards

Silica, amorphous	**CAS** 7631-86-9
SiO_2	**RTECS** VV7310000
Synonyms & Trade Names Diatomaceous earth, Diatomaceous silica, Diatomite, Precipitated amorphous silica, Silica gel, Silicon dioxide (amorphous)	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 6 mg/m^3
	OSHA PEL†: TWA 20 mppcf (80 $mg/m^3/\%SiO_2$)
IDLH 3000 mg/m^3 See: 7631869	**Conversion**

Physical Description
Transparent to gray, odorless powder. [Note: Amorphous silica is the non-crystalline form of SiO_2.]

MW: 60.1	BP: 4046°F	MLT: 3110°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.20
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Fluorine, oxygen difluoride, chlorine trifluoride

Measurement Methods
NIOSH 7501
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air

Respirator Recommendations NIOSH

Up to 30 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 60 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 150 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 300 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 3000 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, pneumoconiosis

Target Organs Eyes, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Sodium bisulfite	**CAS** 7631-90-5
$NaHSO_3$	**RTECS** VZ2000000
Synonyms & Trade Names Monosodium salt of sulfurous acid, Sodium acid bisulfite, Sodium bisulphite, Sodium hydrogen sulfite	**DOT ID & Guide** 2693 154 (solution)

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White crystals or powder with a slight odor of sulfur dioxide.

MW: 104.1	BP: Decomposes	MLT: Decomposes	Sol: 29%
VP: ?	IP: NA		Sp.Gr: 1.48
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Heat (decomposes) [Note: Slowly oxidized to the sulfate on exposure to air.]

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, mucous membrane
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Boron trifluoride	**CAS** 7637-07-2
BF_3	**RTECS** ED2275000
Synonyms & Trade Names Boron fluoride, Trifluoroborane	**DOT ID & Guide** 1008 125

Exposure Limits	NIOSH REL: C 1 ppm (3 mg/m^3)
	OSHA PEL: C 1 ppm (3 mg/m^3)
IDLH 25 ppm See: 7637072	**Conversion** 1 ppm = 2.77 mg/m^3

Physical Description
Colorless gas with a pungent, suffocating odor. [Note: Forms dense white fumes in moist air. Shipped as a nonliquefied compressed gas.]

MW: 67.8	BP: -148°F	FRZ: -196°F	Sol: 106% (in cold H_2O)
VP: >50 atm	IP: 15.50 eV	RGasD: 2.38	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Alkali metals, calcium oxide [Note: Hydrolyzes in moist air or hot water to form boric acid, hydrogen fluoride & fluoboric acid.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 10 ppm: (APF = 10) Any supplied-air respirator*
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, respiratory system; epistaxis (nosebleed); eye, skin burns; in animals: pneumonitis; kidney damage

Target Organs Eyes, skin, respiratory system, kidneys

See also: INTRODUCTION See ICSC CARD: 0231 See MEDICAL TESTS: 0027

NIOSH Pocket Guide to Chemical Hazards

Zinc chloride fume	**CAS** 7646-85-7
$ZnCl_2$	**RTECS** ZH1400000
Synonyms & Trade Names Zinc dichloride fume	**DOT ID & Guide** 2331 154

Exposure Limits	NIOSH REL: TWA 1 mg/m^3 ST 2 mg/m^3
	OSHA PEL†: TWA 1 mg/m^3
IDLH 50 mg/m^3 See: 7646857	**Conversion**

Physical Description
White particulate dispersed in air.

MW: 136.3	BP: 1350°F	MLT: 554°F	Sol(70°F): 435%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr(77°F): 2.91
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Potassium

Measurement Methods
OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA

Up to 10 mg/m^3: (APF = 10) Any dust, mist, and fume respirator*/(APF = 10) Any supplied-air respirator*

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter*

Up to 50 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; conjunctivitis; cough, copious sputum; dyspnea (breathing difficulty), chest pain, pulmonary edema, pneumonitis; pulmonary fibrosis, cor pulmonale; fever; cyanosis; tachypnea; skin burns

Target Organs Eyes, skin, respiratory system, cardiovascular system

See also: INTRODUCTION See MEDICAL TESTS: 0245

NIOSH Pocket Guide to Chemical Hazards

Hydrogen chloride	**CAS** 7647-01-0
HCl	**RTECS** MW4025000
Synonyms & Trade Names Anhydrous hydrogen chloride; Aqueous hydrogen chloride (i.e., Hydrochloric acid, Muriatic acid) [Note: Often used in an aqueous solution.]	**DOT ID & Guide** 1050 125 (anhydrous) 1789 157 (solution)

Exposure Limits	NIOSH REL: C 5 ppm (7 mg/m^3)
	OSHA PEL: C 5 ppm (7 mg/m^3)
IDLH 50 ppm See: 7647010	**Conversion** 1 ppm = 1.49 mg/m^3

Physical Description
Colorless to slightly yellow gas with a pungent, irritating odor. [Note: Shipped as a liquefied compressed gas.]

MW: 36.5	BP: -121°F	FRZ: -174°F	Sol(86°F): 67%
VP: 40.5 atm	IP: 12.74 eV	RGasD: 1.27	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Hydroxides, amines, alkalis, copper, brass, zinc [Note: Hydrochloric acid is highly corrosive to most metals.]

Measurement Methods
NIOSH 7903; OSHA ID174SG
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (solution)/Frostbite Eyes: Prevent eye contact/Frostbite Wash skin: When contaminated (solution) Remove: When wet or contaminated (solution) Change: No recommendation Provide: Eyewash (solution), Quick drench (solution), Frostbite	Eye: Irrigate immediately (solution)/Frostbite Skin: Water flush immediately (solution)/Frostbite Breathing: Respiratory support Swallow: Medical attention immediately (solution)

Respirator Recommendations NIOSH/OSHA

Up to 50 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion (solution), skin and/or eye contact

Symptoms Irritation nose, throat, larynx; cough, choking; dermatitis; solution: eye, skin burns; liquid: frostbite; in animals: laryngeal spasm; pulmonary edema

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0163 See MEDICAL TESTS: 0116

NIOSH Pocket Guide to Chemical Hazards

Phosphoric acid	**CAS** 7664-38-2
H_3PO_4	**RTECS** TB6300000
Synonyms & Trade Names Orthophosphoric acid, Phosphoric acid (aqueous), White phosphoric acid	**DOT ID & Guide** 1805 154

Exposure Limits	NIOSH REL: TWA 1 mg/m^3 ST 3 mg/m^3
	OSHA PEL†: TWA 1 mg/m^3
IDLH 1000 mg/m^3 See: 7664382	**Conversion**

Physical Description
Thick, colorless, odorless, crystalline solid. [Note: Often used in an aqueous solution.]

MW: 98.0	BP: 415°F	MLT: 108°F	Sol: Miscible
VP: 0.03 mmHg	IP: ?		Sp.Gr(77°F): 1.87 (pure) 1.33 (50% solution)
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong caustics, most metals [Note: Readily reacts with metals to form flammable hydrogen gas. DO NOT MIX WITH SOLUTIONS CONTAINING BLEACH OR AMMONIA.]

Measurement Methods
NIOSH 7903; OSHA ID165SG
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash (>1.6%), Quick drench (>1.6%)	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

Up to 50 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1000 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; eye, skin, burns; dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 1008

NIOSH Pocket Guide to Chemical Hazards

Hydrogen fluoride	**CAS** 7664-39-3
HF	**RTECS** MW7875000
Synonyms & Trade Names Anhydrous hydrogen fluoride; Aqueous hydrogen fluoride (i.e., Hydrofluoric acid); HF-A	**DOT ID & Guide** 1052 125 (anhydrous) 1790 157 (solution)

Exposure Limits	NIOSH REL: TWA 3 ppm (2.5 mg/m^3) C 6 ppm (5 mg/m^3) [15-minute]
	OSHA PEL†: TWA 3 ppm
IDLH 30 ppm See: 7664393	**Conversion** 1 ppm = 0.82 mg/m^3

Physical Description
Colorless gas or fuming liquid (below 67°F) with a strong, irritating odor. [Note: Shipped in cylinders.]

MW: 20.0	BP: 67°F	FRZ: -118°F	Sol: Miscible
VP: 783 mmHg	IP: 15.98 eV	RGasD: 1.86	Sp.Gr: 1.00 (Liquid at 67°F)
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Metals, water or steam [Note: Corrosive to metals. Will attack glass and concrete.]

Measurement Methods
NIOSH 7902, 7903, 7906; OSHA ID110
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact (liquid) Eyes: Prevent eye contact (liquid) Wash skin: When contaminated (liquid) Remove: When wet or contaminated (liquid) Change: No recommendation Provide: Eyewash (liquid), Quick drench (liquid)	Eye: Irrigate immediately (solution/liquid) Skin: Water flush immediately (solution/liquid) Breathing: Respiratory support Swallow: Medical attention immediately (solution)

Respirator Recommendations NIOSH/OSHA
Up to 30 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern*/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption (liquid), ingestion (solution), skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; pulmonary edema; eye, skin burns; rhinitis; bronchitis; bone changes

Target Organs Eyes, skin, respiratory system, bones

See also: INTRODUCTION See ICSC CARD: 0283 See MEDICAL TESTS: 0118

NIOSH Pocket Guide to Chemical Hazards

Ammonia	**CAS** 7664-41-7
NH_3	**RTECS** BO0875000
Synonyms & Trade Names Anhydrous ammonia, Aqua ammonia, Aqueous ammonia [Note: Often used in an aqueous solution.]	**DOT ID & Guide** 1005 125 (anhydrous) 2672 154 (10-35% solution) 2073 125 (>35-50% solution) 1005 125 (>50% solution)

Exposure Limits	NIOSH REL: TWA 25 ppm (18 mg/m^3) ST 35 ppm (27 mg/m^3)
	OSHA PEL†: TWA 50 ppm (35 mg/m^3)
IDLH 300 ppm See: 7664417	**Conversion** 1 ppm = 0.70 mg/m^3

Physical Description
Colorless gas with a pungent, suffocating odor. [Note: Shipped as a liquefied compressed gas. Easily liquefied under pressure.]

MW: 17.0	BP: -28°F	FRZ: -108°F	Sol: 34%
VP: 8.5 atm	IP: 10.18 eV	RGasD: 0.60	
Fl.P: NA (Gas)	UEL: 28%	LEL: 15%	

[Note: Although NH_3 does not meet the DOT definition of a Flammable Gas (for labeling purposes), it should be treated as one.]

Incompatibilities & Reactivities
Strong oxidizers, acids, halogens, salts of silver & zinc [Note: Corrosive to copper & galvanized surfaces.]

Measurement Methods
NIOSH 6015, 6016; OSHA ID188
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated (solution)
Remove: When wet or contaminated (solution)
Change: No recommendation
Provide: Eyewash (>10%), Quick drench (>10%)

First Aid (See procedures)
Eye: Irrigate immediately (solution/liquid)
Skin: Water flush immediately (solution/liquid)
Breathing: Respiratory support
Swallow: Medical attention immediately (solution)

Respirator Recommendations NIOSH
Up to 250 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern*/(APF = 10) Any supplied-air respirator*
Up to 300 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*/(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion (solution), skin and/or eye contact (solution/liquid)

Symptoms Irritation eyes, nose, throat; dyspnea (breathing difficulty), wheezing, chest pain; pulmonary edema; pink frothy sputum; skin burns, vesiculation; liquid: frostbite

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0414 See MEDICAL TESTS: 0013

NIOSH Pocket Guide to Chemical Hazards

Sulfuric acid	**CAS** 7664-93-9
H_2SO_4	**RTECS** WS5600000
Synonyms & Trade Names Battery acid, Hydrogen sulfate, Oil of vitriol, Sulfuric acid (aqueous)	**DOT ID & Guide** 1830 137 1831 137 (fuming) 1832 137 (spent)

Exposure Limits	NIOSH REL: TWA 1 mg/m^3
	OSHA PEL: TWA 1 mg/m^3
IDLH 15 mg/m^3 See: 7664939	**Conversion**

Physical Description
Colorless to dark-brown, oily, odorless liquid. [Note: Pure compound is a solid below 51°F. Often used in an aqueous solution.]

MW: 98.1	BP: 554°F	FRZ: 51°F	Sol: Miscible
VP: 0.001 mmHg	IP: ?		Sp.Gr: 1.84 (96-98% acid)
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but capable of igniting finely divided combustible materials.

Incompatibilities & Reactivities
Organic materials, chlorates, carbides, fulminates, water, powdered metals [Note: Reacts violently with water with evolution of heat. Corrosive to metals.]

Measurement Methods
NIOSH 7903; OSHA ID165SG
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash (>1%), Quick drench (>1%)	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 15 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with acid gas cartridge(s) in combination with a high-efficiency particulate filter£

(APF = 50) Any chemical cartridge respirator with a full facepiece and acid gas cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatis; dental erosion; eye, skin burns; dermatitis

Target Organs Eyes, skin, respiratory system, teeth

See also: INTRODUCTION See ICSC CARD: 0362 See MEDICAL TESTS: 0218

NIOSH Pocket Guide to Chemical Hazards

Sodium fluoride (as F)	**CAS** 7681-49-4
NaF	**RTECS** WB0350000
Synonyms & Trade Names Floridine, Sodium monofluoride	**DOT ID & Guide** 1690 154

Exposure Limits	NIOSH REL*: TWA 2.5 mg/m^3 [*Note: The REL also applies to other inorganic, solid fluorides (as F).]
	OSHA PEL*: TWA 2.5 mg/m^3 [*Note: The PEL also applies to other inorganic, solid fluorides (as F).]
IDLH 250 mg/m^3 (as F) See: fluoride	**Conversion**

Physical Description
Odorless, white powder or colorless crystals. [Note: Pesticide grade is often dyed blue.]

MW: 42.0	BP: 3099°F	MLT: 1819°F	Sol: 4%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.78
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 7902, 7906; OSHA ID110
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 12.5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 25 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*/(APF = 10) Any supplied-air respirator*

Up to 62.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*+

Up to 125 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter+/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 250 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter+/Any appropriate escape-type, self-contained breathing apparatus

+Note: May need acid gas sorbent

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; nausea, abdominal pain, diarrhea; salivation, thirst, sweating; stiff spine; dermatitis; calcification of ligaments of ribs, pelvis

Target Organs Eyes, skin, respiratory system, central nervous system, skeleton, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Sodium metabisulfite	**CAS** 7681-57-4
$Na_2S_2O_5$	**RTECS** UX8225000
Synonyms & Trade Names Disodium pyrosulfite, Sodium metabisulphite, Sodium pyrosulfite	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White to yellowish crystals or powder with an odor of sulfur dioxide.

MW: 190.1	BP: Decomposes	MLT: >302°F (Decomposes)	Sol: 54%
VP: ?	IP: NA		Sp.Gr: 1.4
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Heat (decomposes) [Note: Slowly oxidized to the sulfate on exposure to air & moisture.]

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, mucous membrane
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Nitric acid	**CAS** 7697-37-2
HNO_3	**RTECS** QU5775000
Synonyms & Trade Names Aqua fortis, Engravers acid, Hydrogen nitrate, Red fuming nitric acid (RFNA), White fuming nitric acid (WFNA)	**DOT ID & Guide** 1760 154 (</=40% acid) 2031 157 (>40% acid) 2032 157 (fuming)

Exposure Limits	NIOSH REL: TWA 2 ppm (5 mg/m^3) ST 4 ppm (10 mg/m^3)
	OSHA PEL†: TWA 2 ppm (5 mg/m^3)
IDLH 25 ppm See: 7697372	**Conversion** 1 ppm = 2.58 mg/m^3

Physical Description
Colorless, yellow, or red, fuming liquid with an acrid, suffocating odor. [Note: Often used in an aqueous solution. Fuming nitric acid is concentrated nitric acid that contains dissolved nitrogen dioxide.]

MW: 63.0	BP: 181°F	FRZ: -44°F	Sol: Miscible
VP: 48 mmHg	IP: 11.95 eV		Sp.Gr(77°F): 1.50
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but increases the flammability of combustible materials.

Incompatibilities & Reactivities
Combustible materials, metallic powders, hydrogen sulfide, carbides, alcohols [Note: Reacts with water to produce heat. Corrosive to metals.]

Measurement Methods
NIOSH 7903; OSHA ID165SG
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash (pH<2.5), Quick drench (pH<2.5)	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern¿/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; delayed pulmonary edema, pneumonitis, bronchitis; dental erosion

Target Organs Eyes, skin, respiratory system, teeth

See also: INTRODUCTION See ICSC CARD: 0183 See MEDICAL TESTS: 0158

NIOSH Pocket Guide to Chemical Hazards

Thionyl chloride	**CAS** 7719-09-7
$SOCl_2$	**RTECS** XM5150000
Synonyms & Trade Names Sulfinyl chloride, Sulfur chloride oxide, Sulfurous dichloride, Sulfurous oxychloride, Thionyl dichloride	**DOT ID & Guide** 1836 137

Exposure Limits	NIOSH REL: C 1 ppm (5 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.87 mg/m^3

Physical Description
Colorless to yellow to reddish liquid with a pungent odor like sulfur dioxide. [Note: Fumes form when exposed to moist air.]

MW: 119.0	BP: 169°F	FRZ: -156°F	Sol: Reacts
VP(70°F): 100 mmHg	IP: ?		Sp.Gr: 1.64
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Water, acids, alkalis, ammonia, chloryl perchlorate [Note: Reacts violently with water to form sulfur dioxide & hydrogen chloride.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, mucous membrane; eye, skin burns	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Phosphorus trichloride	**CAS** 7719-12-2
PCl_3	**RTECS** TH3675000
Synonyms & Trade Names Phosphorus chloride	**DOT ID & Guide** 1809 137

Exposure Limits	NIOSH REL: TWA 0.2 ppm (1.5 mg/m^3) ST 0.5 ppm (3 mg/m^3)
	OSHA PEL†: TWA 0.5 ppm (3 mg/m^3)
IDLH 25 ppm See: 7719122	**Conversion** 1 ppm = 5.62 mg/m^3

Physical Description
Colorless to yellow, fuming liquid with an odor like hydrochloric acid.

