

**Toluene Diisocyanate (CH₃C₆H₃[NCO]₂)
CAS 26471-62-5 (mixture), CAS 584-84-9 (2,4-isomer),
CAS 91-08-7 (2,6- isomer); UN 2078**

Synonyms include TDI, diisocyanatotoluene, and tolylene diisocyanate.

Persons exposed only to toluene diisocyanate vapor do not pose secondary contamination risks. Persons whose clothing or skin is contaminated with liquid toluene diisocyanate can secondarily contaminate others by direct contact or off-gassing vapor.

At room temperature, toluene diisocyanate is a clear, pale yellow liquid with a sharp, pungent odor. It is combustible only at high temperatures, but burns to produce toxic gases (cyanides and nitrogen oxides). It is volatile, producing toxic concentrations at room temperature. The odor of toluene diisocyanate does not provide adequate warning of hazardous concentrations.

Toluene diisocyanate is absorbed rapidly through the lungs, but dermal absorption is minimal. No information was located pertaining to ingestion of toluene diisocyanate. Exposure by inhalation causes respiratory and systemic effects while dermal exposure causes inflammation and irritation of the skin.

Description

Toluene diisocyanate exists in two isomeric forms (2,4-toluene diisocyanate and 2,6-toluene diisocyanate) which have similar properties and effects. Toluene diisocyanate is produced commercially as an 80:20 (2,4-toluene diisocyanate:2,6-toluene diisocyanate) mixture of the two isomers. At room temperature, the mixture is a clear, pale yellow liquid with a sharp, pungent odor. It should be stored under refrigeration, away from light and moisture in a tightly closed container under an inert atmosphere. Toluene diisocyanate is insoluble in water and miscible with most common organic solvents.

Routes of Exposure

Inhalation

Inhalation is the main route of exposure to toluene diisocyanate. The vapor is readily absorbed from the lungs and is irritating to the respiratory tract and lungs even at low concentrations. Its odor threshold of 2.1 ppm is 100 times greater than the OSHA permissible exposure limit (0.02 ppm). Thus, **odor does not provide an adequate warning of potentially hazardous concentrations.** Toluene diisocyanate vapor is heavier than air and may cause asphyxiation in enclosed, poorly ventilated, or low-lying areas.

Children exposed to the same levels of toluene diisocyanate vapor as adults may receive a larger dose because they have greater lung surface area:body weight ratios and increased minute volumes:weight ratios. In addition, they may be exposed to higher levels than adults in the same location because of their short stature and the higher levels of toluene diisocyanate vapor found nearer to the ground.

Skin/Eye Contact

Direct contact with liquid toluene diisocyanate can cause severe eye and skin irritation. Exposure to relatively high vapor concentrations produces inflammation of mucous membranes. Dermal absorption is slow through intact skin.

Children are more vulnerable to toxicants absorbed through the skin because of their relatively larger surface area:body weight ratio.

Ingestion

No information was located pertaining to ingestion of toluene diisocyanate. Toluene diisocyanate is very irritating; thus, ingestion would probably produce chemical burns of the lips, mouth, throat, esophagus, and stomach. No data were located as to whether ingestion leads to systemic toxicity.

Sources/Uses

Toluene diisocyanate is made by reacting toluene diamine with carbonyl chloride (phosgene).

Toluene diisocyanate is commonly used as a chemical intermediate in the production of polyurethane foams, elastomers, and coatings; paints; varnishes; wire enamels; sealants; adhesives; and binders. It is also used as a cross-linking agent in the manufacture of nylon polymers.

Standards and Guidelines

OSHA PEL (permissible exposure limit) = 0.02 ppm (ceiling)

NIOSH IDLH (immediately dangerous to life or health) = 2.5 ppm

Physical Properties

Description: Clear, straw-colored liquid that becomes cloudy with age

Warning properties: Sharp, pungent odor at 2.1 ppm; inadequate warning of acute or chronic exposures.

