

**Hydrogen Peroxide (H<sub>2</sub>O<sub>2</sub>)****CAS 7722-84-1; UN 2984 (8%-20%), UN 2014 (20%-52%), UN 2015 (>52%)**

Synonyms include dihydrogen dioxide, hydrogen dioxide, hydroperoxide, and peroxide.

**Persons exposed only to hydrogen peroxide gas do not pose risks of secondary contamination to personnel outside the Hot Zone. However, persons whose clothing or skin is contaminated with concentrated hydrogen peroxide solution can secondarily contaminate personnel by direct contact or through off-gassing vapor.**

**Hydrogen peroxide is a clear, colorless, noncombustible liquid. It is a powerful oxidizing agent; when it comes in contact with organic material, spontaneous combustion can occur. Odor does not provide a warning of hazardous concentrations.**

**Description**

Pure hydrogen peroxide is a crystalline solid below 12 °F and a colorless liquid with a bitter taste above 12 °F. It is almost always used as an aqueous solution, which is available in dilute form (3% to 10%) for household use and in concentrated form (greater than 30%) for industrial use. Hydrogen peroxide is unstable, decomposing readily to oxygen and water with release of heat. Commercial peroxide products contain a stabilizer (usually acetanilide) to slow the rate of spontaneous decomposition.

Hydrogen peroxide is nonflammable, but it is a powerful oxidizing agent that can cause spontaneous combustion when it comes in contact with organic material.

**Routes of Exposure***Inhalation*

Inhalation of vapors, mists, or aerosols from concentrated solutions of hydrogen peroxide can cause significant morbidity. Because it is nearly odorless and nonirritating except at high concentrations, persons may not be aware of its presence. No odor threshold was located for hydrogen peroxide (the OSHA PEL is 1 ppm). **Detection of odor does not provide adequate warning of hazardous concentrations.** Hydrogen peroxide vapor is heavier than air and may cause asphyxiation in enclosed, poorly ventilated, or low-lying areas.

Children exposed to the same levels of hydrogen peroxide vapor as adults may receive larger doses 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 hydrogen peroxide vapor found nearer to the ground. Children may be more vulnerable to corrosive agents than adults because of the smaller diameter of their airways.

*Skin/Eye Contact*

Hydrogen peroxide is poorly absorbed through intact skin. When used for household disinfectant purposes (3% to 5%), it is mildly irritating to the skin and mucous membranes. At a concentration of 10%, which is found in some hair-bleaching solutions, it is strongly irritating and may be corrosive.

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

*Ingestion*

If ingested, solutions of hydrogen peroxide up to concentrations of 9% are generally nontoxic; however, even a 3% solution is mildly irritating to mucosal tissue and may cause vomiting and diarrhea. Ingestion of industrial-strength solutions (10%) causes systemic toxicity and has been associated with fatalities.

**Sources/Uses**

In industry, hydrogen peroxide is used as a bleach for textiles and paper, as a component of rocket fuels, and as a reagent for producing foam rubber and organic chemicals. In the home, dilute hydrogen peroxide solutions are used as disinfectants, deodorants, and hair-bleaching agents.

**Standards and Guidelines**

OSHA PEL (permissible exposure limit): 1 ppm (averaged over an 8-hour workshift)

NIOSH IDLH (immediately dangerous to life or health) = 75 ppm

AIHA ERPG-2 (emergency response planning guideline) (maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action) = 50 ppm

**Physical Properties**

*Description:* Colorless liquid at room temperature; used commonly in aqueous solution.

*Warning properties:* Odor is inadequate as index of exposure

*Molecular weight:* 34.0 daltons

*Boiling point* (760 mm Hg): 286 °F (141 °C)

*Freezing point:* 12 °F (-11.1 °C)

*Specific gravity:* 1.39 at 68 °F (20 °C) (water = 1)

*Vapor pressure:* 5 mm Hg at 86 °F (30 °C)

*Gas density:* 1.2 (air = 1) (heavier than air)

*Water solubility:* Miscible with water

*Flammability:* Nonflammable, but a powerful oxidizer and may ignite any organic matter with which it comes in contact

**Incompatibilities**

Hydrogen peroxide reacts with oxidizable materials, iron, copper, brass, bronze, chromium, zinc, lead, manganese, and silver. Contact with organic materials may result in spontaneous combustion.