MW: 137.4	BP: 169°F	FRZ: -170°F	Sol: Reacts
VP: 100 mmHg	IP: 9.91 eV		Sp.Gr: 1.58
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid; however, a strong oxidizer that may ignite combustibles upon contact.

Incompatibilities & Reactivities
Water, chemically-active metals such as sodium & potassium, aluminum, strong nitric acid, acetic acid, organic matter [Note: Hydrolyzes in water to form hydrochloric acid and phosphoric acid.]

Measurement Methods
NIOSH 6402
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 10 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 25 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; pulmonary edema; eye, skin burns

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0696 See MEDICAL TESTS: 0191

NIOSH Pocket Guide to Chemical Hazards

Hydrogen peroxide	**CAS** 7722-84-1
H_2O_2	**RTECS** MX0900000
Synonyms & Trade Names High-strength hydrogen peroxide, Hydrogen dioxide, Hydrogen peroxide (aqueous), Hydroperoxide, Peroxide	**DOT ID & Guide** 2984 140 (8-20% solution) 2014 140 (20-60% solution) 2015 143 (>60% solution)

Exposure Limits	NIOSH REL: TWA 1 ppm (1.4 mg/m^3)
	OSHA PEL: TWA 1 ppm (1.4 mg/m^3)
IDLH 75 ppm See: IDLH INDEX	**Conversion** 1 ppm = 1.39 mg/m^3

Physical Description
Colorless liquid with a slightly sharp odor. [Note: The pure compound is a crystalline solid below 12°F. Often used in an aqueous solution.]

MW: 34.0	BP: 286°F	FRZ: 12°F	Sol: Miscible
VP(86°F): 5 mmHg	IP: 10.54 eV		Sp.Gr: 1.39
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but a powerful oxidizer.

Incompatibilities & Reactivities
Oxidizable materials, iron, copper, brass, bronze, chromium, zinc, lead, silver, manganese. [Note: Contact with combustible material may result in SPONTANEOUS combustion.]

Measurement Methods
OSHA ID126SG
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 10 ppm: (APF = 10) Any supplied-air respirator*
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 50 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 75 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; corneal ulcer; erythema (skin redness), skin vesiculation; bleaching hair

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0164

NIOSH Pocket Guide to Chemical Hazards

Tetrasodium pyrophosphate	**CAS** 7722-88-5
$Na_4P_2O_7$	**RTECS** UX7350000
Synonyms & Trade Names Pyrophosphate, Sodium pyrophosphate, Tetrasodium diphosphate, Tetrasodium pyrophosphate (anhydrous), TSPP	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Odorless, white powder or granules. [Note: The decahydrate ($Na_4P_2O_7 \cdot 10H_2O$) is in the form of colorless, transparent crystals.]

MW: 265.9	BP: Decomposes	MLT: 1810°F	Sol(77°F): 7%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.45
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong acids

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash (solution)	Eye: Irrigate immediately Skin: Water wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, nose, throat; dermatitis	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 1140

NIOSH Pocket Guide to Chemical Hazards

Phosphorus (yellow)	**CAS** 7723-14-0
P_4	**RTECS** TH3500000
Synonyms & Trade Names Elemental phosphorus, White phosphorus	**DOT ID & Guide** 1381 136

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3
	OSHA PEL: TWA 0.1 mg/m^3
IDLH 5 mg/m^3 See: 7723140	**Conversion**

Physical Description
White to yellow, soft, waxy solid with acrid fumes in air. [Note: Usually shipped or stored in water.]

MW: 124.0	BP: 536°F	MLT: 111°F	Sol: 0.0003%
VP: 0.03 mmHg	IP: ?		Sp.Gr: 1.82
Fl.P: ?	UEL: ?	LEL: ?	

Flammable Solid

Incompatibilities & Reactivities
Air, oxidizers (including elemental sulfur & strong caustics), halogens [Note: Ignites SPONTANEOUSLY in moist air.]

Measurement Methods
NIOSH 7905
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact* [*Note: Flame retardant personal protective equipment should be provided.] Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 1 mg/m^3: (APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£

Up to 5 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory tract; eye, skin burns; abdominal pain, nausea, jaundice; anemia; cachexia; dental pain, salivation, jaw pain, swelling

Target Organs Eyes, skin, respiratory system, liver, kidneys, jaw, teeth, blood

See also: INTRODUCTION See ICSC CARD: 0628 See MEDICAL TESTS: 0188

NIOSH Pocket Guide to Chemical Hazards

Bromine	**CAS** 7726-95-6
Br_2	**RTECS** EF9100000
Synonyms & Trade Names Molecular bromine	**DOT ID & Guide** 1744 154

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.7 mg/m^3) ST 0.3 ppm (2 mg/m^3)
	OSHA PEL†: TWA 0.1 ppm (0.7 mg/m^3)
IDLH 3 ppm See: 7726956	**Conversion** 1 ppm = 6.54 mg/m^3

Physical Description
Dark reddish-brown, fuming liquid with suffocating, irritating fumes.

MW: 159.8	BP: 139°F	FRZ: 19°F	Sol: 4%
VP: 172 mmHg	IP: 10.55 eV		Sp.Gr: 3.12
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but accelerates the burning of combustibles.

Incompatibilities & Reactivities
Combustible organics (sawdust, wood, cotton, straw, etc.), aluminum, readily oxidizable materials, ammonia, hydrogen, acetylene, phosphorus, potassium, sodium [Note: Corrodes iron, steel, stainless steel & copper.]

Measurement Methods
NIOSH 6011; OSHA ID108
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern¿£
Up to 3 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern¿/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern¿£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Dizziness, headache; lacrimation (discharge of tears), epistaxis (nosebleed); cough, feeling of oppression, pulmonary edema, pneumonitis; abdominal pain, diarrhea; measle-like eruptions; eye, skin burns

Target Organs respiratory system, eyes, central nervous system, skin

See also: INTRODUCTION See ICSC CARD: 0107 See MEDICAL TESTS: 0028

NIOSH Pocket Guide to Chemical Hazards

Barium sulfate	**CAS** 7727-43-7
$BaSO_4$	**RTECS** CR0600000
Synonyms & Trade Names Artificial barite, Barite, Barium salt of sulfuric acid, Barytes (natural)	**DOT ID & Guide** 1564 154 (barium compounds, n.o.s.)

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White or yellowish, odorless powder.

MW: 233.4	BP: 2912°F (Decomposes)	MLT: 2876°F	Sol(64°F): 0.0002%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 4.25-4.5
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Phosphorus, aluminum [Note: Aluminum in the presence of heat can cause an explosion.]

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, nose, upper respiratory system; benign pneumoconiosis (baritosis)	
Target Organs Eyes, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0827

NIOSH Pocket Guide to Chemical Hazards

Ammonium sulfamate	**CAS** 7773-06-0
$NH_4OSO_2NH_2$	**RTECS** WO6125000
Synonyms & Trade Names Ammate herbicide, Ammonium amidosulfonate, AMS, Monoammonium salt of sulfamic acid, Sulfamate	**DOT ID & Guide** 9089 171

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH 1500 mg/m^3 See: 7773060	**Conversion**

Physical Description
Colorless to white crystalline, odorless solid. [herbicide]

MW: 114.1	BP: 320°F (Decomposes)	MLT: 268°F	Sol: 200%
VP: 0 mmHg (approx)	IP: ?		Sp.Gr: 1.77
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Acids, hot water [Note: Elevated temperatures cause a highly exothermic reaction with water.]

Measurement Methods
NIOSH S348 (II-5)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 50 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 100 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 250 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 500 mg/m^3: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1500 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; cough, dyspnea (breathing difficulty)

Target Organs Eyes, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Calcium sulfate	**CAS** 7778-18-9
$CaSO_4$	**RTECS** WS6920000
Synonyms & Trade Names Anhydrous calcium sulfate, Anhydrous gypsum, Anhydrous sulfate of lime, Calcium salt of sulfuric acid [Note: Gypsum is the dihydrate form & Plaster of Paris is the hemihydrate form.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Odorless, white powder or colorless, crystalline solid. [Note: May have blue, gray, or reddish tinge.]

MW: 136.1	BP: Decomposes	MLT: 2840°F (Decomposes)	Sol: 0.3%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.96
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Diazomethane, aluminum, phosphorus, water [Note: Hygroscopic (i.e., absorbs moisture from the air). Reacts with water to form Gypsum & Plaster of Paris.]

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; conjunctivitis; rhinitis, epistaxis (nosebleed)	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Calcium arsenate (as As)	**CAS** 7778-44-1
$Ca_3(AsO_4)_2$	**RTECS** CG0830000
Synonyms & Trade Names Calcium salt (2:3) of arsenic acid, Cucumber dust, Tricalcium arsenate, Tricalcium ortho-arsenate [Note: Also see specific listing for Arsenic (inorganic compounds, as As).]	**DOT ID & Guide** 1573 151

Exposure Limits	NIOSH REL: Ca C 0.002 mg/m^3 [15-minute] See Appendix A
	OSHA PEL: [1910.1018] TWA 0.010 mg/m^3
IDLH Ca [5 mg/m^3 (as As)] See: 7778441	**Conversion**

Physical Description
Colorless to white, odorless solid. [insecticide/herbicide]

MW: 398.1	BP: Decomposes	MLT: ?	Sol(77°F): 0.01%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 3.62
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported [Note: Produces toxic fumes of arsenic when heated to decomposition.]

Measurement Methods
NIOSH 7900; OSHA ID105
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Lassitude (weakness, exhaustion); gastrointestinal disturbance; peripheral neuropathy; skin hyperpigmentation, palmar planter hyperkeratoses; dermatitis; [potential occupational carcinogen]; in animals: liver damage

Target Organs Eyes, respiratory system, liver, skin, central nervous system, lymphatic system

Cancer Site [lymphatic & lung cancer]

See also: INTRODUCTION See ICSC CARD: 0765

NIOSH Pocket Guide to Chemical Hazards

Fluorine	**CAS** 7782-41-4
F_2	**RTECS** LM6475000
Synonyms & Trade Names Fluorine-19	**DOT ID & Guide** 9192 167 (cryogenic liquid) 1045 124 (compressed)

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.2 mg/m^3)
	OSHA PEL: TWA 0.1 ppm (0.2 mg/m^3)
IDLH 25 ppm See: 7782414	**Conversion** 1 ppm = 1.55 mg/m^3

Physical Description
Pale-yellow to greenish gas with a pungent, irritating odor.

MW: 38.0	BP: -307°F	FRZ: -363°F	Sol: Reacts
VP: >1 atm	IP: 15.70 eV	RGasD: 1.31	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas, but an extremely strong oxidizer.

Incompatibilities & Reactivities
Water, nitric acid, oxidizers, organic compounds [Note: Reacts violently with all combustible materials, except the metal containers in which it is shipped. Reacts with H_2O to form hydrofluoric acid.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (liquid) Eyes: Prevent eye contact (liquid) Wash skin: When contaminated (liquid) Remove: When wet or contaminated (liquid) Change: No recommendation Provide: Eyewash (liquid), Quick drench (liquid)	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 1 ppm: (APF = 10) Any supplied-air respirator*
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 5 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 25 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, nose, respiratory system; laryngeal spasm, wheezing; pulmonary edema; eye, skin burns; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0046 See MEDICAL TESTS: 0109

NIOSH Pocket Guide to Chemical Hazards

Graphite (natural)	**CAS** 7782-42-5
C	**RTECS** MD9659600
Synonyms & Trade Names Black lead, Mineral carbon, Plumbago, Silver graphite, Stove black [Note: Also see specific listing for Graphite (synthetic).]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2.5 mg/m^3 (resp)
	OSHA PEL†: TWA 15 mppcf
IDLH 1250 mg/m^3 See: 7782425	**Conversion**

Physical Description
Steel gray to black, greasy feeling, odorless solid.

MW: 12.0	BP: Sublimes	MLT: 6602°F (Sublimes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.0-2.25
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid

Incompatibilities & Reactivities
Very strong oxidizers such as fluorine, chlorine trifluoride & potassium peroxide

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air

Respirator Recommendations NIOSH

Up to 12.5 mg/m^3: (APF = 5) Any dust respirator

Up to 25 mg/m^3: (APF = 10) Any dust respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 62.5 mg/m^3: (APF = 25) Any powered, air-purifying respirator with a dust filter/(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 125 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1250 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Cough, dyspnea (breathing difficulty), black sputum, decreased pulmonary function, lung fibrosis

Target Organs respiratory system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0893 See MEDICAL TESTS: 0112

NIOSH Pocket Guide to Chemical Hazards

Selenium	**CAS** 7782-49-2
Se	**RTECS** VS7700000
Synonyms & Trade Names Elemental selenium, Selenium alloy	**DOT ID & Guide** 2658 152 (powder)

Exposure Limits	NIOSH REL*: TWA 0.2 mg/m^3 [*Note: The REL also applies to other selenium compounds (as Se) except Selenium hexafluoride.]
	OSHA PEL*: TWA 0.2 mg/m^3 [*Note: The PEL also applies to other selenium compounds (as Se) except Selenium hexafluoride.]
IDLH 1 mg/m^3 (as Se) See: 7782492	**Conversion**

Physical Description
Amorphous or crystalline, red to gray solid. [Note: Occurs as an impurity in most sulfide ores.]

MW: 79.0	BP: 1265°F	MLT: 392°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 4.28
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid

Incompatibilities & Reactivities
Acids, strong oxidizers, chromium trioxide, potassium bromate, cadmium

Measurement Methods
NIOSH 7300, S190 (II-7); OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 1 mg/m^3: (APF = 5) Any dust and mist respirator^*/(APF = 10) Any dust, mist, and fume respirator*/(APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter^*/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; in animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage

Target Organs Eyes, skin, respiratory system, liver, kidneys, blood, spleen

See also: INTRODUCTION See ICSC CARD: 0072 See MEDICAL TESTS: 0202

NIOSH Pocket Guide to Chemical Hazards

Chlorine	**CAS** 7782-50-5
Cl_2	**RTECS** FO2100000
Synonyms & Trade Names Molecular chlorine	**DOT ID & Guide** 1017 124

Exposure Limits	NIOSH REL: C 0.5 ppm (1.45 mg/m^3) [15-minute]
	OSHA PEL†: C 1 ppm (3 mg/m^3)
IDLH 10 ppm See: 7782505	**Conversion** 1 ppm = 2.90 mg/m^3

Physical Description
Greenish-yellow gas with a pungent, irritating odor. [Note: Shipped as a liquefied compressed gas.]

MW: 70.9	BP: -29°F	FRZ: -150°F	Sol: 0.7%
VP: 6.8 atm	IP: 11.48 eV	RGasD: 2.47	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas, but a strong oxidizer.

Incompatibilities & Reactivities
Reacts explosively or forms explosive compounds with many common substances such as acetylene, ether, turpentine, ammonia, fuel gas, hydrogen & finely divided metals.

Measurement Methods
NIOSH 6011; OSHA ID101
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	**First Aid** (See procedures) Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern*/(APF = 10) Any supplied-air respirator*
Up to 10 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*/(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Burning of eyes, nose, mouth; lacrimation (discharge of tears), rhinorrhea (discharge of thin mucus); cough, choking, substernal (occurring beneath the sternum) pain; nausea, vomiting; headache, dizziness; syncope; pulmonary edema; pneumonitis; hypoxemia (reduced oxygen in the blood); dermatitis; liquid: frostbite

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0126 See MEDICAL TESTS: 0044

NIOSH Pocket Guide to Chemical Hazards

Germanium tetrahydride	**CAS** 7782-65-2
GeH_4	**RTECS** LY4900000
Synonyms & Trade Names Germane, Germanium hydride, Germanomethane, Monogermane [Note: Used chiefly for the production of high purity germanium for use in semiconductors.]	**DOT ID & Guide** 2192 119

Exposure Limits	NIOSH REL: TWA 0.2 ppm (0.6 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 3.13 mg/m^3

Physical Description
Colorless gas with a pungent odor. [Note: Shipped as a compressed gas.]

MW: 76.6	BP: -127°F	FRZ: -267°F	Sol: Insoluble
VP: >1 atm	IP: 11.34 eV	RGasD: 2.65	
Fl.P: NA (Gas)	UEL: ?	LEL: ?	

Flammable Gas (may ignite SPONTANEOUSLY in air).

Incompatibilities & Reactivities
Bromine

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Breathing: Respiratory support
Respirator Recommendations To be added later	
Exposure Routes inhalation	
Symptoms Malaise (vague feeling of discomfort), headache, dizziness, fainting; dyspnea (breathing difficulty); nausea, vomiting; kidney injury; hemolytic effects	
Target Organs central nervous system, kidneys, blood	

See also: INTRODUCTION See ICSC CARD: 1244

NIOSH Pocket Guide to Chemical Hazards

Hydrogen sulfide	**CAS** 7783-06-4
H_2S	**RTECS** MX1225000
Synonyms & Trade Names Hydrosulfuric acid, Sewer gas, Sulfuretted hydrogen	**DOT ID & Guide** 1053 117

Exposure Limits	NIOSH REL: C 10 ppm (15 mg/m^3) [10-minute]
	OSHA PEL†: C 20 ppm 50 ppm [10-minute maximum peak]
IDLH 100 ppm See: 7783064	**Conversion** 1 ppm = 1.40 mg/m^3

Physical Description
Colorless gas with a strong odor of rotten eggs. [Note: Sense of smell becomes rapidly fatigued & can NOT be relied upon to warn of the continuous presence of H_2S. Shipped as a liquefied compressed gas.]

MW: 34.1	BP: -77°F	FRZ: -122°F	Sol: 0.4%
VP: 17.6 atm	IP: 10.46 eV	RGasD: 1.19	
Fl.P: NA (Gas)	UEL: 44.0%	LEL: 4.0%	

Flammable Gas

Incompatibilities & Reactivities
Strong oxidizers, strong nitric acid, metals

Measurement Methods
NIOSH 6013; OSHA ID141
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH

Up to 100 ppm: (APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, lassitude (weakness, exhaustion), irritability, insomnia; gastrointestinal disturbance; liquid: frostbite

Target Organs Eyes, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0165 See MEDICAL TESTS: 0119

NIOSH Pocket Guide to Chemical Hazards

Hydrogen selenide	**CAS** 7783-07-5
H_2Se	**RTECS** MX1050000
Synonyms & Trade Names Selenium dihydride, Selenium hydride	**DOT ID & Guide** 2202 117 (anhydrous)

Exposure Limits	NIOSH REL: TWA 0.05 ppm (0.2 mg/m^3)
	OSHA PEL: TWA 0.05 ppm (0.2 mg/m^3)
IDLH 1 ppm See: 7783075	**Conversion** 1 ppm = 3.31 mg/m^3

Physical Description
Colorless gas with an odor resembling decayed horse radish. [Note: Shipped as a liquefied compressed gas.]