Molecular weight: 174.2 daltons

Boiling point (760 mm Hg): 484 °F (251 °C) (mixed isomers)

Freezing point: 52–57 °F (11–14 °C) (mixed isomers)

Vapor pressure: 0.025 mm Hg at 77 °F (25 °C)

Gas density: 6 (air = 1)

Specific gravity: 1.22 (water = 1)

Water solubility: insoluble

Flammability: 250 °F (121 °C) (mixed isomers)

Flammable range: 0.9% to 9.5% (concentration in air)

Incompatibilities

Toluene diisocyanate reacts with strong oxidizers, water, acids, bases, amines, and alcohols.

Health Effects

Toluene diisocyanate is severely irritating to tissues, especially to mucous membranes. Inhalation of toluene diisocyanate produces euphoria, ataxia, mental aberrations, vomiting, abdominal pain, respiratory sensitization, bronchitis, emphysema, and asthma.

The mechanism by which toluene diisocyanate produces toxic symptoms is not known, but the compound is highly reactive and may inactivate tissue biomolecules by covalent binding. No information was found as to whether the health effects of toluene diisocyanate in children are different than in adults. Exposure to toluene diisocyanate produces severe respiratory problems and individuals with pre-existing breathing difficulties may be more susceptible to its effects.

Acute Exposure

The mechanism by which toluene diisocyanate produces toxic symptoms is not known, but the compound is highly reactive and may inactivate tissue biomolecules by covalent binding. Onset of symptoms may be delayed for 4 to 8 hours.

Children do not always respond to chemicals in the same way that adults do. Different protocols for managing their care may be needed.

Respiratory

Toluene diisocyanate produces irritation of the respiratory-tract. Concentration-dependent effects occur, often after a delay of 4 to 8 hours and may persist for 3 to 7 days. High-concentration inhalation can lead to chest tightness, cough, breathlessness, and inflammation of the bronchi with sputum production and wheezing. Accumulation of fluid in the lungs can also occur.

Previously exposed persons may develop inflammation of the lungs when reexposed to extremely low levels of toluene diisocyanate. Flu-like symptoms such as fever, malaise, shortness of breath, and cough can develop 4 to 6 hours after exposure and persist for 12 hours or longer. Chest x-rays may indicate lung changes.

In sensitized individuals, asthmatic attacks can occur after exposure to extremely low toluene diisocyanate air concentrations (0.0001 ppm). Asthmatic reactions can be immediate, delayed (4 to 8 hours), or both.

Exposure to toluene diisocyanate can lead to Reactive Airway Dysfunction Syndrome (RADS), a chemically- or irritant-induced type of asthma.

Children may be more vulnerable because of relatively increased minute ventilation per kg and failure to evacuate an area promptly when exposed.

CNS Acute exposure to high levels of toluene diisocyanate vapor or toluene diisocyanate-containing smoke has been associated with lightheadedness, headache, insomnia, mental aberrations, impaired gait, loss of consciousness, and coma.

Dermal Toluene diisocyanate is a skin irritant. Contact with the liquid may cause second- and third-degree skin burns. Skin contact may also result in respiratory sensitization, although this is rare.

Because of their relatively larger surface area:body weight ratio, children are more vulnerable to toxicants absorbed through the skin.

Ocular Toluene diisocyanate can cause eye irritation, inflammation of the eye membrane, inflammation of the cornea, clouding of the eye surface, and secondary glaucoma.

Gastrointestinal No cases involving ingestion were located. Because toluene diisocyanate is a known irritant, it is likely to cause burns of the lips, mouth, throat, esophagus and stomach. No data were located as to whether ingestion leads to systemic toxicity.

Potential Sequelae After an acute, high-concentration exposure, persons may develop non-specific bronchial hyperresponsiveness and toluene diisocyanate hypersensitization.

Sensitization occurs after exposure to levels greater than 0.02 ppm or after skin exposure. Allergic tendency is not a strong predisposing factor. Toluene diisocyanate can also cause lung-function decline in persons not sensitized to the chemical. Respiratory symptoms related to narrowing of the bronchi can persist for years.

Neurologic effects, such as difficulty concentrating, poor memory, and dull headache, have been reported to persist years after a high-level exposure. It is not known whether these complications resulted from the neurotoxic effects of toluene diisocyanate or from lack of oxygen in the blood.