MW: 81.0	BP: -42°F	FRZ: -87°F	Sol(73°F): 0.9%
VP(70°F): 9.5 atm	IP: 9.88 eV	RGasD: 2.80	
Fl.P: NA (Gas)	UEL: ?	LEL: ?	

Flammable Gas

Incompatibilities & Reactivities
Strong oxidizers, acids, water, halogenated hydrocarbons

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	**First Aid** (See procedures) Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 0.5 ppm: (APF = 10) Any supplied-air respirator
Up to 1 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; nausea, vomiting, diarrhea; metallic taste, garlic breath; dizziness, lassitude (weakness, exhaustion); liquid: frostbite; in animals: pneumonitis; liver damage

Target Organs Eyes, respiratory system, liver

See also: INTRODUCTION See ICSC CARD: 0284

NIOSH Pocket Guide to Chemical Hazards

Oxygen difluoride	**CAS** 7783-41-7
OF_2	**RTECS** RS2100000
Synonyms & Trade Names Difluorine monoxide, Fluorine monoxide, Oxygen fluoride	**DOT ID & Guide** 2190 124

Exposure Limits	NIOSH REL: C 0.05 ppm (0.1 mg/m^3)
	OSHA PEL†: TWA 0.05 ppm (0.1 mg/m^3)
IDLH 0.5 ppm See: 7783417	**Conversion** 1 ppm = 2.21 mg/m^3

Physical Description
Colorless gas with a peculiar, foul odor. [Note: Shipped as a nonliquefied compressed gas.]

MW: 54.0	BP: -230°F	FRZ: -371°F	Sol: 0.02%
VP: >1 atm	IP: 13.11 eV	RGasD: 1.88	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas, but a strong oxidizer.

Incompatibilities & Reactivities
Combustible materials, chlorine, bromine, iodine, platinum, metal oxides, moist air, hydrogen sulfide, hydrocarbons, water [Note: Reacts very slowly with water to form hydrofluoric acid.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 0.5 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; headache; pulmonary edema; eye, skin burns (from contact with the gas under pressure)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0818 See MEDICAL TESTS: 0171

NIOSH Pocket Guide to Chemical Hazards

Nitrogen trifluoride	**CAS** 7783-54-2
NF_3	**RTECS** QX1925000
Synonyms & Trade Names Nitrogen fluoride, Trifluoramine, Trifluorammonia	**DOT ID & Guide** 2451 122

Exposure Limits	NIOSH REL: TWA 10 ppm (29 mg/m^3)
	OSHA PEL: TWA 10 ppm (29 mg/m^3)
IDLH 1000 ppm See: 7783542	**Conversion** 1 ppm = 2.90 mg/m^3

Physical Description
Colorless gas with a moldy odor. [Note: Shipped as a nonliquefied compressed gas.]

MW: 71.0	BP: -200°F	FRZ: -340°F	Sol: Slight
VP: >1 atm	IP: 12.97 eV	RGasD: 2.46	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Water, oil, grease, oxidizable materials, ammonia, carbon monoxide, methane, hydrogen, hydrogen sulfide, activated charcoal, diborane

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 100 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern/(APF = 10) Any supplied-air respirator
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern
Up to 500 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern*/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1000 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms In animals: anoxia, cyanosis; methemoglobinemia; lassitude (weakness, exhaustion), dizziness, headache; liver, kidney injury

Target Organs Blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 1234 See MEDICAL TESTS: 0165

NIOSH Pocket Guide to Chemical Hazards

Sulfur tetrafluoride	**CAS** 7783-60-0
SF_4	**RTECS** WT4800000
Synonyms & Trade Names Tetrafluorosulfurane	**DOT ID & Guide** 2418 125

Exposure Limits	NIOSH REL: C 0.1 ppm (0.4 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.42 mg/m^3

Physical Description
Colorless gas with an odor like sulfur dioxide. [Note: Shipped as a liquefied compressed gas.]

MW: 108.1	BP: -41°F	FRZ: -185°F	Sol: Reacts
VP(70°F): 10.5 atm	IP: 12.63 eV	RGasD: 3.78	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Moisture, concentrated sulfuric acid, dioxygen difluoride [Note: Readily hydrolyzed by moisture, forming hydrofluoric acid & thionyl fluoride.]

Measurement Methods
OSHA ID110
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations To be added later

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; eye, skin burns (from SF_4 releasing hydrofluoric acid on exposure to moisture); liquid: frostbite; in animals: dyspnea (breathing difficulty), lassitude (weakness, exhaustion), rhinorrhea (discharge of thin mucus)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Selenium hexafluoride	**CAS** 7783-79-1
SeF_6	**RTECS** VS9450000
Synonyms & Trade Names Selenium fluoride	**DOT ID & Guide** 2194 125

Exposure Limits	NIOSH REL: TWA 0.05 ppm
	OSHA PEL: TWA 0.05 ppm (0.4 mg/m^3)
IDLH 2 ppm See: 7783791	**Conversion** 1 ppm = 7.89 mg/m^3

Physical Description
Colorless gas.

MW: 193.0	BP: -30°F	FRZ: -59°F	Sol: Insoluble
VP: >1 atm	IP: ?	RGasD: 6.66	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Water [Note: Hydrolyzes very slowly in cold water.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 0.5 ppm: (APF = 10) Any supplied-air respirator
Up to 1.25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 2 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms In animals: pulmonary irritation, edema

Target Organs respiratory system

See also: INTRODUCTION See ICSC CARD: 0947 See MEDICAL TESTS: 0203

NIOSH Pocket Guide to Chemical Hazards

Tellurium hexafluoride	**CAS** 7783-80-4
TeF_6	**RTECS** WY2800000
Synonyms & Trade Names Tellurium fluoride	**DOT ID & Guide** 2195 125

Exposure Limits	NIOSH REL: TWA 0.02 ppm (0.1 mg/m^3)
	OSHA PEL: TWA 0.02 ppm (0.2 mg/m^3)
IDLH 1 ppm See: 7783804	**Conversion** 1 ppm = 9.88 mg/m^3

Physical Description
Colorless gas with a repulsive odor. MW: 241.6

	BP: Sublimes	FRZ: -36°F (Sublimes)	Sol: Decomposes
VP: >1 atm	IP: ?	RGasD: 8.34	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Water [Note: Hydrolyzes slowly in water to telluric acid.]

Measurement Methods
NIOSH S187 (II-3)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 0.2 ppm: (APF = 10) Any supplied-air respirator
Up to 0.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 1 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms Headache; dyspnea (breathing difficulty); garlic breath; in animals: pulmonary edema

Target Organs respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0220

NIOSH Pocket Guide to Chemical Hazards

Arsine	**CAS** 7784-42-1
AsH_3	**RTECS** CG6475000
Synonyms & Trade Names Arsenic hydride, Arsenic trihydride, Arseniuretted hydrogen, Arsenous hydride, Hydrogen arsenide	**DOT ID & Guide** 2188 119

Exposure Limits	NIOSH REL: Ca C 0.002 mg/m^3 [15-minute] See Appendix A
	OSHA PEL: TWA 0.05 ppm (0.2 mg/m^3)
IDLH Ca [3 ppm] See: 7784421	**Conversion** 1 ppm = 3.19 mg/m^3

Physical Description
Colorless gas with a mild, garlic-like odor. [Note: Shipped as a liquefied compressed gas.]

MW: 78.0	BP: -81°F	FRZ: -179°F	Sol: 20%
VP(70°F): 14.9 atm	IP: 9.89 eV	RGasD: 2.69	
Fl.P: NA (Gas)	UEL: 78%	LEL: 5.1%	

Flammable Gas

Incompatibilities & Reactivities
Strong oxidizers, chlorine, nitric acid [Note: Decomposes above 446°F. There is a high potential for the generation of arsine gas when inorganic arsenic is exposed to nascent (freshly formed) hydrogen.]

Measurement Methods
NIOSH 6001; OSHA ID105
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Headache, malaise (vague feeling of discomfort), lassitude (weakness, exhaustion), dizziness; dyspnea (breathing difficulty); abdominal, back pain; nausea, vomiting; bronze skin; hematuria (blood in the urine); jaundice; peripheral neuropathy; liquid: frostbite; [potential occupational carcinogen]

Target Organs Blood, kidneys, liver

Cancer Site [lung & lymphatic cancer]

See also: INTRODUCTION See ICSC CARD: 0222 See MEDICAL TESTS: 0018

NIOSH Pocket Guide to Chemical Hazards

Phosdrin	**CAS** 7786-34-7
$C_7H_{13}PO_6$	**RTECS** GQ5250000
Synonyms & Trade Names 2-Carbomethoxy-1-methylvinyl dimethyl phosphate, Mevinphos [Note: Commercial product is a mixture of the cis- & trans-isomers.]	**DOT ID & Guide** 2783 152

Exposure Limits	NIOSH REL: TWA 0.01 ppm (0.1 mg/m^3) ST 0.03 ppm (0.3 mg/m^3) [skin]
	OSHA PEL†: TWA 0.1 mg/m^3 [skin]
IDLH 4 ppm See: 7786347	**Conversion** 1 ppm = 9.17 mg/m^3

Physical Description
Pale-yellow to orange liquid with a weak odor. [Note: Insecticide that may be absorbed on a dry carrier.]

MW: 224.2	BP: Decomposes	FRZ: 44°F (trans-) 70°F (cis-)	Sol: Miscible
VP: 0.003 mmHg	IP: ?		Sp.Gr: 1.25
Fl.P(oc): 347°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers [Note: Corrosive to cast iron, some stainless steels & brass.]

Measurement Methods
NIOSH 5600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 0.1 ppm: (APF = 10) Any supplied-air respirator
Up to 0.25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 0.5 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 4 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; miosis; rhinorrhea (discharge of thin mucus); headache; chest tightness, wheezing, laryngeal spasm, salivation, cyanosis; anorexia, nausea, vomiting, abdominal cramps, diarrhea; paralysis; ataxia, convulsions; low blood pressure, cardiac irregularities

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0924 See MEDICAL TESTS: 0185

NIOSH Pocket Guide to Chemical Hazards

Bromine pentafluoride	**CAS** 7789-30-2
BrF_5	**RTECS** EF9350000
Synonyms & Trade Names Bromine fluoride	**DOT ID & Guide** 1745 144

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.7 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 7.15 mg/m^3

Physical Description
Colorless to pale-yellow, fuming liquid with a pungent odor. [Note: A colorless gas above 105°F. Shipped as a compressed gas.]

MW: 174.9	BP: 105°F	FRZ: -77°F	Sol: Reacts violently
VP: 328 mmHg	IP: ?		Sp.Gr: 2.48
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but a very powerful oxidizer.

Incompatibilities & Reactivities
Acids, halogens, arsenic, selenium, sulfur, glass, organic materials, water [Note: Reacts with all elements except inert gases, nitrogen & oxygen.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; corneal necrosis; skin burns; cough, dyspnea (breathing difficulty), pulmonary edema; liver, kidney injury	
Target Organs Eyes, skin, respiratory system, liver, kidneys	

See also: INTRODUCTION See ICSC CARD: 0974

NIOSH Pocket Guide to Chemical Hazards

Chlorine trifluoride	**CAS** 7790-91-2
ClF_3	**RTECS** FO2800000
Synonyms & Trade Names Chlorine fluoride, Chlorotrifluoride	**DOT ID & Guide** 1749 124

Exposure Limits	NIOSH REL: C 0.1 ppm (0.4 mg/m^3)
	OSHA PEL: C 0.1 ppm (0.4 mg/m^3)
IDLH 20 ppm See: 7790912	**Conversion** 1 ppm = 3.78 mg/m^3

Physical Description
Colorless gas or a greenish-yellow liquid (below 53°F) with a somewhat sweet, suffocating odor. [Note: Shipped as a liquefied compressed gas.]

MW: 92.5	BP: 53°F	FRZ: -105°F	Sol: Reacts
VP: 1.4 atm	IP: 13.00 eV	RGasD: 3.21	Sp.Gr: 1.77 (Liquid at 53°F)
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas Noncombustible Liquid, but contact with organic materials may result in SPONTANEOUS ignition.

Incompatibilities & Reactivities
Oxidizers, water, acids, combustible materials, sand, glass, metals (corrosive) [Note: Reacts with water to form chlorine & hydrofluoric acid.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated (liquid) Remove: When wet or contaminated (liquid) Change: No recommendation Provide: Eyewash (liquid), Quick drench (liquid)	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately (liquid)

Respirator Recommendations NIOSH/OSHA
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£
Up to 5 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 20 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion (liquid), skin and/or eye contact

Symptoms Eye, skin burns (liquid or high vapor concentration); respiratory irritation; in animals: lacrimation (discharge of tears), corneal ulcer; pulmonary edema

Target Organs Skin, eyes, respiratory system

See also: INTRODUCTION See ICSC CARD: 0656 See MEDICAL TESTS: 0046

NIOSH Pocket Guide to Chemical Hazards

Phosphine	**CAS** 7803-51-2
PH_3	**RTECS** SY7525000
Synonyms & Trade Names Hydrogen phosphide, Phosphorated hydrogen, Phosphorus hydride, Phosphorus trihydride	**DOT ID & Guide** 2199 119

Exposure Limits	NIOSH REL: TWA 0.3 ppm (0.4 mg/m^3) ST 1 ppm (1 mg/m^3)
	OSHA PEL†: TWA 0.3 ppm (0.4 mg/m^3)
IDLH 50 ppm See: 7803512	**Conversion** 1 ppm = 1.39 mg/m^3

Physical Description
Colorless gas with a fish- or garlic-like odor. [pesticide] [Note: Shipped as a liquefied compressed gas. Pure compound is odorless.]

MW: 34.0	BP: -126°F	FRZ: -209°F	Sol: Slight
VP: 41.3 atm	IP: 9.96 eV	RGasD: 1.18	
Fl.P: NA (Gas)	UEL: ?	LEL: 1.79%	

Flammable Gas

Incompatibilities & Reactivities
Air, oxidizers, chlorine, acids, moisture, halogenated hydrocarbons, copper [Note: May ignite SPONTANEOUSLY on contact with air.]

Measurement Methods
OSHA 1003, ID180
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 3 ppm: (APF = 10) Any supplied-air respirator
Up to 7.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 15 ppm: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 50 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Nausea, vomiting, abdominal pain, diarrhea; thirst; chest tightness, dyspnea (breathing difficulty); muscle pain, chills; stupor or syncope; pulmonary edema; liquid: frostbite

Target Organs respiratory system

See also: INTRODUCTION See ICSC CARD: 0694 See MEDICAL TESTS: 0187

NIOSH Pocket Guide to Chemical Hazards

Stibine	**CAS** 7803-52-3
SbH_3	**RTECS** WJ0700000
Synonyms & Trade Names Antimony hydride, Antimony trihydride, Hydrogen antimonide	**DOT ID & Guide** 2676 119

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.5 mg/m^3)
	OSHA PEL: TWA 0.1 ppm (0.5 mg/m^3)
IDLH 5 ppm See: 7803523	**Conversion** 1 ppm = 5.10 mg/m^3

Physical Description
Colorless gas with a disagreeable odor like hydrogen sulfide.

MW: 124.8	BP: -1°F	FRZ: -126°F	Sol: Slight
VP: >1 atm	IP: 9.51 eV	RGasD: 4.31	
Fl.P: NA (Gas)	UEL: ?	LEL: ?	

Flammable Gas

Incompatibilities & Reactivities
Acids, halogenated hydrocarbons, oxidizers, moisture, chlorine, ozone, ammonia

Measurement Methods
NIOSH 6008
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 1 ppm: (APF = 10) Any supplied-air respirator
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 5 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms Headache, lassitude (weakness, exhaustion); nausea, abdominal pain; lumbar pain, hematuria (blood in the urine), hemolytic anemia; jaundice; pulmonary irritation

Target Organs Blood, liver, kidneys, respiratory system

See also: INTRODUCTION See ICSC CARD: 0776 See MEDICAL TESTS: 0211

NIOSH Pocket Guide to Chemical Hazards

Silicon tetrahydride	**CAS** 7803-62-5
SiH_4	**RTECS** VV1400000
Synonyms & Trade Names Monosilane, Silane, Silicane	**DOT ID & Guide** 2203 116

Exposure Limits	NIOSH REL: TWA 5 ppm (7 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 1.31 mg/m^3

Physical Description
Colorless gas with a repulsive odor.

MW: 32.1	BP: -169°F	FRZ: -301°F	Sol: Decomposes
VP: >1 atm	IP: ?	RGasD: 1.11	
Fl.P: NA (Gas)	UEL: ?	LEL: ?	

Flammable Gas (may ignite SPONTANEOUSLY in air).

Incompatibilities & Reactivities
Halogens (bromine, chlorine, carbonyl chloride, antimony pentachloride, tin(IV) chloride), water

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Breathing: Respiratory support

Respirator Recommendations To be added later
Exposure Routes inhalation
Symptoms Irritation eyes, skin, mucous membrane; nausea, headache
Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0564

NIOSH Pocket Guide to Chemical Hazards

Chlorinated camphene	**CAS** 8001-35-2
$C_{10}H_{10}Cl_8$	**RTECS** XW5250000
Synonyms & Trade Names Chlorocamphene, Octachlorocamphene, Polychlorocamphene, Toxaphene	**DOT ID & Guide** 2761 151

Exposure Limits	NIOSH REL: Ca [skin] See Appendix A
	OSHA PEL†: TWA 0.5 mg/m^3 [skin]
IDLH Ca [200 mg/m^3] See: 8001352	**Conversion**

Physical Description
Amber, waxy solid with a mild, piney, chlorine- and camphor-like odor. [insecticide]

MW: 413.8	BP: Decomposes	MLT: 149-194°F	Sol: 0.0003%
VP(77°F): 0.4 mmHg	IP: ?		Sp.Gr: 1.65
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Strong oxidizers [Note: Slightly corrosive to metals under moist conditions.]

Measurement Methods
NIOSH 5039
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Nausea, confusion, agitation, tremor, convulsions, unconsciousness; dry, red skin; [potential occupational carcinogen]

Target Organs central nervous system, skin

Cancer Site [in animals: liver cancer]

See also: INTRODUCTION See ICSC CARD: 0843

NIOSH Pocket Guide to Chemical Hazards

Petroleum distillates (naphtha)	**CAS** 8002-05-9
	RTECS SE7449000
Synonyms & Trade Names Aliphatic petroleum naphtha, Petroleum naphtha, Rubber solvent	**DOT ID & Guide** 1255 128

Exposure Limits	NIOSH REL: TWA 350 mg/m^3 C 1800 mg/m^3 [15-minute]
	OSHA PEL†: TWA 500 ppm (2000 mg/m^3)
IDLH 1100 ppm [10%LEL] See: 8002059	**Conversion** 1 ppm = 4.05 mg/m^3

Physical Description
Colorless liquid with a gasoline- or kerosene-like odor. [Note: A mixture of paraffins (C5 to C13) that may contain a small amount of aromatic hydrocarbons.]

MW: 99 (approx)	BP: 86-460°F	FRZ: -99°F	Sol: Insoluble
VP: 40 mmHg (approx)	IP: ?		Sp.Gr: 0.63-0.66
Fl.P: -40 to -86°F	UEL: 5.9%	LEL: 1.1%	

Flammable Liquid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1550
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 850 ppm: (APF = 10) Any supplied-air respirator
Up to 1100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; dizziness, drowsiness, headache, nausea; dry cracked skin; chemical pneumonitis (aspiration liquid)

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Paraffin wax fume	**CAS** 8002-74-2
C_nH_{2n+2}	**RTECS** RV0350000
Synonyms & Trade Names Paraffin fume, Paraffin scale fume	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Paraffin wax is a white to slightly yellowish, odorless solid. [Note: Consists of a mixture of high molecular weight hydrocarbons (e.g., C36H74).]

MW: 350-420	BP: ?	MLT: 115-154°F	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.88-0.92
Fl.P: 390°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
OSHA PV2047
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Breathing: Respiratory support

Respirator Recommendations To be added later
Exposure Routes inhalation, skin and/or eye contact
Symptoms Irritation eyes, skin, respiratory system; discomfort, nausea
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Pyrethrum	**CAS** 8003-34-7
$C_{20}H_{28}O_3$ / $C_{21}H_{28}O_5$ / $C_{21}H_{30}O_3$ / $C_{22}H_{30}O_5$ / $C_{21}H_{28}O_3$ / $C_{22}H_{28}O_5$	**RTECS** UR4200000
Synonyms & Trade Names Cinerin I or II, Jasmolin I or II, Pyrethrin I or II, Pyrethrum I or II [Note: Pyrethrum is a variable mixture of Cinerin, Jasmolin, and Pyrethrin.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL: TWA 5 mg/m^3
IDLH 5000 mg/m^3 See: 8003347	**Conversion**

Physical Description
Brown, viscous oil or solid. [insecticide]

MW: 316-374	BP: ?	MLT: ?	Sol: Insoluble
VP: Low	IP: ?		Sp.Gr: 1 (approx)
Fl.P: 180-190°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5008; OSHA 70
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter*/(APF = 10) Any supplied-air respirator*

Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter*

Up to 250 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 5000 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Erythema, dermatitis, papules, pruritus, rhinorrhea (discharge of thin mucus); sneezing; asthma

Target Organs respiratory system, skin, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Phenyl ether-biphenyl mixture (vapor)	**CAS** 8004-13-5
$C_6H_5OC_6H_5/C_6H_5C_6H_5$	**RTECS** DV1500000
Synonyms & Trade Names Diphenyl oxide-diphenyl mixture, Dowtherm® A	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 ppm (7 mg/m^3)
	OSHA PEL: TWA 1 ppm (7 mg/m^3)
IDLH 10 ppm See: 8004135	**Conversion** 1 ppm = 6.79 mg/m^3 (approx)

Physical Description
Colorless to straw-colored liquid or solid (below 54°F) with a disagreeable, aromatic odor. [Note: A mixture typically contains 75% phenyl ether & 25% biphenyl.]

MW: 166 (approx)	BP: 495°F	FRZ: 54°F	Sol: Insoluble
VP(77°F): 0.08 mmHg	IP: ?		Sp.Gr(77°F): 1.06
Fl.P: 239°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 2013
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 10 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, nose, skin; nausea

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Gasoline	**CAS** 8006-61-9
	RTECS LX3300000
Synonyms & Trade Names Motor fuel, Motor spirits, Natural gasoline, Petrol [Note: A complex mixture of volatile hydrocarbons (paraffins, cycloparaffins & aromatics).]	**DOT ID & Guide** 1203 128

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion** 1 ppm 2.95 mg/m^3 (approx)

Physical Description
Clear liquid with a characteristic odor.

MW: 72 (approx)	BP: 102°F	FRZ: ?	Sol: Insoluble
VP: 38-300 mmHg	IP: ?		Sp.Gr(60°F): 0.72-0.76
Fl.P: -45°F	UEL: 7.6%	LEL: 1.4%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers such as peroxides, nitric acid & perchlorates

Measurement Methods
OSHA PV2028
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid); possible liver, kidney damage; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

Cancer Site [in animals: liver & kidney cancer]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Turpentine	**CAS** 8006-64-2
$C_{10}H_{16}$ (approx)	**RTECS** YO8400000
Synonyms & Trade Names Gumspirits, Gum turpentine, Spirits of turpentine, Steam distilled turpentine, Sulfate wood turpentine, Turps, Wood turpentine	**DOT ID & Guide** 1299 128

Exposure Limits	NIOSH REL: TWA 100 ppm (560 mg/m^3)
	OSHA PEL: TWA 100 ppm (560 mg/m^3)
IDLH 800 ppm See: 8006642	**Conversion** 1 ppm = 5.56 mg/m^3 (approx)

Physical Description
Colorless liquid with a characteristic odor.

MW: 136 (approx)	BP: 309-338°F	FRZ: -58 to -76°F	Sol: Insoluble
VP: 4 mmHg	IP: ?		Sp.Gr: 0.86
Fl.P: 95°F	UEL: ?	LEL: 0.8%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, chlorine, chromic anhydride, stannic chloride, chromyl chloride

Measurement Methods
NIOSH 1551
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 800 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache, dizziness, convulsions; skin sensitization; hematuria (blood in the urine), proteinuria; kidney damage; abdominal pain, nausea, vomiting, diarrhea; chemical pneumonitis (aspiration liquid)

Target Organs Eyes, skin, respiratory system, central nervous system, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Kerosene	**CAS** 8008-20-6
	RTECS OA5500000
Synonyms & Trade Names Fuel Oil No. 1, Range oil [Note: A refined petroleum solvent (predominantly C9-C16), which typically is 25% normal paraffins, 11% branched paraffins, 30% monocycloparaffins, 12% dicycloparaffins, 1% tricycloparaffins, 16% mononuclear aromatics & 5% dinuclear aromatics.]	**DOT ID & Guide** 1223 128

Exposure Limits	NIOSH REL: TWA 100 mg/m^3
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless to yellowish, oily liquid with a strong, characteristic odor.

MW: 170 (approx)	BP: 347-617°F	FRZ: -50°F	Sol: Insoluble
VP(100°F): 5 mmHg	IP: ?		Sp.Gr: 0.81
Fl.P: 100-162°F	UEL: 5%	LEL: 0.7%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1550
See: NMAM or OSHA Methods

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 1000 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator

Up to 2500 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)

Up to 5000 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0663

NIOSH Pocket Guide to Chemical Hazards

Oil mist (mineral)	**CAS** 8012-95-1
	RTECS PY8030000
Synonyms & Trade Names Heavy mineral oil mist, Paraffin oil mist, White mineral oil mist	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3 ST 10 mg/m^3
	OSHA PEL: TWA 5 mg/m^3
IDLH 2500 mg/m^3 See: 8012951	**Conversion**

Physical Description
Colorless, oily liquid aerosol dispersed in air. [Note: Has an odor like burned lubricating oil.]

MW: Varies	BP: 680°F	FRZ: 0°F	Sol: Insoluble
VP: <0.5 mmHg	IP: ?		Sp.Gr: 0.90
Fl.P(oc): 380°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5026
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Skin: Soap wash Breathing: Fresh air

Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator

Up to 125 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter

Up to 250 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 2500 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Methyl demeton	**CAS** 8022-00-2
$C_6H_{15}O_3PS_2$	**RTECS** TG1760000
Synonyms & Trade Names Demeton methyl; O,O-Dimethyl 2-ethylmercaptoethyl thiophosphate; Metasystox®; Methyl mercaptophos; Methyl systox®	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Oily, colorless to pale-yellow liquid with an unpleasant odor. [insecticide] [Note: Technical grade consists of 2 isomers: thiono & thiolo.]

MW: 230.3	BP: Decomposes	FRZ: ?	Sol: 0.03-0.3%
VP: 0.0004 mmHg	IP: ?		Sp.Gr: 1.20
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
Strong oxidizers, alkalis, water

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; ache eyes, rhinorrhea (discharge of thin mucus); nausea, headache, dizziness, vomiting

Target Organs Eyes, skin, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0862

NIOSH Pocket Guide to Chemical Hazards

Naphtha (coal tar)	**CAS** 8030-30-6
	RTECS DE3030000
Synonyms & Trade Names Crude solvent coal tar naphtha, High solvent naphtha, Naphtha	**DOT ID & Guide** 1256 128 (solvent) 2553 128

Exposure Limits	NIOSH REL: TWA 100 ppm (400 mg/m^3)
	OSHA PEL: TWA 100 ppm (400 mg/m^3)
IDLH 1000 ppm [10%LEL] See: 8030306	**Conversion** 1 ppm = 4.50 mg/m^3 (approx)

Physical Description
Reddish-brown, mobile liquid with an aromatic odor.

MW: 110 (approx)	BP: 320-428°F	FRZ: ?	Sol: Insoluble
VP: <5 mmHg	IP: ?		Sp.Gr: 0.89-0.97
Fl.P: 100-109°F	UEL: ?	LEL: 1.0%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1550
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£]/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)[£]/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; dizziness, drowsiness; dermatitis; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

VM & P Naphtha	**CAS** 8032-32-4
	RTECS OI6180000
Synonyms & Trade Names Ligroin, Painters naphtha, Petroleum ether, Petroleum spirit, Refined solvent naphtha, Varnish makers' & painters' naphtha	**DOT ID & Guide** 1271 128

Exposure Limits	NIOSH REL: TWA 350 mg/m^3 C 1800 mg/m^3 [15-minute]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Clear to yellowish liquid with a pleasant, aromatic odor.

MW: 87-114 (approx)	BP: 203-320°F	FRZ: ?	Sol: Insoluble
VP: 2-20 mmHg	IP: ?		Sp.Gr(60°F): 0.73-0.76
Fl.P: 20-55°F	UEL: 6.0%	LEL: 1.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
None reported [Note: VM&P Naphtha is a refined petroleum solvent predominantly C7-C11 which is typically 55% paraffins, 30% monocycloparaffins, 2% dicycloparaffins & 12% alklybenzenes.]

Measurement Methods
NIOSH 1550; OSHA 48
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 3500 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)/(APF = 10) Any supplied-air respirator

Up to 8750 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)

Up to 17,500 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, upper respiratory system; dermatitis; central nervous system depression; chemical pneumonitis (aspiration liquid)

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Stoddard solvent	**CAS** 8052-41-3
	RTECS WJ8925000
Synonyms & Trade Names Dry cleaning safety solvent, Mineral spirits, Petroleum solvent, Spotting naphtha [Note: A refined petroleum solvent with a flash point of 102-110°F, boiling point of 309-396°F, and containingg >65% C10 or higher hydrocarbons.]	**DOT ID & Guide** 1268 128 (petroleum distillate)

Exposure Limits	NIOSH REL: TWA 350 mg/m^3 C 1800 mg/m^3 [15-minute]
	OSHA PEL†: TWA 500 ppm (2900 mg/m^3)
IDLH 20,000 mg/m^3 See: 8052413	**Conversion**

Physical Description
Colorless liquid with a kerosene-like odor.

MW: Varies	BP: 309-396°F	FRZ: ?	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.78
Fl.P: 102-110°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1550
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 3500 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*

Up to 8750 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*

Up to 17,500 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 20,000 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; dizziness; dermatitis; chemical pneumonitis (aspiration liquid); in animals: kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, kidneys

See also: INTRODUCTION See ICSC CARD: 0361 See MEDICAL TESTS: 0212

NIOSH Pocket Guide to Chemical Hazards

Asphalt fumes	**CAS** 8052-42-4
	RTECS CI9900000
Synonyms & Trade Names Asphalt: Asphaltum, Bitumen (European term), Petroleum asphalt, Petroleum bitumen, Road asphalt, Roofing asphalt	**DOT ID & Guide** 1999 130 (asphalt)

Exposure Limits	NIOSH REL: Ca C 5 mg/m^3 [15-minute] See Appendix A
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Fumes generated during the production or application of asphalt (a dark-brown to black cement-like substance manufactured by the vacuum distillation of crude petroleum oil).

Properties vary depending upon the specific asphalt formulation or mixture.			

Asphalt: Combustible Solid

Incompatibilities & Reactivities
None reported [Note: Asphalt becomes molten at about 200°F.]

Measurement Methods
NIOSH 5042
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Breathing: Respiratory support

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; [potential occupational carcinogen]

Target Organs Eyes, respiratory system

Cancer Site [in animals: skin tumors]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Demeton	**CAS** 8065-48-3
$(C_2H_5O)_2PSOC_2H_4SC_2H_5$	**RTECS** TF3150000
Synonyms & Trade Names O-O-Diethyl-O(and S)-2-(ethylthio)ethyl phosphorothioate mixture, Systox®	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 [skin]
	OSHA PEL: TWA 0.1 mg/m^3 [skin]
IDLH 10 mg/m^3 See: 8065483	**Conversion**

Physical Description
Amber, oily liquid with a sulfur-like odor. [insecticide]

MW: 258.3	BP: Decomposes	FRZ: <-13°F	Sol: 0.01%
VP: 0.0003 mmHg	IP: ?		Sp.Gr: 1.12
Fl.P: 113°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers, alkalis, water

Measurement Methods
NIOSH 5514
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 1 mg/m^3: (APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 5 mg/m^3: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 10 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; miosis, ache eyes, rhinorrhea (discharge of thin mucus), headache; chest tightness, wheezing, laryngeal spasm, salivation, cyanosis; anorexia, nausea, vomiting, abdominal cramps, diarrhea; localized sweating; muscle fasciculation, lassitude (weakness, exhaustion), paralysis; dizziness, confusion, ataxia; convulsions, coma; low blood pressure; cardiac irregularities

Target Organs Eyes, skin, respiratory system, cardiovascular system, central nervous system, blood cholinesterase

See also: INTRODUCTION See MEDICAL TESTS: 0066

NIOSH Pocket Guide to Chemical Hazards

Cellulose	**CAS** 9004-34-6
$(C_6H_{10}O_5)_n$	**RTECS** FJ5691460
Synonyms & Trade Names Hydroxycellulose, Pyrocellulose	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Odorless, white substance. [Note: The principal fiber cell wall material of vegetable tissues (wood, cotton, flax, grass, etc.).]

MW: 160,000-560,000	BP: Decomposes	MLT: 500-518°F (Decomposes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.27-1.61
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid

Incompatibilities & Reactivities
Water, bromine pentafluoride, sodium nitrate, fluorine, strong oxidizers

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, mucous membrane	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Starch	**CAS** 9005-25-8
$(C_6H_{10}O_5)_n$	**RTECS** GM5090000
Synonyms & Trade Names Corn starch, Rice starch, Sorghum gum, alpha-Starch, Starch gum, Tapioca starch	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Fine, white, odorless powder. [Note: A carbohydrate polymer composed of 25% amylose & 75% amylpectin.]

MW: varies	BP: Decomposes	MLT: Decomposes	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.45
Fl.P: NA	UEL: NA	LEL: NA	MEC: 50 g/m^3

Noncombustible Solid, but may form explosive mixture with air.

Incompatibilities & Reactivities
Oxidizers, acids, iodine, alkalis

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, mucous membrane; cough, chest pain; dermatitis; rhinorrhea (discharge of thin mucus)	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Barium nitrate (as Ba)	**CAS** 10022-31-8
$Ba(NO_3)_2$	**RTECS** CQ9625000
Synonyms & Trade Names Barium dinitrate, Barium(II) nitrate (1:2), Barium salt of nitric acid	**DOT ID & Guide** 1446 141

Exposure Limits	NIOSH REL*: TWA 0.5 mg/m^3 [*Note: The REL also applies to other soluble barium compounds (as Ba) except Barium sulfate.]
	OSHA PEL*: TWA 0.5 mg/m^3 [*Note: The PEL also applies to other soluble barium compounds (as Ba) except Barium sulfate.]
IDLH 50 mg/m^3 (as Ba) See: IDLH INDEX	**Conversion**

Physical Description
White, odorless solid.

MW: 261.4	BP: Decomposes	MLT: 1094°F	Sol: 9%
VP: Low	IP: ?		Sp.Gr: 3.24
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but will accelerate the burning of combustible materials.

Incompatibilities & Reactivities
Acids, oxidizers, aluminum-magnesium alloys, (barium dioxide + zinc) [Note: Contact with combustible material may cause fire.]

Measurement Methods
NIOSH 7056; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 25 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse, extrasystoles; hypokalemia

Target Organs Eyes, skin, respiratory system, heart, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Nitrous oxide	**CAS** 10024-97-2
N_2O	**RTECS** QX1350000
Synonyms & Trade Names Dinitrogen monoxide, Hyponitrous acid anhydride, Laughing gas	**DOT ID & Guide** 1070 122 2201 122 (refrigerated liquid)

Exposure Limits	NIOSH REL*: TWA 25 ppm (46 mg/m^3) (TWA over the time exposed) [*Note: REL for exposure to waste anesthetic gas.]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 1.80 mg/m^3

Physical Description
Colorless gas with a slightly sweet odor. [inhalation anesthetic] [Note: Shipped as a liquefied compressed gas.]