Chronic Exposure

Workers who chronically inhale low levels of toluene diisocyanate may have minimal or no respiratory symptoms, then suddenly develop asthma. Chronic workplace exposure is associated with an increased prevalence of sensitization; the reported sensitization rate

has varied between 2% and 20% of workers and is dependent on the level of exposure. Sensitized persons are at risk of developing chronic asthma that may be precipitated by exposures to other chemicals.

Chronic exposure may be more serious for children because of their potential longer latency period.

Carcinogenicity

The Department of Health and Human Services has determined that toluene diisocyanate may reasonably be anticipated to be a carcinogen. The International Agency for Research on Cancer has determined that toluene diisocyanate is possibly carcinogenic to humans.

*Reproductive and
Developmental Effects*

No studies were located which address reproductive effects of toluene diisocyanate in either humans or experimental animals. No information was found as to whether toluene diisocyanate crosses the placenta or is excreted in breast milk. Toluene diisocyanate is not included in *Reproductive and Developmental Toxicants*, a 1991 report published by the U.S. General Accounting Office (GAO) that lists 30 chemicals of concern because of widely acknowledged reproductive and developmental consequences.

No known teratogenic effects from acute exposure are known.

Prehospital Management

Victims exposed only to toluene diisocyanate vapor do not pose contamination risks to rescuers. Victims whose clothing or skin is contaminated with liquid toluene diisocyanate can secondarily contaminate response personnel by direct contact or by off-gassing vapor.

Toluene diisocyanate is a direct irritant to mucous membranes, skin, eyes, and the respiratory system. Acute inhalation exposure may lead to euphoria, ataxia, mental aberrations, vomiting, abdominal pain, bronchospasm, chemical bronchitis, hypersensitivity pneumonitis, and noncardiogenic pulmonary edema.

There is no antidote for toluene diisocyanate. Treatment consists of bronchodilators and respiratory and cardiovascular support.

Hot Zone

Rescuers should be trained and appropriately attired before entering the Hot Zone. If the proper equipment is not available, or if rescuers have not been trained in its use, assistance should be obtained from a local or regional HAZMAT team or other properly equipped response organization.

Rescuer Protection

Toluene diisocyanate is a severe respiratory tract and skin irritant and sensitizer.

Respiratory Protection: Positive-pressure, self-contained breathing apparatus (SCBA) is recommended in response situations that involve exposure to potentially unsafe levels of toluene diisocyanate.

Skin Protection: Chemical-protective clothing is recommended because toluene diisocyanate can cause skin irritation, burns, and sensitization.

ABC Reminders

Quickly access for a patent airway, ensure adequate respiration and pulse. If trauma is suspected, maintain cervical immobilization manually and apply a cervical collar and a backboard when feasible.

Victim Removal

If victims can walk, lead them out of the Hot Zone to the Decontamination Zone. Victims who are unable to walk may be removed on backboards or gurneys; if these are not available, carefully carry or drag victims to safety.

Consider appropriate management of chemically-contaminated children, such as measures to reduce separation anxiety if a child is separated from a parent or other adult.

Decontamination Zone

Patients exposed only to toluene diisocyanate vapor who have no skin or eye irritation may be transferred immediately to the Support Zone. Other patients will require decontamination as described below.

Rescuer Protection

If exposure levels are determined to be safe, decontamination may be conducted by personnel wearing a lower level of protection than that worn in the Hot Zone (described above).

ABC Reminders

Quickly access for a patent airway, ensure adequate respiration and pulse. Stabilize the cervical spine with a collar and a backboard if trauma is suspected. Administer supplemental oxygen as required. Assist ventilation with a bag-valve-mask device if necessary.

Basic Decontamination

Victims who are able may assist with their own decontamination. Quickly remove and double-bag contaminated clothing and personal belongings.

Flush exposed skin and hair with water for 2 to 3 minutes, then wash twice with mild soap. Rinse thoroughly with water. Use caution to avoid hypothermia when decontaminating children or the elderly. Use blankets or warmers when appropriate.

Flush exposed or irritated eyes with plain water or saline for 15 minutes. Remove contact lenses if easily removable without additional trauma to the eye. Continue eye irrigation during other basic care and transport. If a corrosive material is suspected or if pain or injury is evident, continue irrigation while transferring the victim to the Support Zone.