MW: 44.0	BP: -127°F	FRZ: -132°F	Sol(77°F): 0.1%
VP: 51.3 atm	IP: 12.89 eV	RGasD: 1.53	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas, but supports combustion at elevated temperatures.

Incompatibilities & Reactivities
Aluminum, boron, hydrazine, lithium hydride, phosphine, sodium

Measurement Methods
NIOSH 3800, 6600; OSHA ID166
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: No recommendation Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Fresh air

Respirator Recommendations To be added later

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Dyspnea (breathing difficulty); drowsiness, headache; asphyxia; reproductive effects; liquid: frostbite

Target Organs respiratory system, central nervous system, reproductive system

See also: INTRODUCTION See ICSC CARD: 0067

NIOSH Pocket Guide to Chemical Hazards

Sulfur monochloride	**CAS** 10025-67-9
S_2Cl_2	**RTECS** WS4300000
Synonyms & Trade Names Sulfur chloride, Sulfur subchloride, Thiosulfurous dichloride	**DOT ID & Guide** 1828 137

Exposure Limits	NIOSH REL: C 1 ppm (6 mg/m^3)
	OSHA PEL†: TWA 1 ppm (6 mg/m^3)
IDLH 5 ppm See: 10025679	**Conversion** 1 ppm = 5.52 mg/m^3

Physical Description
Light-amber to yellow-red, oily liquid with a pungent, nauseating, irritating odor.

MW: 135.0	BP: 280°F	FRZ: -107°F	Sol: Decomposes
VP: 7 mmHg	IP: 9.40 eV		Sp.Gr: 1.68
Fl.P: 245°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Peroxides, oxides of phosphorous, organics, water [Note: Decomposes violently in water to form hydrochloric acid, sulfur dioxide, sulfur, sulfite, thiosulfate, and hydrogen sulfide. Corrosive to metals.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 5 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern[£]/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; lacrimation (discharge of tears); cough; eye, skin burns; pulmonary edema

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0958 See MEDICAL TESTS: 0216

NIOSH Pocket Guide to Chemical Hazards

Phosphorus oxychloride	**CAS** 10025-87-3
$POCl_3$	**RTECS** TH4897000
Synonyms & Trade Names Phosphorus chloride, Phosphorus oxytrichloride, Phosphoryl chloride	**DOT ID & Guide** 1810 137

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.6 mg/m^3) ST 0.5 ppm (3 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.27 mg/m^3

Physical Description
Clear, colorless to yellow, oily liquid with a pungent & musty odor. [Note: A solid below 34°F.]

MW: 153.3	BP: 222°F	FRZ: 34°F	Sol: Decomposes
VP(81°F): 40 mmHg	IP: ?		Sp.Gr(77°F): 1.65
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but may set fire to combustible materials.

Incompatibilities & Reactivities
Water, combustible materials, carbon disulfide, dimethyl-formamide, metals (except nickel & lead) [Note: Decomposes in water to hydrochloric & phosphoric acids.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; eye, skin burns; dyspnea (breathing difficulty), cough, pulmonary edema; dizziness, headache, lassitude (weakness, exhaustion); abdominal pain, nausea, vomiting; nephritis

Target Organs Eyes, skin, respiratory system, central nervous system, kidneys

See also: INTRODUCTION See ICSC CARD: 0190

NIOSH Pocket Guide to Chemical Hazards

Phosphorus pentachloride	**CAS** 10026-13-8
PCl_5	**RTECS** TB6125000
Synonyms & Trade Names Pentachlorophosphorus, Phosphoric chloride, Phosphorus perchloride	**DOT ID & Guide** 1806 137

Exposure Limits	NIOSH REL: TWA 1 mg/m^3
	OSHA PEL: TWA 1 mg/m^3
IDLH 70 mg/m^3 See: 10026138	**Conversion**

Physical Description
White to pale-yellow, crystalline solid with a pungent, unpleasant odor.

MW: 208.3	BP: Sublimes	MLT: 324°F (Sublimes)	Sol: Reacts
VP(132°F): 1 mmHg	IP: ?		Sp.Gr: 3.60
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Water, magnesium oxide, chemically-active metals such as sodium & potassium, alkalis, amines [Note: Hydrolyzes in water (even in humid air) to form hydrochloric acid & phosphoric acid. Corrosive to metals.]

Measurement Methods
NIOSH S257 (II-5)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 10 mg/m^3: (APF = 10) Any supplied-air respirator*

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

Up to 50 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 70 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; bronchitis; dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0544 See MEDICAL TESTS: 0189

NIOSH Pocket Guide to Chemical Hazards

Ozone	**CAS** 10028-15-6
O_3	**RTECS** RS8225000
Synonyms & Trade Names Triatomic oxygen	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 0.1 ppm (0.2 mg/m^3)
	OSHA PEL†: TWA 0.1 ppm (0.2 mg/m^3)
IDLH 5 ppm See: 10028156	**Conversion** 1 ppm = 1.96 mg/m^3

Physical Description
Colorless to blue gas with a very pungent odor.

MW: 48.0	BP: -169°F	FRZ: -315°F	Sol(32°F): 0.001%
VP: >1 atm	IP: 12.52 eV	RGasD: 1.66	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas, but a powerful oxidizer.

Incompatibilities & Reactivities
All oxidizable materials (both organic & inorganic)

Measurement Methods
OSHA ID214
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Medical attention Breathing: Fresh air; 100% O_2

Respirator Recommendations NIOSH/OSHA
Up to 1 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern¿/(APF = 10) Any supplied-air respirator
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern¿
Up to 5 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern¿/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, mucous membrane; pulmonary edema; chronic respiratory disease

Target Organs Eyes, respiratory system

See also: INTRODUCTION See ICSC CARD: 0068 See MEDICAL TESTS: 0172

NIOSH Pocket Guide to Chemical Hazards

Hydrogen bromide	**CAS** 10035-10-6
HBr	**RTECS** MW3850000
Synonyms & Trade Names Anhydrous hydrogen bromide; Aqueous hydrogen bromide (i.e., Hydrobromic acid)	**DOT ID & Guide** 1048 125 (anhydrous) 1788 154 (solution)

Exposure Limits	NIOSH REL: C 3 ppm (10 mg/m^3)
	OSHA PEL†: TWA 3 ppm (10 mg/m^3)
IDLH 30 ppm See: 10035106	**Conversion** 1 ppm = 3.31 mg/m^3

Physical Description
Colorless gas with a sharp, irritating odor. [Note: Shipped as a liquefied compressed gas. Often used in an aqueous solution.]

MW: 80.9	BP: -88°F	FRZ: -124°F	Sol: 49%
VP: 20 atm	IP: 11.62 eV	RGasD: 2.81	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas

Incompatibilities & Reactivities
Strong oxidizers, strong caustics, moisture, copper, brass, zinc [Note: Hydrobromic acid is highly corrosive to most metals.]

Measurement Methods
NIOSH 7903; OSHA ID165SG
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (solution)/Frostbite Eyes: Prevent eye contact (solution)/Frostbite Wash skin: When contaminated (solution) Remove: When wet or contaminated (solution) Change: No recommendation Provide: Eyewash (liquid), Quick drench (solution), Frostbite	Eye: Irrigate immediately (solution)/Frostbite Skin: Water flush immediately (solution)/Frostbite Breathing: Respiratory support Swallow: Medical attention immediately (solution)

Respirator Recommendations NIOSH/OSHA

Up to 30 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with acid gas cartridge(s)£/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion (solution), skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; solution: eye, skin burns; liquid: frostbite

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0282

NIOSH Pocket Guide to Chemical Hazards

Chlorine dioxide	**CAS** 10049-04-4
ClO_2	**RTECS** FO3000000
Synonyms & Trade Names Chlorine oxide, Chlorine peroxide	**DOT ID & Guide** 9191 143 (hydrate, frozen)

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.3 mg/m^3) ST 0.3 ppm (0.9 mg/m^3)
	OSHA PEL†: TWA 0.1 ppm (0.3 mg/m^3)
IDLH 5 ppm See: 10049044	**Conversion** 1 ppm = 2.76 mg/m^3

Physical Description
Yellow to red gas or a red-brown liquid (below 52°F) with an unpleasant odor similar to chlorine and nitric acid.

MW: 67.5	BP: 52°F	FRZ: -74°F	Sol(77°F): 0.3%
VP: >1 atm	IP: 10.36 eV	RGasD: 2.33	Sp.Gr: 1.6 (Liquid at 32°F)
Fl.P: NA (Gas) ? (Liquid)	UEL: ?	LEL: ?	

Flammable Gas/Combustible Liquid

Incompatibilities & Reactivities
Organic materials, heat, phosphorus, potassium hydroxide, sulfur, mercury, carbon monoxide [Note: Unstable in light. A powerful oxidizer.]

Measurement Methods
OSHA ID202
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact (liquid) Eyes: Prevent eye contact (liquid) Wash skin: When contaminated (liquid) Remove: When wet (flammable) Change: No recommendation Provide: Eyewash (liquid), Quick drench (liquid)	Eye: Irrigate immediately (liquid) Skin: Soap wash immediately (liquid) Breathing: Respiratory support Swallow: Medical attention immediately (liquid)

Respirator Recommendations NIOSH/OSHA
Up to 1 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern/(APF = 10) Any supplied-air respirator
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern£
Up to 5 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion (liquid), skin and/or eye contact

Symptoms Irritation eyes, nose, throat; cough, wheezing, bronchitis, pulmonary edema; chronic bronchitis

Target Organs Eyes, respiratory system

See also: INTRODUCTION See ICSC CARD: 0127 See MEDICAL TESTS: 0045

NIOSH Pocket Guide to Chemical Hazards

Nitric oxide	**CAS** 10102-43-9
NO	**RTECS** QX0525000
Synonyms & Trade Names Mononitrogen monoxide, Nitrogen monoxide	**DOT ID & Guide** 1660 124

Exposure Limits	NIOSH REL: TWA 25 ppm (30 mg/m^3)
	OSHA PEL: TWA 25 ppm (30 mg/m^3)
IDLH 100 ppm See: 10102439	**Conversion** 1 ppm = 1.23 mg/m^3

Physical Description
Colorless gas. [Note: Shipped as a nonliquefied compressed gas.]

MW: 30.0	BP: -241°F	FRZ: -263°F	Sol: 5%
VP: 34.2 atm	IP: 9.27 eV	RGasD: 1.04	
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Gas, but will accelerate the burning of combustible materials.

Incompatibilities & Reactivities
Fluorine, combustible materials, ozone, NH_3, chlorinated hydrocarbons, metals, carbon disulfide [Note: Reacts with water to form nitric acid. Rapidly converted in air to nitrogen dioxide.]

Measurement Methods
NIOSH 6014; OSHA ID190
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern¿/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*¿/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms Irritation eyes, wet skin, nose, throat; drowsiness, unconsciousness; methemoglobinemia

Target Organs Eyes, skin, respiratory system, blood, central nervous system

See also: INTRODUCTION See ICSC CARD: 1311 See MEDICAL TESTS: 0159

NIOSH Pocket Guide to Chemical Hazards

Nitrogen dioxide	**CAS** 10102-44-0
NO_2	**RTECS** QW9800000
Synonyms & Trade Names Dinitrogen tetroxide (N_2O_4), Nitrogen peroxide	**DOT ID & Guide** 1067 124

Exposure Limits	NIOSH REL: ST 1 ppm (1.8 mg/m^3)
	OSHA PEL†: C 5 ppm (9 mg/m^3)
IDLH 20 ppm See: 10102440	**Conversion** 1 ppm = 1.88 mg/m^3

Physical Description
Yellowish-brown liquid or reddish-brown gas (above 70°F) with a pungent, acrid odor. [Note: In solid form (below 15°F) it is found structurally as N_2O_4.]

MW: 46.0	BP: 70°F	FRZ: 15°F	Sol: Reacts
VP: 720 mmHg	IP: 9.75 eV	RGasD: 2.62	Sp.Gr: 1.44 (Liquid at 68°F)
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid/Gas, but will accelerate the burning of combustible materials.

Incompatibilities & Reactivities
Combustible material, water, chlorinated hydrocarbons, carbon disulfide, ammonia [Note: Reacts with water to form nitric acid.]

Measurement Methods
NIOSH 6014; OSHA ID182
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 20 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern¿/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; cough, mucoid frothy sputum, decreased pulmonary function, chronic bronchitis, dyspnea (breathing difficulty); chest pain; pulmonary edema, cyanosis, tachypnea, tachycardia

Target Organs Eyes, respiratory system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0930 See MEDICAL TESTS: 0164

NIOSH Pocket Guide to Chemical Hazards

Cobalt carbonyl (as Co)	**CAS** 10210-68-1
$C_8Co_2O_8$	**RTECS** GG0300000
Synonyms & Trade Names di-mu-Carbonylhexacarbonyldicobalt, Cobalt octacarbonyl, Cobalt tetracarbonyl dimer, Dicobalt carbonyl, Dicobalt Octacarbonyl, Octacarbonyldicobalt	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Orange to dark-brown, crystalline solid. [Note: The pure substance is white.]

MW: 341.9	BP: 126°F (Decomposes)	MLT: 124°F	Sol: Insoluble
VP: 0.7 mmHg	IP: ?		Sp.Gr: 1.87
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but flammable carbon monoxide is emitted during decomposition.

Incompatibilities & Reactivities
Air [Note: Decomposes on exposure to air or heat; stable in atmosphere of hydrogen & carbon monoxide.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, mucous membrane; cough, decreased pulmonary function, wheezing, dyspnea (breathing difficulty); in animals: liver, kidney injury, pulmonary edema	
Target Organs Eyes, skin, respiratory system, blood, central nervous system	

See also: INTRODUCTION See ICSC CARD: 0976

NIOSH Pocket Guide to Chemical Hazards

Boron tribromide	**CAS** 10294-33-4
BBr_3	**RTECS** ED7400000
Synonyms & Trade Names Boron bromide, Tribromoborane	**DOT ID & Guide** 2692 157

Exposure Limits	NIOSH REL: C 1 ppm (10 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 10.25 mg/m^3

Physical Description
Colorless, fuming liquid with a sharp, irritating odor.

MW: 250.5	BP: 194°F	FRZ: -51°F	Sol: Decomposes
VP(57°F): 40 mmHg	IP: 9.70 eV		Sp.Gr(65°F): 2.64
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
Moisture, water, heat, potassium, sodium, alcohols [Note: Attacks metals, wood & rubber. Reacts with water to form boric acid and hydrogen bromide.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes, skin, respiratory system; eye, skin burns; dyspnea (breathing difficulty), pulmonary edema
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0230

NIOSH Pocket Guide to Chemical Hazards

Barium chloride (as Ba)	**CAS** 10361-37-2
$BaCl_2$	**RTECS** CQ8750000
Synonyms & Trade Names Barium dichloride	**DOT ID & Guide** 1564 154 (barium compounds, n.o.s.)

Exposure Limits	NIOSH REL*: TWA 0.5 mg/m^3 [*Note: The REL also applies to other soluble barium compounds (as Ba) except Barium sulfate.]
	OSHA PEL*: TWA 0.5 mg/m^3 [*Note: The PEL also applies to other soluble barium compounds (as Ba) except Barium sulfate.]
IDLH 50 mg/m^3 (as Ba) See: IDLH INDEX	**Conversion**

Physical Description
White, odorless solid.

MW: 208.2	BP: 2840°F	MLT: 1765°F	Sol: 38%
VP: Low	IP: ?		Sp.Gr: 3.86
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Acids, oxidizers

Measurement Methods
NIOSH 7056; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 25 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse, extrasystoles; hypokalemia

Target Organs Eyes, skin, respiratory system, heart, central nervous system

See also: INTRODUCTION See ICSC CARD: 0614

NIOSH Pocket Guide to Chemical Hazards

Chlorodiphenyl (54% chlorine)	**CAS** 11097-69-1
$C_6H_3Cl_2C_6H_2Cl_3$ (approx)	**RTECS** TQ1360000
Synonyms & Trade Names Aroclor® 1254, PCB, Polychlorinated biphenyl	**DOT ID & Guide** 2315 171

Exposure Limits	NIOSH REL*: Ca TWA 0.001 mg/m^3 See Appendix A [*Note: The REL also applies to other PCBs.]
	OSHA PEL: TWA 0.5 mg/m^3 [skin]
IDLH Ca [5 mg/m^3] See: IDLH INDEX	**Conversion**

Physical Description
Colorless to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor.

MW: 326 (approx)	BP: 689-734°F	FRZ: 50°F	Sol: Insoluble
VP: 0.00006 mmHg	IP: ?		Sp.Gr(77°F): 1.38
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5503
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

Target Organs Skin, eyes, liver, reproductive system

Cancer Site [in animals: tumors of the pituitary gland & liver, leukemia]

See also: INTRODUCTION See ICSC CARD: 0939 See MEDICAL TESTS: 0176

NIOSH Pocket Guide to Chemical Hazards

Tungsten carbide (cemented)	**CAS** 1: 11107-01-0 2: 12718-69-3 3: 37329-49-0
WC/Co/Ni/Ti	**RTECS** 1: Y07350000 2: Y07525000 3: YO7700000
Synonyms & Trade Names Cemented tungsten carbide, Cemented WC, Hard metal [Note: The tungsten carbide (WC) content is generally 85-95% & the cobalt content is generally 5-15%.] [1: 85% WC, 15% Co 2: 92% WC, 8% Co 3: 78% WC, 14% Co, 8% Ti]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix C
	OSHA PEL†: See Appendix C
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
A mixture of tungsten carbide, cobalt, and sometimes other metals & metal oxides or carbides.

Properties vary depending upon the specific mixture.			

Incompatibilities & Reactivities
Tungsten carbide: Fluorine, chlorine trifluoride, oxides of nitrogen, lead dioxide

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily (Ni) Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 0.25 mg Co/m^3: (APF = 5) Any dust and mist respirator^

Up to 0.5 mg Co/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*^/(APF = 10) Any dust, mist, and fume respirator*/(APF = 10) Any supplied-air respirator*

Up to 1.25 mg Co/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*^/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter*

Up to 2.5 mg Co/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 20 mg Co/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

NIOSH*

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

[*Note: Respirator for Tungsten carbide (cemented) containing Nickel.]

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; possible skin sensitization to cobalt, nickel; diffuse pulmonary fibrosis; loss of appetite, nausea, cough; blood changes
Target Organs Eyes, skin, respiratory system, blood

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Mica (containing less than 1% quartz)	**CAS** 12001-26-2
	RTECS VV8760000
Synonyms & Trade Names Biotite, Lepidolite, Margarite, Muscovite, Phlogopite, Roscoelite, Zimmwaldite	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 3 mg/m^3 (resp)
	OSHA PEL†: TWA 20 mppcf
IDLH 1500 mg/m^3 See: 12001262	**Conversion**

Physical Description
Colorless, odorless flakes or sheets of hydrous silicates.

MW: 797 (approx)	BP: ?	MLT: ?	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.6-3.2
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air

Respirator Recommendations NIOSH

Up to 15 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 30 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 75 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 150 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1500 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes; pneumoconiosis, cough, dyspnea (breathing difficulty); lassitude (weakness, exhaustion); weight loss

Target Organs respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0149

NIOSH Pocket Guide to Chemical Hazards

Manganese cyclopentadienyl tricarbonyl (as Mn)	**CAS** 12079-65-1
$C_5H_5Mn(CO)_3$	**RTECS** OO9720000
Synonyms & Trade Names Cyclopentadienylmanganese tricarbonyl, Cyclopentadienyl tricarbonyl manganese, MCT	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 [skin]
	OSHA PEL†: C 5 mg/m^3
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Yellow, crystalline solid with a characteristic odor. [Note: An antiknock additive for gasoline. May be found in an oil & gaseous solution.]

MW: 204.1	BP: Sublimes	MLT: 167°F (Sublimes)	Sol: Slight
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Oxygen

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms In animals: irritation skin; pulmonary edema; convulsions; central nervous system, respiratory system, kidney changes; decreased resistance to infection	
Target Organs Skin, respiratory system, central nervous system, kidneys	

See also: INTRODUCTION See ICSC CARD: 0977 See MEDICAL TESTS: 0131

NIOSH Pocket Guide to Chemical Hazards

Methyl cyclopentadienyl manganese tricarbonyl (as Mn)	**CAS** 12108-13-3
$CH_3C_5H_4Mn(CO)_3$	**RTECS** OP1450000
Synonyms & Trade Names CI-2, Combustion Improver-2, Manganese tricarbonylmethylcyclopentadienyl, 2-Methylcyclopentadienyl manganese tricarbonyl, MMT	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.2 mg/m^3 [skin]
	OSHA PEL†: C 5 mg/m^3
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Yellow to dark-orange liquid with a faint, pleasant odor. [Note: A solid below 36°F.]

MW: 218.1	BP: 449°F	FRZ: 36°F	Sol: Insoluble
VP(212°F): 7 mmHg	IP: ?		Sp.Gr: 1.39
Fl.P: 230°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Light (decomposes)

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; dizziness, nausea, headache; in animals: tremor, severe clonic spasms, lassitude (weakness, exhaustion), slow respiration; liver, kidney injury

Target Organs Eyes, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 1169

NIOSH Pocket Guide to Chemical Hazards

Ammonium chloride fume	**CAS** 12125-02-9
NH_4Cl	**RTECS** BP4550000
Synonyms & Trade Names Ammonium chloride, Ammonium muriate fume, Sal ammoniac fume	**DOT ID & Guide** 9085 171

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 ST 20 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Finely divided, odorless, white particulate dispersed in air.

MW: 53.5	BP: Sublimes	MLT: 662°F (Sublimes)	Sol: 37%
VP(321°F): 1 mmHg	IP: NA		Sp.Gr: 1.53
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Alkalis & their carbonates, lead & silver salts, strong oxidizers, ammonium nitrate, potassium chlorate, bromine trifluoride [Note: Corrodes most metals at high (i.e., fire) temperatures.]

Measurement Methods
OSHA ID188
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; cough, dyspnea (breathing difficulty), pulmonary sensitization	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 1051

NIOSH Pocket Guide to Chemical Hazards

Borates, tetra, sodium salts (Pentahydrate)	**CAS** 12179-04-3
$Na_2B_4O_7 \cdot 5H_2O$	**RTECS**
Synonyms & Trade Names Borax pentahydrate, Sodium borate pentahydrate, Sodium tetraborate pentahydrate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless or white, odorless crystals or free-flowing powder. [herbicide] [Note: Begins to lose water of hydration at 252°F.]

MW: 291.4	BP: ?	MLT: 392°F	Sol: 3%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.82
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported [However, see the reactivities & incompatibilities reported for the related substance Borax decahydrate above.]

Measurement Methods
NIOSH 0500; OSHA ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; dermatitis; epistaxis (nosebleed); cough, dyspnea (breathing difficulty)	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Ferrovanadium dust	**CAS** 12604-58-9
FeV	**RTECS** LK2900000
Synonyms & Trade Names Ferrovanadium	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 1 mg/m^3 ST 3 mg/m^3 [*Note: The REL also applies to Vanadium metal and Vadium carbide.]
	OSHA PEL†: TWA 1 mg/m^3
IDLH 500 mg/m^3 See: 12604589	**Conversion**

Physical Description
Dark, odorless particulate dispersed in air. [Note: Ferrovanadium metal is an alloy usually containing 50-80% vanadium.]

MW: 106.8	BP: ?	MLT: 2696-2768°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	MEC: 1.3 g/m^3

Metal: Noncombustible Solid, but dust may be an explosion hazard.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 5) Any dust and mist respirator*

Up to 10 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*/(APF = 10) Any supplied-air respirator*

Up to 25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*

Up to 50 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 500 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; in animals: bronchitis, pneumonitis

Target Organs Eyes, respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0107

NIOSH Pocket Guide to Chemical Hazards

Cyhexatin	**CAS** 13121-70-5
$(C_6H_{11})_3SnOH$	**RTECS** WH8750000
Synonyms & Trade Names TCHH, Tricyclohexylhydroxystannane, Tricyclohexylhydroxytin, Tricyclohexylstannium hydroxide, Tricyclohexyltin hydroxide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: TWA 0.32 mg/m^3 [0.1 mg/m^3 (as Sn)]
IDLH 80 mg/m^3 [25 mg/m^3 (as Sn)] See: IDLH INDEX	**Conversion**

Physical Description
Colorless to white, nearly odorless, crystalline powder. [insecticide]

MW: 385.2	BP: 442°F (Decomposes)	MLT: 383°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Incompatibilities & Reactivities
Strong oxidizers, ultraviolet light

Measurement Methods
NIOSH 5504
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations OSHA

Up to 3.2 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter/(APF = 10) Any supplied-air respirator

Up to 8 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter

Up to 16 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 80 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; headache, dizziness; sore throat, cough; abdominal pain, vomiting; skin burns, pruritus; in animals: liver, kidney damage

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Gypsum	**CAS** 13397-24-5
$CaSO_4 \cdot 2H_2O$	**RTECS** MG2360000
Synonyms & Trade Names Calcium(II) sulfate dihydrate, Gypsum stone, Hydrated calcium sulfate, Mineral white [Note: Gypsum is the dihydrate form of calcium sulfate; Plaster of Paris is the hemihydrate form.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White or nearly white, odorless, crystalline solid.

MW: 172.2	BP: ?	MLT: 262-325°F (Loses H_2O)	Sol(77°F): 0.2%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.32
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Aluminum (at high temperatures), diazomethane

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, mucous membrane, upper respiratory system; cough, sneezing, rhinorrhea (discharge of thin mucus)	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 1215

NIOSH Pocket Guide to Chemical Hazards

Nickel carbonyl	**CAS** 13463-39-3
$Ni(CO)_4$	**RTECS** QR6300000
Synonyms & Trade Names Nickel tetracarbonyl, Tetracarbonyl nickel	**DOT ID & Guide** 1259 131

Exposure Limits	NIOSH REL: Ca TWA 0.001 ppm (0.007 mg/m^3) See Appendix A
	OSHA PEL: TWA 0.001 ppm (0.007 mg/m^3)
IDLH Ca [2 ppm] See: 13463393	**Conversion** 1 ppm = 6.98 mg/m^3

Physical Description
Colorless to yellow liquid with a musty odor. [Note: A gas above 110°F.]

MW: 170.7	BP: 110°F	FRZ: -13°F	Sol: 0.05%
VP: 315 mmHg	IP: 8.28 eV		Sp.Gr(63°F): 1.32
Fl.P: <-4°F	UEL: ?	LEL: 2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitric acid, bromine, chlorine & other oxidizers; flammable materials

Measurement Methods
NIOSH 6007
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin absorption, skin and/or eye contact

Symptoms Headache, dizziness; nausea, vomiting, epigastric pain; substernal pain; cough, hyperpnea; cyanosis; lassitude (weakness, exhaustion); leukocytosis (increased blood leukocytes), pneumonitis; delirium, convulsions; [potential occupational carcinogen]; in animals: reproductive, teratogenic effects

Target Organs Lungs, paranasal sinus, central nervous system, reproductive system

Cancer Site [lung & nasal cancer]

See also: INTRODUCTION See ICSC CARD: 0064 See MEDICAL TESTS: 0155

NIOSH Pocket Guide to Chemical Hazards

Iron pentacarbonyl (as Fe)	**CAS** 13463-40-6
$Fe(CO)_5$	**RTECS** NO4900000
Synonyms & Trade Names Iron carbonyl, Pentacarbonyl iron	**DOT ID & Guide** 1994 131

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.23 mg/m^3) ST 0.2 ppm (0.45 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.28 mg/m^3 (as Fe)

Physical Description
Colorless to yellow to dark-red, oily liquid.

MW: 195.9	BP(749 mmHg): 217°F	FRZ: -6°F	Sol: Insoluble
VP(87°F): 40 mmHg	IP: ?		Sp.Gr: 1.46-1.52
Fl.P: 5°F	UEL: ?	LEL: ?	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers, nitrogen oxide, (zinc + cobalt halides) [Note: Pyrophoric (i.e., ignites spontaneously in air). Decomposed by light or air, releasing carbon monoxide.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, mucous membrane, respiratory system; headache, dizziness, nausea, vomiting; fever, cyanosis, cough, dyspnea (breathing difficulty); liver, kidney, lung injury; degenerative changes in central nervous system	
Target Organs Eyes, respiratory system, central nervous system, liver, kidneys	

See also: INTRODUCTION See ICSC CARD: 0168

NIOSH Pocket Guide to Chemical Hazards

Titanium dioxide	**CAS** 13463-67-7
TiO_2	**RTECS** XR2275000
Synonyms & Trade Names Rutile, Titanium oxide, Titanium peroxide	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: TWA 15 mg/m^3
IDLH Ca [5000 mg/m^3] See: 13463677	**Conversion**

Physical Description
White, odorless powder.

MW: 79.9	BP: 4532-5432°F	MLT: 3326-3362°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 4.26
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH S385 (II-3)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: Daily	**First Aid** (See procedures) Breathing: Respiratory support

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms Lung fibrosis; [potential occupational carcinogen]

Target Organs respiratory system

Cancer Site [in animals: lung tumors]

See also: INTRODUCTION See ICSC CARD: 0338

NIOSH Pocket Guide to Chemical Hazards

Tellurium	**CAS** 13494-80-9
Te	**RTECS** WY2625000
Synonyms & Trade Names Aurum paradoxum, Metallum problematum	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 0.1 mg/m^3 [*Note: The REL also applies to other tellurium compounds (as Te) except Tellurium hexafluoride and Bismuth telluride.]
	OSHA PEL*: TWA 0.1 mg/m^3 [*Note: The PEL also applies to other tellurium compounds (as Te) except Tellurium hexafluoride and Bismuth telluride.]
IDLH 25 mg/m^3 (as Te) See: 13494809	**Conversion**

Physical Description
Odorless, dark-gray to brown, amorphous powder or grayish-white, brittle solid.

MW: 127.6	BP: 1814°F	MLT: 842°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 6.24
Fl.P: NA	UEL: NA	LEL: NA	

Combustible Solid

Incompatibilities & Reactivities
Oxidizers, chlorine, cadmium

Measurement Methods
NIOSH 7300; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.5 mg/m^3: (APF = 5) Any dust and mist respirator^

Up to 1 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators^/(APF = 10) Any dust, mist, and fume respirator/(APF = 10) Any supplied-air respirator

Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter^

Up to 5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 25 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Garlic breath, sweating; dry mouth, metallic taste; drowsiness; anorexia, nausea, no sweating; dermatitis; in animals: central nervous system, red blood cell changes

Target Organs Skin, central nervous system, blood

See also: INTRODUCTION See ICSC CARD: 0986

NIOSH Pocket Guide to Chemical Hazards

Enflurane	**CAS** 13838-16-9
CHF_2OCF_2CHClF	**RTECS** KN6800000
Synonyms & Trade Names 2-Chloro-1-(difluoromethoxy)-1,1,2-trifluoroethane; 2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether; Ethrane®	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: C 2 ppm (15.1 mg/m^3) [60-minute] [*Note: REL for exposure to waste anesthetic gas.]
	OSHA PEL: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 7.55 mg/m^3

Physical Description
Clear, colorless liquid with a mild, sweet odor. [inhalation anesthetic]

MW: 184.5	BP: 134°F	FRZ: ?	Sol: Low
VP: 175 mmHg	IP: ?		Sp.Gr(77°F): 1.52
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid

Incompatibilities & Reactivities
None reported

Measurement Methods
OSHA 29, 103
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: Prevent eye contact Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms Irritation eyes; central nervous system depression, analgesia, anesthesia, convulsions, respiratory depression
Target Organs Eyes, central nervous system

See also: INTRODUCTION See ICSC CARD: 0887

NIOSH Pocket Guide to Chemical Hazards

Ferbam	**CAS** 14484-64-1
$[(CH_3)_2NCS_2]_3Fe$	**RTECS** NO8750000
Synonyms & Trade Names tris(Dimethyldithiocarbamato)iron, Ferric dimethyl dithiocarbamate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3
	OSHA PEL†: TWA 15 mg/m^3
IDLH 800 mg/m^3 See: 14484641	**Conversion**

Physical Description
Dark brown to black, odorless solid. [fungicide]

MW: 416.5	BP: Decomposes	MLT: >356°F (Decomposes)	Sol: 0.01%
VP: 0 mmHg (approx)	IP: 7.72 eV		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	MEC: 55 g/m^3

Combustible Solid

Incompatibilities & Reactivities
Strong oxidizers, moisture

Measurement Methods
NIOSH 0500
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 50 mg/m^3: (APF = 5) Any dust respirator

Up to 100 mg/m^3: (APF = 10) Any dust respirator except single-use and quarter-mask respirators*/(APF = 10) Any air-purifying respirator with a high-efficiency particulate filter*/(APF = 10) Any supplied-air respirator*

Up to 250 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust filter*

Up to 500 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 800 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory tract; dermatitis; gastrointestinal disturbance

Target Organs Eyes, skin, respiratory system, gastrointestinal tract

See also: INTRODUCTION See ICSC CARD: 0792

NIOSH Pocket Guide to Chemical Hazards

Talc (containing no asbestos and less than 1% quartz)	**CAS** 14807-96-6
$Mg_3Si_4O_{10}(OH)_2$	**RTECS** WW2710000
Synonyms & Trade Names Hydrous magnesium silicate, Steatite talc	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2 mg/m^3 (resp)
	OSHA PEL†: TWA 20 mppcf
IDLH 1000 mg/m^3 See: 14807966	**Conversion**

Physical Description
Odorless, white powder.

MW: Varies	BP: ?	MLT: 1652 to 1832°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.70-2.80
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH P&CAM355 (III)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air

Respirator Recommendations NIOSH

Up to 10 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 20 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 50 mg/m^3: (APF = 25) Any powered, air-purifying respirator with a dust and mist filter/(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 100 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1000 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Fibrotic pneumoconiosis; irritation eyes

Target Organs Eyes, respiratory system, cardiovascular system

See also: INTRODUCTION See ICSC CARD: 0329 See MEDICAL TESTS: 0207

NIOSH Pocket Guide to Chemical Hazards

Silica, crystalline (as respirable dust)	**CAS** 14808-60-7
SiO_2	**RTECS** VV7330000
Synonyms & Trade Names Cristobalite, Quartz, Tridymite, Tripoli	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 0.05 mg/m^3 See Appendix A
	OSHA PEL: Crystalline Quartz (respirable): TWA 250 mppcf/(%SiO_2 +5); TWA 10 mg/m^3/(%SiO_2 + 2) Quartz (total dust): TWA 30 mg/m^3/(%SiO_2 + 2) Cristobalite: Use ½ the value calculated from the count or mass formulae for quartz. Tridymite: Use ½ the value calculated from the formulae for quartz.
IDLH Ca [25 mg/m^3 (cristobalite, tridymite); 50 mg/m^3 (quartz, tripoli) See: 14808607	**Conversion**

Physical Description
Colorless, odorless solid. [Note: A component of many mineral dusts.]

MW: 60.1	BP: 4046°F	MLT: 3110°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.66
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Powerful oxidizers: fluorine, chlorine trifluoride, manganese trioxide, oxygen difluoride, hydrogen peroxide, etc.; acetylene; ammonia

Measurement Methods
NIOSH 7500, 7601, 7602; OSHA ID142
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: No recommendation
Eyes: No recommendation
Wash skin: No recommendation
Remove: No recommendation
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately

Breathing: Fresh air

Respirator Recommendations NIOSH
Up to 0.5 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter
Up to 1.25 mg/m^3: (APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter/(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 2.5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
Up to 25 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Cough, dyspnea (breathing difficulty), wheezing; decreased pulmonary function, progressive respiratory symptoms (silicosis); irritation eyes; [potential occupational carcinogen]

Target Organs Eyes, respiratory system

Cancer Site [in animals: lung cancer]

See also: INTRODUCTION See ICSC CARD: 0808

NIOSH Pocket Guide to Chemical Hazards

Chromyl chloride	**CAS** 14977-61-8
$Cr(OCl)_2$	**RTECS** GB5775000
Synonyms & Trade Names Chlorochromic anhydride, Chromic oxychloride, Chromium chloride oxide, Chromium dichloride dioxide, Chromium dioxide dichloride, Chromium dioxychloride, Chromium oxychloride, Dichlorodioxochromium	**DOT ID & Guide** 1758 137

Exposure Limits	NIOSH REL: Ca 0.001 mg Cr(VI)/m^3 See Appendix A See Appendix C
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Deep-red liquid with a musty, burning, acrid odor. [Note: Fumes in moist air.]