In cases of ingestion, **do not induce emesis**. If the victim is alert, asymptomatic, and has a gag reflex, administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g). A soda can and a straw may be of assistance when offering charcoal to a child.

Victims who are conscious and able to swallow should be given 4 to 8 ounces of milk or water (not to exceed 15 mL/kg in a child). If the victim is symptomatic, delay decontamination until other emergency measures have been instituted.

Consider appropriate management of chemically contaminated children at the exposure site. Provide reassurance to the child during decontamination, especially if separation from a parent occurs.

<i>Transfer to Support Zone</i>	As soon as basic decontamination is complete, move the victim to the Support Zone.
Support Zone	Be certain that victims have been decontaminated properly (see <i>Decontamination Zone</i> , above). Victims who have undergone decontamination or have been exposed only to vapor pose no serious risks of secondary contamination to rescuers. In such cases, Support Zone personnel require no specialized protective gear.
<i>ABC Reminders</i>	Quickly access for a patent airway. If trauma is suspected, maintain cervical immobilization manually and apply a cervical collar and a backboard when feasible. Ensure adequate respiration and pulse. Administer supplemental oxygen as required and establish intravenous access if necessary. Place on a cardiac monitor.
<i>Additional Decontamination</i>	<p>Continue irrigating exposed skin and eyes, as appropriate.</p> <p>In cases of ingestion, do not induce emesis. If the victim is alert, asymptomatic, and has a gag reflex, administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g) if it has not already been administered. A soda can and a straw may be of assistance when offering charcoal to a child.</p> <p>Victims who are conscious and able to swallow should be given 4 to 8 ounces of milk or water (not to exceed 15 mL/kg in a child) if it has not been given previously. If the victim is symptomatic, delay decontamination until other emergency measures have been instituted.</p>
<i>Advanced Treatment</i>	<p>In cases of respiratory compromise secure airway and respiration via endotracheal intubation. If not possible, perform cricothyroidotomy if equipped and trained to do so.</p> <p>Treat patients who have bronchospasm with aerosolized bronchodilators. The use of bronchial sensitizing agents in situations of multiple chemical exposures may pose additional risks. Consider the health of the myocardium before choosing which type of bronchodilator should be administered. Cardiac sensitizing agents may be appropriate; however, the use of cardiac sensitizing agents after exposure to certain chemicals may pose enhanced risk of cardiac arrhythmias (especially in the elderly). Toluene diisocyanate poisoning is not known to pose additional risk during the use of bronchial or cardiac sensitizing agents. Administer corticosteroids as indicated to patients who have persistent wheezing or hypersensitivity pneumonitis.</p>

Consider racemic epinephrine aerosol for children who develop stridor. Dose 0.25–0.75 mL of 2.25% racemic epinephrine solution in 2.5 cc water, repeat every 20 minutes as needed, cautioning for myocardial variability.

Patients who are comatose, hypotensive, or having seizures or cardiac arrhythmias should be treated according to advanced life support (ALS) protocols.

Transport to Medical Facility

Only decontaminated patients or patients not requiring decontamination should be transported to a medical facility. “Body bags” are not recommended.

Report to the base station and the receiving medical facility the condition of the patient, treatment given, and estimated time of arrival at the medical facility.

If toluene diisocyanate has been ingested, prepare the ambulance in case the victim vomits toxic material. Have ready several towels and open plastic bags to quickly clean up and isolate vomitus.

Multi-Casualty Triage

Consult with the base station physician or the regional poison control center for advice regarding triage of multiple victims.

Patients who are seriously symptomatic (as in cases of chest tightness or wheezing), patients who have histories or evidence of significant exposure, and all patients who have ingested toluene diisocyanate should be transported to a medical facility for evaluation. Others may be discharged at the scene after their names, addresses, and telephone numbers are recorded. Those discharged should be advised to seek medical care promptly if symptoms develop (see *Patient Information Sheet* below).

Emergency Department Management

Hospital personnel in an enclosed area can be secondarily contaminated by direct contact or by off-gassing vapor from soaked skin or clothing. Patients do not pose contamination risks after contaminated clothing is removed and the skin is washed.

Toluene diisocyanate is irritating to mucous membranes, skin, eyes, and the respiratory tract. Acute inhalation exposure may lead to euphoria, ataxia, mental aberrations, vomiting, abdominal pain, bronchospasm, chemical bronchitis, hypersensitivity pneumonitis, and noncardiogenic pulmonary edema.

There is no antidote for toluene diisocyanate. Treatment consists of bronchodilators and respiratory and cardiovascular support.

Decontamination Area

Unless previously decontaminated, all patients suspected of contact with toluene diisocyanate liquid and all victims with skin or eye irritation require decontamination as described below. All other patients may be transferred immediately to the Critical Care Area.

Be aware that use of protective equipment by the provider may cause fear in children, resulting in decreased compliance with further management efforts.

Because of their relatively larger surface area:body weight ratio, children are more vulnerable to toxicants absorbed through the skin. Also emergency room personnel should examine children's mouths because of the frequency of hand-to-mouth activity among children.

ABC Reminders

Evaluate and support airway, breathing, and circulation. In cases of respiratory compromise secure airway and respiration via endotracheal intubation. If not possible, surgically create an airway.

Treat patients who have bronchospasm with aerosolized bronchodilators. The use of bronchial sensitizing agents in situations of multiple chemical exposures may pose additional risks. Consider the health of the myocardium before choosing which type of bronchodilator should be administered. Cardiac sensitizing agents may be appropriate; however, the use of cardiac sensitizing agents after exposure to certain chemicals may pose enhanced risk of cardiac arrhythmias (especially in the elderly). Toluene diisocyanate poisoning is not known to pose additional risk during the use of bronchial or cardiac sensitizing agents. Administer corticosteroids as indicated to patients who have persistent wheezing or hypersensitivity pneumonitis.

Consider racemic epinephrine aerosol for children who develop stridor. Dose 0.25–0.75 mL of 2.25% racemic epinephrine solution in 2.5 cc water, repeat every 20 minutes as needed, cautioning for myocardial variability.

Patients who are comatose, hypotensive, or have seizures or ventricular arrhythmias should be treated in the conventional manner.

Basic Decontamination

Patients who are able and cooperative may assist with their own decontamination. Remove and double-bag contaminated clothing and all personal belongings.

Flush exposed skin and hair with water for 2 to 3 minutes (preferably under a shower), then wash thoroughly with mild soap. Rinse thoroughly with water.

Use caution when flushing a child's skin to avoid the complication of hypothermia. Use blankets to keep children warm after decontamination.

Flush exposed eyes with plain water or saline for at least 15 minutes. Remove contact lenses if easily removable without additional trauma to the eye. If a corrosive material is present or if pain or injury is evident, continue irrigation while transporting the patient to the Critical Care Area.

In cases of ingestion, **do not induce emesis**. If the victim is alert, asymptomatic, and has a gag reflex, administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g) if it has not already been administered. A soda can and a straw may be of assistance when offering charcoal to a child.

Victims who are conscious and able to swallow should be given 4 to 8 ounces of milk or water (not to exceed 15 mL/kg in a child) if it has not been given previously (see *Critical Care Area* below for more information on ingestion exposure).

Critical Care Area

Be certain that appropriate decontamination has been carried out (see *Decontamination Area* above).

ABC Reminders

Evaluate and support airway, breathing, and circulation as in ABC Reminders above under *Decontamination Zone*. Establish intravenous access in seriously ill patients if this has not been done previously. Continuously monitor cardiac rhythm.

Patients who are comatose, hypotensive, or have seizures or cardiac arrhythmias should be treated in the conventional manner.

Inhalation Exposure

Administer supplemental oxygen by mask to patients who have respiratory symptoms. Treat patients who have bronchospasm with aerosolized bronchodilators. The use of bronchial sensitizing agents in situations of multiple chemical exposures may pose additional risks. Consider the health of the myocardium before choosing which type of bronchodilator should be administered. Cardiac sensitizing agents may be appropriate; however, the use of cardiac sensitizing agents after exposure to certain chemicals may pose enhanced risk of cardiac arrhythmias (especially in the elderly). Toluene diisocyanate poisoning is not known to pose additional risk during the use of bronchial or cardiac sensitizing agents. Administer corticosteroids as indicated to patients who have persistent wheezing or hypersensitivity pneumonitis.