MW: 154.9	BP: 243°F	FRZ: -142°F	Sol: Reacts
VP: 20 mmHg	IP: 12.60 eV		Sp.Gr(77°F): 1.91
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but a powerful oxidizer.

Incompatibilities & Reactivities
Water, combustible substances, halides, phosphorus, turpentine [Note: Reacts violently in water; forms chromic acid, chromic chloride, hydrochloric acid & chlorine. Corrodes common metals.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; eye, skin burns

Target Organs Eyes, skin, respiratory system

Cancer Site [lung cancer]

See also: INTRODUCTION See ICSC CARD: 0854

NIOSH Pocket Guide to Chemical Hazards

Sodium aluminum fluoride (as F)	**CAS** 15096-52-3
Na_3AlF_6	**RTECS** WA9625000
Synonyms & Trade Names Cryocide, Cryodust, Cryolite, Sodium hexafluoroaluminate	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 2.5 mg/m^3 [*Note: The REL also applies to other inorganic, solid fluorides (as F).]
	OSHA PEL*: TWA 2.5 mg/m^3 [*Note: The PEL also applies to other inorganic, solid fluorides (as F).]
IDLH 250 mg/m^3 (as F) See: fluoride	**Conversion**

Physical Description
Colorless to dark odorless solid. [pesticide] [Note: Loses color on heating.]

MW: 209.9	BP: Decomposes	MLT: 1832°F	Sol: 0.04%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.90
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 7902; OSHA ID110
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 12.5 mg/m^3: (APF = 5) Any dust and mist respirator

Up to 25 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*/(APF = 10) Any supplied-air respirator*

Up to 62.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*+

Up to 125 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter+/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 250 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter+/Any appropriate escape-type, self-contained breathing apparatus

+Note: May need acid gas sorbent

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; nausea, abdominal pain, diarrhea; salivation, thirst, sweating; stiff spine; dermatitis; calcification of ligaments of ribs, pelvis

Target Organs Eyes, skin, respiratory system, central nervous system, skeleton, kidneys

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Ethylidene norbornene	**CAS** 16219-75-3
C_9H_{12}	**RTECS** RB9450000
Synonyms & Trade Names ENB, 5-Ethylidenebicyclo(2.2.1)-hept-2-ene, 5-Ethylidene-2-norbornene [Note: Due to its reactivity, ENB may be stabilized with tert-butyl catechol.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: C 5 ppm (25 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.92 mg/m^3

Physical Description
Colorless to white liquid with a turpentine-like odor.

MW: 120.2	BP: 298°F	FRZ: -112°F	Sol: ?
VP: 4 mmHg	IP: ?		Sp.Gr: 0.90
Fl.P(oc): 101°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Oxygen [Note: ENB should be stored in a nitrogen atmosphere since it reacts with oxygen.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; headache; cough, dyspnea (breathing difficulty); nausea, vomiting; olfactory, taste changes; chemical pneumonitis (aspiration liquid); in animals: liver, kidney, urogenital injury; bone marrow effects

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys, urogenital system, bone marrow

See also: INTRODUCTION See ICSC CARD: 0473

NIOSH Pocket Guide to Chemical Hazards

Methomyl	**CAS** 16752-77-5
$CH_3C(SCH_3)NOC(O)NHCH_3$	**RTECS** AK2975000
Synonyms & Trade Names Lannate®, Methyl N-((methylamino)carbonyl)oxy)ethanimidothioate, S-Methyl-N-(methylcarbamoyloxy)thioacetimidate	**DOT ID & Guide** 2757 151 (carbamate pesticide, solid, n.o.s.)

Exposure Limits	NIOSH REL: TWA 2.5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White, crystalline solid with a slight, sulfur-like odor. [insecticide]

MW: 162.2	BP: ?	MLT: 172°F	Sol(77°F): 6%
VP(77°F): 0.00005 mmHg	IP: ?		Sp.Gr(75°F): 1.29
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

Incompatibilities & Reactivities
Strong bases

Measurement Methods
NIOSH 5601
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes; blurred vision, miosis; salivation; abdominal cramps, nausea, vomiting; dyspnea (breathing difficulty); lassitude (weakness, exhaustion), muscle twitching; liver, kidney damage

Target Organs Eyes, respiratory system, central nervous system, cardiovascular system, liver, kidneys, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0177

NIOSH Pocket Guide to Chemical Hazards

Cobalt hydrocarbonyl (as Co)	**CAS** 16842-03-8
$HCo(CO)_4$	**RTECS** GG0900000
Synonyms & Trade Names Hydrocobalt tetracarbonyl, Tetracarbonylhydridocobalt, Tetracarbonylhydrocobalt	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Gas with an offensive odor.

MW: 172.0	BP: ?	FRZ: -15°F	Sol: 0.05%
VP: >1 atm	IP: ?	RGasD: 5.93	
Fl.P: NA (Gas)	UEL: ?	LEL: ?	

Flammable Gas

Incompatibilities & Reactivities
Air [Note: Unstable gas that decomposes rapidly in air at room temperature to cobalt carbonyl & hydrogen.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms In animals: irritation respiratory system; dyspnea (breathing difficulty), cough, decreased pulmonary function, pulmonary edema	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Decaborane	**CAS** 17702-41-9
$B_{10}H_{14}$	**RTECS** HD1400000
Synonyms & Trade Names Decaboron tetradecahydride	**DOT ID & Guide** 1868 134

Exposure Limits	NIOSH REL: TWA 0.3 mg/m^3 (0.05 ppm) ST 0.9 mg/m^3 (0.15 ppm) [skin]
	OSHA PEL†: TWA 0.3 mg/m^3 (0.05 ppm) [skin]
IDLH 15 mg/m^3 See: IDLH INDEX	**Conversion** 1 ppm = 5.00 mg/m^3

Physical Description
Colorless to white crystalline solid with an intense, bitter, chocolate-like odor.

MW: 122.2	BP: 415°F	MLT: 211°F	Sol: Slight
VP: 0.2 mmHg	IP: 9.88 eV		Sp.Gr: 0.94
Fl.P: 176°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Oxidizers, water, halogenated compounds (especially carbon tetrachloride) [Note: May ignite SPONTANEOUSLY on exposure to air. Decomposes slowly in hot water.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 3 mg/m^3: (APF = 10) Any supplied-air respirator

Up to 7.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 15 mg/m^3: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Dizziness, headache, nausea, drowsiness; incoordination, localized muscle spasm, tremor, convulsions; lassitude (weakness, exhaustion); in animals: dyspnea (breathing difficulty); lassitude (weakness, exhaustion); liver, kidney damage

Target Organs central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0712

NIOSH Pocket Guide to Chemical Hazards

Benomyl	**CAS** 17804-35-2
$C_{14}H_{18}N_4O_3$	**RTECS** DD6475000
Synonyms & Trade Names Methyl 1-(butylcarbamoyl)-2-benzimidazolecarbamate	**DOT ID & Guide** 2757 151 (carbamate pesticide, solid)

Exposure Limits	NIOSH REL: See Appendix D
	OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White crystalline solid with a faint, acrid odor. [fungicide] [Note: Decomposes without melting above 572°F.]

MW: 290.4	BP: Decomposes	MLT: >572°F (Decomposes)	Sol: 0.0004%
VP: <0.00001 mmHg	IP: NA		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Heat, strong acids, strong alkalis

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; skin sensitization; possible reproductive, teratogenic effects	
Target Organs Eyes, skin, respiratory system, reproductive system	

See also: INTRODUCTION See ICSC CARD: 0382

NIOSH Pocket Guide to Chemical Hazards

Tin(IV) oxide (as Sn)	**CAS** 18282-10-5
SnO_2	**RTECS** XQ4000000
Synonyms & Trade Names Stannic dioxide, Stannic oxide, White tin oxide [Note: Also see specific listing for Tin(II) oxide (as Sn).]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White or slightly gray powder.

MW: 150.7	BP: Decomposes	MLT: 2966°F (Decomposes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 6.95
Fl.P: NA	UEL: NA	LEL: NA	

Incompatibilities & Reactivities
Chlorine trifluoride

Measurement Methods
NIOSH 7300
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Stannosis (benign pneumoconiosis): dyspnea (breathing difficulty), decreased pulmonary function	
Target Organs respiratory system	

See also: INTRODUCTION See ICSC CARD: 0954

NIOSH Pocket Guide to Chemical Hazards

Diborane	**CAS** 19287-45-7
B_2H_6	**RTECS** HQ9275000
Synonyms & Trade Names Boroethane, Boron hydride, Diboron hexahydride	**DOT ID & Guide** 1911 119

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.1 mg/m^3)
	OSHA PEL: TWA 0.1 ppm (0.1 mg/m^3)
IDLH 15 ppm See: 19287457	**Conversion** 1 ppm = 1.13 mg/m^3

Physical Description
Colorless gas with a repulsive, sweet odor. [Note: Usually shipped in pressurized cylinders diluted with hydrogen, argon, nitrogen, or helium.]

MW: 27.7	BP: -135°F	FRZ: -265°F	Sol: Reacts
VP(62°F): 39.5 atm	IP: 11.38 eV	RGasD: 0.97	
Fl.P: NA (Gas)	UEL: 88%	LEL: 0.8%	

Flammable Gas

Incompatibilities & Reactivities
Water, halogenated compounds, aluminum, lithium, oxidized surfaces, acids [Note: Will ignite spontaneously in moist air at room temperature. Reacts with water to form hydrogen & boric acid.]

Measurement Methods
NIOSH 6006
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 1 ppm: (APF = 10) Any supplied-air respirator
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 5 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 15 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation

Symptoms Chest tightness, precordial pain, shortness breath, nonproductive cough, nausea; headache, dizziness, chills, fever, lassitude (weakness, exhaustion), tremor, muscle fasciculation; in animals: liver, kidney damage; pulmonary edema; hemorrhage

Target Organs respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0432 See MEDICAL TESTS: 0069

NIOSH Pocket Guide to Chemical Hazards

Pentaborane	**CAS** 19624-22-7
B_5H_9	**RTECS** RY8925000
Synonyms & Trade Names Pentaboron nonahydride	**DOT ID & Guide** 1380 135

Exposure Limits	NIOSH REL: TWA 0.005 ppm (0.01 mg/m^3) ST 0.015 ppm (0.03 mg/m^3)
	OSHA PEL†: TWA 0.005 ppm (0.01 mg/m^3)
IDLH 1 ppm See: 19624227	**Conversion** 1 ppm = 2.58 mg/m^3

Physical Description
Colorless liquid with a pungent odor like sour milk.

MW: 63.1	BP: 140°F	FRZ: -52°F	Sol: Reacts
VP: 171 mmHg	IP: 9.90 eV		Sp.Gr: 0.62
Fl.P: 86°F	UEL: ?	LEL: 0.42%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Oxidizers, halogens, water, halogenated hydrocarbons [Note: May ignite SPONTANEOUSLY in moist air. Corrosive to natural rubber. Hydrolyzes slowly with heat in water to form boric acid.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 0.05 ppm: (APF = 10) Any supplied-air respirator
Up to 0.125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 0.25 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; dizziness, headache, drowsiness, incoordination, tremor, convulsions, behavioral changes; tonic spasm face, neck, abdominal, limbs

Target Organs Eyes, skin, central nervous system

See also: INTRODUCTION See ICSC CARD: 0819

NIOSH Pocket Guide to Chemical Hazards

Osmium tetroxide	**CAS** 20816-12-0
OsO_4	**RTECS** RN1140000
Synonyms & Trade Names Osmic acid anhydride, Osmium oxide	**DOT ID & Guide** 2471 154

Exposure Limits	NIOSH REL: TWA 0.002 mg/m^3 (0.0002 ppm) ST 0.006 mg/m^3 (0.0006 ppm)
	OSHA PEL†: TWA 0.002 mg/m^3
IDLH 1 mg/m^3 See: 20816120	**Conversion** 1 ppm = 10.40 mg/m^3

Physical Description
Colorless, crystalline solid or pale-yellow mass with an unpleasant, acrid, chlorine-like odor. [Note: A liquid above 105°F.]

MW: 254.2	BP: 266°F	MLT: 105°F	Sol(77°F): 6%
VP: 7 mmHg	IP: 12.60 eV		Sp.Gr: 5.10
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Hydrochloric acid, easily oxidized organic materials [Note: Begins to sublime below BP. Contact with other materials may cause fire.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 0.1 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern and having a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern and having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; lacrimation (discharge of tears), visual disturbance; conjunctivitis; headache; cough, dyspnea (breathing difficulty); dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0528

NIOSH Pocket Guide to Chemical Hazards

Metribuzin	**CAS** 21087-64-9
$C_8H_{14}N_4OS$	**RTECS** XZ2990000
Synonyms & Trade Names 4-Amino-6-(1,1-dimethylethyl)-3-(methylthio)-1,2,4-triazin-5(4H)-one	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 5 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless, crystalline solid. [herbicide]

MW: 214.3	BP: ?	MLT: 257°F	Sol: 0.1%
VP: 0.0000004 mmHg	IP: ?		Sp.Gr: 1.31
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
OSHA PV2044
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms In animals: central nervous system depression; thyroid, liver enzyme changes	
Target Organs central nervous system, thyroid, liver	

See also: INTRODUCTION See ICSC CARD: 0516

NIOSH Pocket Guide to Chemical Hazards

Cesium hydroxide	**CAS** 21351-79-1
CsOH	**RTECS** FK9800000
Synonyms & Trade Names Cesium hydrate, Cesium hydroxide dimer	**DOT ID & Guide** 2682 157 2681 154 (solution)

Exposure Limits	NIOSH REL: TWA 2 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless or yellowish, crystalline solid. [Note: Hygroscopic (i.e., absorbs moisture from the air).]

MW: 149.9	BP: ?	MLT: 522°F	Sol(59°F): 395%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 3.68
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Water, acids, CO_2, metals (e.g., Al, Pb, Sn, Zn), oxygen [Note: CsOH is a strong base, causing the generation of considerable heat in contact with water or moisture.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, upper respiratory system; eye, skin burns	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Tin(II) oxide (as Sn)	**CAS** 21651-19-4
SnO	**RTECS**
Synonyms & Trade Names Stannous oxide, Tin protoxide [Note: Also see specific listing for Tin(IV) oxide (as Sn).]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 2 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Brownish-black powder.

MW: 134.7	BP: Decomposes	MLT(600 mmHg): 1976°F (Decomposes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 6.3
Fl.P: NA	UEL: NA	LEL: NA	

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 7300
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Stannosis (benign pneumoconiosis): dyspnea (breathing difficulty), decreased pulmonary function	
Target Organs respiratory system	

See also: INTRODUCTION See ICSC CARD: 0956

NIOSH Pocket Guide to Chemical Hazards

Fenamiphos	**CAS** 22224-92-6
$C_{13}H_{22}NO_3PS$	**RTECS** TB3675000
Synonyms & Trade Names Ethyl 3-methyl-4-(methylthio)phenyl-(1-methylethyl)phosphoramidate, Nemacur®, Phenamiphos	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.1 mg/m^3 [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Off-white to tan, waxy solid. [insecticide] [Note: Found commercially as a granular ingredient (5-15%) or in an emulsifiable concentrate (400 g/l).]

MW: 303.4	BP: ?	MLT: 121°F	Sol: 0.03%
VP: 0.00005 mmHg	IP: ?		Sp.Gr: 1.14
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
None reported [Note: May hydrolyze under alkaline conditions.]

Measurement Methods
NIOSH 5600
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms Nausea, vomiting, abdominal cramps, diarrhea, salivation; headache, dizziness, lassitude (weakness, exhaustion); rhinorrhea (discharge of thin mucus), chest tightness; blurred vision, miosis; cardiac irregularities; muscle fasciculation; dyspnea (breathing difficulty)
Target Organs respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 0483

NIOSH Pocket Guide to Chemical Hazards

Vinyl toluene	**CAS** 25013-15-4 (inhibited)
CH_2=$CHC_6H_4CH_3$	**RTECS** WL5075000
Synonyms & Trade Names Ethenylmethylbenzene, Methylstyrene, Tolyethylene	**DOT ID & Guide** 2618 130P

Exposure Limits	NIOSH REL: TWA 100 ppm (480 mg/m^3)
	OSHA PEL: TWA 100 ppm (480 mg/m^3)
IDLH 400 ppm See: IDLH INDEX	**Conversion** 1 ppm = 4.83 mg/m^3

Physical Description
Colorless liquid with a strong, disagreeable odor.

MW: 118.2	BP: 339°F	FRZ: -106°F	Sol: 0.009%
VP: 1 mmHg	IP: 8.20 eV		Sp.Gr: 0.89
Fl.P: 127°F	UEL: 11.0%	LEL: 0.8%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Oxidizers, peroxides, strong acids, iron or aluminum salts [Note: Usually inhibited with tert-butyl catechol to prevent polymerization.]

Measurement Methods
NIOSH 1501, OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 400 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; drowsiness; in animals: narcosis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0514

NIOSH Pocket Guide to Chemical Hazards

Dinitrotoluene	**CAS** 25321-14-6
$CH_3C_6H_3(NO_2)_2$	**RTECS** XT1300000
Synonyms & Trade Names Dinitrotoluol, DNT, Methyldinitrobenzene [Note: Various isomers of DNT exist.]	**DOT ID & Guide** 1600 152 (molten) 2038 152 (solid)

Exposure Limits	NIOSH REL: Ca TWA 1.5 mg/m^3 [skin] See Appendix A
	OSHA PEL: TWA 1.5 mg/m^3 [skin]
IDLH Ca [50 mg/m^3] See: 25321146	**Conversion**

Physical Description
Orange-yellow crystalline solid with a characteristic odor. [Note: Often shipped molten.]