Consider racemic epinephrine aerosol for children who develop stridor. Dose 0.25–0.75 mL of 2.25% racemic epinephrine solution in 2.5 cc water, repeat every 20 minutes as needed, cautioning for myocardial variability.

Skin Exposure

If the skin was in contact with liquid toluene diisocyanate, chemical burns may occur; treat as thermal burns.

Because of their larger surface area:body weight ratio, children are more vulnerable to toxicants affecting the skin.

Eye Exposure

Continue irrigation for at least 15 minutes. Test visual acuity. Examine the eyes for corneal damage and treat appropriately. Immediately consult an ophthalmologist for patients who have corneal injuries.

Ingestion Exposure

Do not induce emesis.

If the victim is alert, asymptomatic, and has a gag reflex, administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g) if it has not already been administered. A soda can and a straw may be of assistance when offering charcoal to a child.

Victims who are conscious and able to swallow should be given 4 to 8 ounces of milk or water (not to exceed 15 mL/kg in a child) if it has not been given previously.

Consider endoscopy to evaluate the extent of gastrointestinal-tract injury. Extreme throat swelling may require endotracheal intubation or cricothyriodotomy. Gastric lavage is useful in certain

circumstances to remove caustic material and prepare for endoscopic examination. Consider gastric lavage with a small nasogastric tube if: (1) a large dose has been ingested; (2) the patient's condition is evaluated within 30 minutes; (3) the patient has oral lesions or persistent esophageal discomfort; and (4) the lavage can be administered within one hour of ingestion. Care must be taken when placing the gastric tube because blind gastric-tube placement may further injure the chemically damaged esophagus or stomach.

Because children do not ingest large amounts of corrosive materials, and because of the risk of perforation from NG intubation, lavage is discouraged in children unless performed under endoscopic guidance.

Toxic vomitus or gastric washings should be isolated, e.g., by attaching the lavage tube to isolated wall suction or another closed container.

*Antidotes and
Other Treatments*

There is no antidote for toluene diisocyanate. Treatment is supportive of respiratory function.

Laboratory Tests

Routine laboratory studies for all exposed patients include CBC, glucose, and electrolyte determinations. Patients who have respiratory complaints may require pulse oximetry (or ABG measurements), chest radiography, and peak-flow spirometry.

**Disposition and
Follow-up**

Consider hospitalizing patients who have histories of significant inhalation exposure and are symptomatic (e.g., chest tightness or wheezing) or who have ingested toluene diisocyanate.

Delayed Effects

Toluene diisocyanate-induced bronchospasm can occur 4 to 8 hours after inhalation exposure.

Patient Release

Patients who remain asymptomatic for 8 to 12 hours after exposure may be discharged with instructions to seek medical care promptly if symptoms develop (see the *Toluene Diisocyanate—Patient Information Sheet* below).

Follow-up

Obtain the name of the patient's primary care physician so that the hospital can send a copy of the ED visit to the patient's doctor.

If significant inhalation or skin contact has occurred, monitor pulmonary function. Persons who have wheezing episodes may be permanently sensitized and may need to be removed from future

work with toluene diisocyanate; patients should consult an occupational medicine or pulmonary specialist before returning to work that entails exposure to toluene diisocyanate.

Toluene diisocyanate poisoning can cause permanent alterations of nervous system function, including problems with memory, learning, thinking, sleeping, personality changes, depression, headache, and sensory and perceptual changes. Patients who have shown symptoms such as seizures, convulsions, headache or confusion should be followed for permanent nervous system dysfunction with neurobehavioral toxicity testing.

Patients who have corneal injuries should be reexamined within 24 hours.

Reporting

If a work-related incident has occurred, you may be legally required to file a report; contact your state or local health department.

Other persons may still be at risk in the setting where this incident occurred. If the incident occurred in the workplace, discussing it with company personnel may prevent future incidents. If a public health risk exists, notify your state or local health department or other responsible public agency. When appropriate, inform patients that they may request an evaluation of their workplace from OSHA or NIOSH. See Appendices III and IV for a list of agencies that may be of assistance.

Toluene Diisocyanate Patient Information Sheet

This handout provides information and follow-up instructions for persons who have been exposed to toluene diisocyanate.

What is Toluene diisocyanate?

Toluene diisocyanate is a pale-yellow liquid with a strong, sharp odor. It is used mainly to make polyurethane foams and coatings.

What immediate health effects can be caused by exposure to toluene diisocyanate?

Low levels of toluene diisocyanate in the air can irritate the eyes, nose, throat, and lungs and cause cough, chest tightness, and shortness of breath. Higher levels can cause a build-up of fluid in the lungs, which may cause death. If liquid toluene diisocyanate comes in contact with the skin or eyes, it can cause severe burns. Generally, the more serious the exposure, the more severe the symptoms.

Can toluene diisocyanate poisoning be treated?

There is no antidote for toluene diisocyanate, but its effects can be treated and most exposed persons get well. Seriously exposed persons may need to be hospitalized.

Are any future health effects likely to occur?

After exposure to toluene diisocyanate, certain persons can develop allergies in which even small exposures to toluene diisocyanate or other irritants can trigger asthma attacks or shortness of breath. Therefore, it is important to tell your doctor that you have been exposed to toluene diisocyanate. After a serious exposure or repeated exposures, toluene diisocyanate can cause permanent lung damage. Toluene diisocyanate poisoning can cause permanent alterations of nervous system function, including problems with memory, learning, thinking, sleeping, personality changes, depression, headache, and sensory and perceptual changes.

What tests can be done if a person has been exposed to toluene diisocyanate?

Specific tests for the presence of toluene diisocyanate in blood are not available. If a severe exposure has occurred, respiratory function tests and a chest x-ray may show whether damage has been done to the lungs. Patients who have problems with memory, concentration, or personality changes or who experienced seizures or convulsions when exposed to toluene diisocyanate may need neurobehavioral toxicity testing. Testing is not needed in every case.

Where can more information about toluene diisocyanate be found?

More information about toluene diisocyanate can be obtained from your regional poison control center; your state, county, or local health department; the Agency for Toxic Substances and Disease Registry (ATSDR); your doctor, or a clinic in your area that specializes in occupational and environmental health. If the exposure happened at work, you may wish to discuss it with your employer, the Occupational Safety and Health Administration (OSHA), or the National Institute for Occupational Safety and Health (NIOSH). Ask the person who gave you this form for help in locating these telephone numbers.

Follow-up Instructions

Keep this page and take it with you to your next appointment. Follow *only* the instructions checked below.

Call your doctor or the Emergency Department if you develop any unusual signs or symptoms within the next 24 hours, especially:

- coughing, wheezing, difficulty breathing, shortness of breath, or chest pain
- headache or lightheadedness
- increased pain or a discharge from your eyes
increased redness or pain or a pus-like discharge in the area of a skin burn

No follow-up appointment is necessary unless you develop any of the symptoms listed above.

Call for an appointment with Dr. _____ in the practice of _____.

When you call for your appointment, please say that you were treated in the Emergency Department at _____ Hospital by _____ and were advised to be seen again in _____ days.

Return to the Emergency Department/ _____ Clinic on (date) _____ at _____ AM/PM for a follow-up examination.

Do not perform vigorous physical activities for 1 to 2 days.

You may resume everyday activities including driving and operating machinery.

Do not return to work for _____ days.

You may return to work on a limited basis. See instructions below.

Avoid exposure to cigarette smoke for 72 hours; smoke may worsen the condition of your lungs.

Avoid drinking alcoholic beverages for at least 24 hours; alcohol may worsen injury to your stomach or have other effects.

Avoid taking the following medications: _____

You may continue taking the following medication(s) that your doctor(s) prescribed for you: _____

Other instructions: _____

- Provide the Emergency Department with the name and the number of your primary care physician so that the ED can send him or her a record of your emergency department visit.

- You or your physician can get more information on the chemical by contacting: _____
_____ or _____, or by checking out the following Internet
Web sites: _____; _____.

Signature of patient _____ Date _____

Signature of physician _____ Date _____