MW: 182.2	BP: 572°F	MLT: 158°F	Sol: Insoluble
VP: 1 mmHg	IP: ?		Sp.Gr: 1.32
Fl.P: 404°F	UEL: ?	LEL: ?	

Combustible Solid, but difficult to ignite.

Incompatibilities & Reactivities
Strong oxidizers, caustics, metals such as tin & zinc [Note: Commercial grades will decompose at 482°F, with self-sustaining decomposition at 536°F.]

Measurement Methods
OSHA 44
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Anoxia, cyanosis; anemia, jaundice; reproductive effects; [potential occupational carcinogen]

Target Organs Blood, liver, cardiovascular system, reproductive system

Cancer Site [in animals: liver, skin & kidney tumors]

See also: INTRODUCTION See ICSC CARD: 0465

NIOSH Pocket Guide to Chemical Hazards

Toluenediamine	**CAS** 25376-45-8 95-80-7 (2,4-TDA)
$CH_3C_6H_3(NH_2)_2$	**RTECS** XS9445000 XS9625000 (2,4-TDA)
Synonyms & Trade Names Diaminotoluene, Methylphenylene diamine, TDA, Toluenediamine isomers, Tolylenediamine [Note: Various isomers of TDA exist.]	**DOT ID & Guide** 1709 151

Exposure Limits	NIOSH REL: Ca (all isomers) See Appendix A
	OSHA PEL: none
IDLH Ca [N.D.] See: IDLH INDEX	**Conversion**

Physical Description
Colorless to brown, needle-shaped crystals or powder. [Note: Tends to darken on storage & exposure to air. Properties given are for 2,4-TDA.]

MW: 122.2	BP: 558°F	MLT: 210°F	Sol: Soluble
VP(224°F): 1 mmHg	IP: ?		Sp.Gr: 1.05 (Liquid at 212°F)
Fl.P: 300°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5516; OSHA 65
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dermatitis; ataxia, tachycardia, nausea, vomiting, convulsions, respiratory depression; methemoglobinemia, cyanosis, headache, lassitude (weakness, exhaustion), dizziness, bluish skin; liver injury; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, blood, cardiovascular system, liver

Cancer Site [in animals: liver, skin & mammary gland tumors]

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Methylcyclohexanol	**CAS** 25639-42-3
$CH_3C_6H_{10}OH$	**RTECS** GW0175000
Synonyms & Trade Names Hexahydrocresol, Hexahydromethylphenol	**DOT ID & Guide** 2617 129

Exposure Limits	NIOSH REL: TWA 50 ppm (235 mg/m^3)
	OSHA PEL†: TWA 100 ppm (470 mg/m^3)
IDLH 500 ppm See: 25639423	**Conversion** 1 ppm = 4.67 mg/m^3

Physical Description
Straw-colored liquid with a weak odor like coconut oil.

MW: 114.2	BP: 311-356°F	FRZ: -58°F	Sol: 4%
VP(86°F): 2 mmHg	IP: 9.80 eV		Sp.Gr: 0.92
Fl.P: 149-158°F	UEL: ?	LEL: ?	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1404
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; headache; in animals: narcosis; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, kidneys, liver

See also: INTRODUCTION See ICSC CARD: 0292

NIOSH Pocket Guide to Chemical Hazards

Plaster of Paris	**CAS** 26499-65-0
$CaSO_4 \cdot 0.5H_2O$	**RTECS** TP0700000
Synonyms & Trade Names Calcium sulfate hemihydrate, Dried calcium sulfate, Gypsum hemihydrate, Hemihydrate gypsum [Note: Plaster of Paris is the hemihydrate form of Calcium Sulfate & Gypsum is the dihydrate form.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
White or yellowish, finely divided, odorless powder.

MW: 145.2	BP: ?	MLT: 325°F (Loses H_2O)	Sol(77°F): 0.3%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.5
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Moisture, water [Note: Hygroscopic (i.e., absorbs moisture from the air). Reacts with water to form Gypsum.]

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	Eye: Irrigate immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, mucous membrane, respiratory system; cough	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 1217

NIOSH Pocket Guide to Chemical Hazards

Sodium azide	**CAS** 26628-22-8
NaN_3	**RTECS** VY8050000
Synonyms & Trade Names Azide, Azium, Sodium salt of hydrazoic acid	**DOT ID & Guide** 1687 153

Exposure Limits	NIOSH REL: C 0.1 ppm (as HN_3) [skin] C 0.3 mg/m^3 (as NaN_3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Colorless to white, odorless, crystalline solid. [pesticide] [Note: Forms hydrazoic acid (HN3) in water.]

MW: 65.0	BP: Decomposes	MLT: 527°F (Decomposes)	Sol(63°F): 42%
VP: ?	IP: 11.70 eV		Sp.Gr: 1.85
Fl.P: ?	UEL: ?	LEL: ?	

Combustible Solid (if heated above 572°F).

Incompatibilities & Reactivities
Acids, metals, water [Note: Over a period of time, sodium azide may react with copper, lead, brass, or solder in plumbing systems to form an accumulation of the HIGHLY EXPLOSIVE compounds of lead azide & copper azide.]

Measurement Methods
OSHA ID121, ID211
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin; headache, dizziness, lassitude (weakness, exhaustion), blurred vision; low blood pressure, bradycardia; kidney changes	
Target Organs Eyes, skin, central nervous system, cardiovascular system, kidneys	

See also: INTRODUCTION See ICSC CARD: 0950

NIOSH Pocket Guide to Chemical Hazards

Isooctyl alcohol	**CAS** 26952-21-6
$C_7H_{15}CH_2OH$	**RTECS** NS7700000
Synonyms & Trade Names Isooctanol, Oxooctyl alcohol [Note: A mixture of closely related isomeric, primary alcohols with branched chains such as 2-Ethylhexanol, $CH_3(CH_2)_3CH(CH_2CH_3)CH_2OH$.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 50 ppm (270 mg/m^3) [skin]
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 5.33 mg/m^3

Physical Description
Clear, colorless liquid.

MW: 130.3	BP: 367°F	FRZ: <-105°F	Sol: Insoluble
VP: 0.4 mmHg	IP: ?		Sp.Gr: 0.83
Fl.P(oc): 180°F	UEL(est.): 5.7%	LEL(calc.): 0.9%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
None reported

Measurement Methods
OSHA PV2033
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: No recommendation Provide: Eyewash	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, nose, throat; eye, skin burns	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 0497

NIOSH Pocket Guide to Chemical Hazards

Dipropylene glycol methyl ether	**CAS** 34590-94-8
$CH_3OC_3H_6OC_3H_6OH$	**RTECS** JM1575000
Synonyms & Trade Names Dipropylene glycol monomethyl ether, Dowanol® 50B	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 100 ppm (600 mg/m^3) ST 150 ppm (900 mg/m^3) [skin]
	OSHA PEL†: TWA 100 ppm (600 mg/m^3) [skin]
IDLH 600 ppm See: 34590948	**Conversion** 1 ppm = 6.06 mg/m^3

Physical Description
Colorless liquid with a mild, ether-like odor.

MW: 148.2	BP: 408°F	FRZ: -112°F	Sol: Miscible
VP: 0.5 mmHg	IP: ?		Sp.Gr: 0.95
Fl.P: 180°F	UEL: 3.0%	LEL(392°F): 1.1%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH S69 (II-2)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 600 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; lassitude (weakness, exhaustion), dizziness, headache

Target Organs Eyes, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0884

NIOSH Pocket Guide to Chemical Hazards

Sulprofos	**CAS** 35400-43-2
$C_{12}H_{19}O_2PS_3$	**RTECS** TE4165000
Synonyms & Trade Names Bolstar®, O-Ethyl O-(4-methylthio)phenyl S-propylphosphorodithioate	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 1 mg/m^3
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 13.19 mg/m^3

Physical Description
Tan-colored liquid with a sulfide-like odor.

MW: 322.5	BP: ?	FRZ: ?	Sol: Low
VP: <8 mmHg	IP: ?		Sp.Gr: 1.20
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 5600; PV2037
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion
Symptoms Nausea, vomiting, abdominal cramps, diarrhea, salivation; headache, dizziness, lassitude (weakness, exhaustion); rhinorrhea (discharge of thin mucus), chest tightness; blurred vision, miosis; cardiac irregularities; muscle fasciculation; dyspnea (breathing difficulty)
Target Organs respiratory system, central nervous system, cardiovascular system, blood cholinesterase

See also: INTRODUCTION See ICSC CARD: 1248

NIOSH Pocket Guide to Chemical Hazards

Chlorodiphenyl (42% chlorine)	**CAS** 53469-21-9
$C_6H_4ClC_6H_3Cl_2$ (approx)	**RTECS** TQ1356000
Synonyms & Trade Names Aroclor® 1242, PCB, Polychlorinated biphenyl	**DOT ID & Guide** 2315 171

Exposure Limits	NIOSH REL*: Ca TWA 0.001 mg/m^3 See Appendix A [*Note: The REL also applies to other PCBs.]
	OSHA PEL: TWA 1 mg/m^3 [skin]
IDLH Ca [5 mg/m^3] See: 53469219	**Conversion**

Physical Description
Colorless to light-colored, viscous liquid with a mild, hydrocarbon odor.

MW: 258 (approx)	BP: 617-691°F	FRZ: -2°F	Sol: Insoluble
VP: 0.001 mmHg	IP: ?		Sp.Gr(77°F): 1.39
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans & chlorinated dibenzo-p-dioxins.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5503
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

Target Organs Skin, eyes, liver, reproductive system

Cancer Site [in animals: tumors of the pituitary gland & liver, leukemia]

See also: INTRODUCTION See MEDICAL TESTS: 0175

NIOSH Pocket Guide to Chemical Hazards

Methyl acetylene-propadiene mixture	**CAS** 59355-75-8
C_3H_4	**RTECS** UK4920000
Synonyms & Trade Names MAPP gas, Methyl acetylene-allene mixture, Methyl acetylene-propadiene mixture (stabilized), Propadiene-methyl acetylene, Propyne-allene mixture, Propyne-propadiene mixture	**DOT ID & Guide** 1060 116P (stabilized)

Exposure Limits	NIOSH REL: TWA 1000 ppm (1800 mg/m^3) ST 1250 ppm (2250 mg/m^3)
	OSHA PEL†: TWA 1000 ppm (1800 mg/m^3)
IDLH 3400 ppm [10%LEL] See: 59355758	**Conversion** 1 ppm = 1.64 mg/m^3

Physical Description
Colorless gas with a strong, characteristic, foul odor. [Note: A fuel that is shipped as a liquefied compressed gas.]

MW: 40.1	BP: -36 to -4°F	FRZ: -213°F	Sol: Insoluble
VP: >1 atm	IP: ?	RGasD: 1.48	
Fl.P: NA (Gas)	UEL: 10.8%	LEL: 3.4%	

Flammable Gas

Incompatibilities & Reactivities
Strong oxidizers, copper alloys [Note: Forms explosive compounds at high pressure in contact with alloys containing more than 67% copper.]

Measurement Methods
NIOSH S85 (II-6); OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 3400 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Irritation respiratory system; excitement, confusion, anesthesia; liquid: frostbite

Target Organs respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Hydrogenated terphenyls	**CAS** 61788-32-7
$(C_6H_n)_3$	**RTECS** WZ6535000
Synonyms & Trade Names Hydrogenated diphenylbenzenes, Hydrogenated phenylbiphenyls, Hydrogenated triphenyls [Note: Complex mixture of terphenyl isomers that are partially hydrogenated.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.5 ppm (5 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 12.19 mg/m^3 (40% hydrogenated)

Physical Description
Clear, oily, pale-yellow liquids with a faint odor. [plasticizer/heat-transfer media]

MW: 298 (40% hydrogenated)	BP: 644°F (40% hydrogenated)	FRZ: ?	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr(77°F): 1.003-1.009 (40% hydrogenated)
Fl.P: 315°F (40% hydrogenated)	UEL: ?	LEL: ?	

Class IIIB Combustible Liquids

Incompatibilities & Reactivities
None reported [Note: When heated, irritating vapors will be released.]

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Respirator Recommendations To be added later	
Exposure Routes inhalation, ingestion, skin and/or eye contact	
Symptoms Irritation eyes, skin, respiratory system; liver, kidney, hematopoietic damage	
Target Organs Eyes, skin, respiratory system, liver, kidneys, hematopoietic system	

See also: INTRODUCTION See ICSC CARD: 1249

NIOSH Pocket Guide to Chemical Hazards

Niax® Catalyst ESN	**CAS** 62765-93-9
	RTECS QR3900000
Synonyms & Trade Names None [Note: A mixture of 95% dimethylaminopropionitrile & 5% bis(2-dimethylamino)ethyl ether.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix C
	OSHA PEL: See Appendix C
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
A liquid mixture. [Note: Used in the past as a catalyst in the manufacture of flexible polyurethane foams.

MW: mixture	BP: ?	FRZ: ?	Sol: ?
VP: ?	IP: ?		Sp.Gr: ?
Fl.P: ?	UEL: ?	LEL: ?	

Incompatibilities & Reactivities
Oxidizers

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; urinary disturbance; neurological disorders; pins & needles in hands & feet; muscle weakness, lassitude (weakness, exhaustion), nausea, vomiting; decreased nerve conduction in lower legs

Target Organs Eyes, skin, urinary tract, peripheral nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Coal tar pitch volatiles	**CAS** 65996-93-2
	RTECS GF8655000
Synonyms & Trade Names Synonyms vary depending upon the specific compound (e.g., pyrene, phenanthrene, acridine, chrysene, anthracene & benzo(a)pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction) See Appendix A See Appendix C
	OSHA PEL: TWA 0.2 mg/m^3 (benzene-soluble fraction) [1910.1002] See Appendix C
IDLH Ca [80 mg/m^3] See: 65996932	**Conversion**

Physical Description
Black or dark-brown amorphous residue.

Properties vary depending upon the specific compound.			

Combustible Solids

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
OSHA 58
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact

Symptoms Dermatitis, bronchitis, [potential occupational carcinogen]

Target Organs respiratory system, skin, bladder, kidneys

Cancer Site [lung, kidney & skin cancer]

See also: INTRODUCTION See MEDICAL TESTS: 0054

NIOSH Pocket Guide to Chemical Hazards

Portland cement	**CAS** 65997-15-1
	RTECS VV8770000
Synonyms & Trade Names Cement, Hydraulic cement, Portland cement silicate [Note: A class of hydraulic cements containing tri- and dicalcium silicate in addition to alumina, tricalcium aluminate, and iron oxide.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL†: TWA 50 mppcf
IDLH 5000 mg/m^3 See: 65997151	**Conversion**

Physical Description
Gray, odorless powder.

MW: ?	BP: NA	MLT: NA	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: ?
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0500; OSHA ID207
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 50 mg/m^3: (APF = 5) Any dust respirator

Up to 100 mg/m^3: (APF = 10) Any dust respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 250 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust filter

Up to 500 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 5000 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; cough, expectoration; exertional dyspnea (breathing difficulty), wheezing, chronic bronchitis; dermatitis

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See MEDICAL TESTS: 0196

NIOSH Pocket Guide to Chemical Hazards

L.P.G.	**CAS** 68476-85-7
$C_3H_8/C_3H_6/C_4H_{10}/C_4H_8$	**RTECS** SE7545000
Synonyms & Trade Names Bottled gas, Compressed petroleum gas, Liquefied hydrocarbon gas, Liquefied petroleum gas, LPG [Note: A fuel mixture of propane, propylene, butanes & butylenes.]	**DOT ID & Guide** 1075 115

Exposure Limits	NIOSH REL: TWA 1000 ppm (1800 mg/m^3)
	OSHA PEL: TWA 1000 ppm (1800 mg/m^3)
IDLH 2000 ppm [10%LEL] See: 68476857	**Conversion** 1 ppm = 1.72-2.37 mg/m^3

Physical Description
Colorless, noncorrosive, odorless gas when pure. [Note: A foul-smelling odorant is usually added. Shipped as a liquefied compressed gas.]

MW: 42-58	BP: >-44°F	FRZ: ?	Sol: Insoluble
VP: >1 atm	IP: 10.95 eV	RGasD: 1.45-2.00	
Fl.P: NA (Gas)	UEL: 9.5% (Propane) 8.5% (Butane)	LEL: 2.1% (Propane) 1.9% (Butane)	

Flammable Gas

Incompatibilities & Reactivities
Strong oxidizers, chlorine dioxide

Measurement Methods
NIOSH S93 (II-2)
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Dizziness, drowsiness, asphyxia; liquid: frostbite

Target Organs respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Vegetable oil mist	**CAS** 68956-68-3
	RTECS YX1850000
Synonyms & Trade Names Vegetable mist	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
An oil extracted from the seeds, fruit, or nuts of vegetables or other plant matter.

MW: varies	BP: ?	FRZ: ?	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.91-0.95
Fl.P: 323-540°F	UEL: ?	LEL: ?	

Combustible Liquid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH: 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Breathing: Fresh air

Respirator Recommendations To be added later

Exposure Routes inhalation, skin and/or eye contact
Symptoms Irritation eyes, skin, respiratory system; lacrimation (discharge of tears)
Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Perlite	**CAS** 93763-70-3
	RTECS SO5254000
Synonyms & Trade Names Expanded perlite [Note: An amorphous material consisting of fused sodium potassium aluminum silicate.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)
	OSHA PEL: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)
IDLH N.D. See: IDLH INDEX	**Conversion**

Physical Description
Odorless, light-gray to glassy-black solid. [Note: Expanded perlite is a fluffy, white particulate.]

MW: varies	BP: ?	MLT: >2000°F	Sol: <1%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.2-2.4 (crude) 0.05-0.3 (expanded)
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
None reported

Measurement Methods
NIOSH 0500, 0600
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Breathing: Fresh air
Respirator Recommendations To be added later	
Exposure Routes inhalation, skin and/or eye contact	
Symptoms Irritation eyes, skin, throat, upper respiratory system	
Target Organs Eyes, skin, respiratory system	

See also: INTRODUCTION See ICSC CARD: 1141