## Health Effects

**Hydrogen peroxide is corrosive to skin, eyes, and mucous membranes at high concentrations (>10%); lower concentrations may cause irritation.**

**Other effects occur from inhalation or ingestion and may include gas embolism, gastric irritation, gastric distension and emesis, an accumulation of fluid in the lungs, unconsciousness, and respiratory arrest.**

**Symptoms become more severe as the concentration of hydrogen peroxide increases.**

### Acute Exposure

The systemic effects of hydrogen peroxide result from its interaction with catalase in the tissues with the liberation of oxygen and water as it decomposes. One milliliter of 3% hydrogen peroxide liberates 10 mL of oxygen. When the amount of oxygen evolved exceeds the maximum blood solubility, venous embolism occurs. Intravascular oxygen embolism may also occur. Ingestion of dilute solutions (3–10%) produces mild gastrointestinal irritation, gastric distension and emesis, and on rare occasions, gastrointestinal erosions or embolism. Ingestion of 10–20% solutions produces similar symptoms, but exposed tissues may also be burned. Ingestion of 20–40% produces the symptoms described for lower concentrations, but may also induce rapid loss of consciousness followed by respiratory arrest.

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

### Respiratory

Vapors, mists, or aerosols of hydrogen peroxide can cause upper airway irritation, inflammation of the nose, hoarseness, shortness of breath, and a sensation of burning or tightness in the chest. Exposure to high concentrations can result in severe mucosal congestion of the trachea and bronchi and delayed accumulation of fluid in the lungs.

Children may be more vulnerable to corrosive agents than adults because of the relatively smaller diameter of their airways.

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

### CNS

Inhalation or ingestion of high concentrations of hydrogen peroxide may result in seizures, cerebral infarction, or cerebral

embolism. The ensuing damage to the CNS may cause permanent neurological deficits or death.

*Dermal* Prolonged exposure to concentrated vapor or to dilute solutions can cause irritation and temporary bleaching of skin and hair. Contact with concentrated solutions can cause severe skin burns with blisters.

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

*Ocular* Exposure to concentrated vapor, mist, or aerosol can cause stinging pain and tearing. Solutions that are 5% or greater can cause injury to the eye surface if splashed in the eye (sometimes with delayed effects).

*Gastrointestinal* Ingestion of household solutions (3%) usually causes mild mucosal irritation and vomiting. Gastric distention due to liberation of oxygen in the stomach may occur, but hollow-organ rupture is uncommon when dilute solutions are ingested.

Ingestion of concentrated solutions ( 10%) can cause extreme irritation, inflammation, and burns of the alimentary tract can occur, and hollow-organ distention and rupture is a significant danger. Hydrogen peroxide enemas have caused colonic rupture, intestinal gangrene with gas bubbles, and acute ulcerative colitis.

*Potential Sequelae* Survivors of severe inhalation injury may sustain permanent lung damage. Severe eye exposures may result in ulceration of the eye and blindness. Permanent neurological deficits have also been reported.

### **Chronic Exposure**

Because hydrogen peroxide is rapidly decomposed in the body, it is unlikely to cause chronic toxicity. However, repeated exposures to hydrogen peroxide vapor may cause chronic irritation of the respiratory tract and partial or complete lung collapse. Repeated contact with vapor or solution may result in bleaching of skin and hair.

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

*Carcinogenicity* The International Agency for Research on Cancer (IARC) has determined that hydrogen peroxide is not classifiable as to its carcinogenicity to humans.

*Developmental and  
Reproductive Effects*

Hydrogen peroxide 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 reports were located on the developmental or reproductive effects of hydrogen peroxide in humans.



## Prehospital Management

- **Victims exposed only to hydrogen peroxide vapor do not pose substantial risks of secondary contamination to personnel outside the Hot Zone. Victims whose clothing or skin is contaminated with concentrated hydrogen peroxide solution can secondarily contaminate personnel by direct contact or through off-gassing vapor.**
- **Hydrogen peroxide is corrosive to skin, eyes, and mucous membranes at high concentrations (>10%); lower concentrations may cause irritation. Symptoms become more severe as the concentration of hydrogen peroxide increases.**
- **Other effects occur from inhalation or ingestion and may include gas embolism, gastric irritation, gastric distension, gastric rupture and emesis, an accumulation of fluid in the lungs, unconsciousness, and respiratory arrest.**
- **There is no antidote for hydrogen peroxide. Treatment consists of support of respiratory and cardiovascular functions.**

### **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*

Hydrogen peroxide vapor is a severe respiratory tract irritant. Hydrogen peroxide solutions are corrosive at high concentrations (>10%); lower concentrations may cause irritation.

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

*Skin Protection:* Chemical-protective clothing is recommended for concentrations greater than 10% because hydrogen peroxide can cause skin irritation and burns.

### *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 hydrogen peroxide 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. Remove contaminated clothing while flushing exposed areas. Double-bag contaminated clothing and personal belongings.

Flush liquid-exposed skin and hair with plain water for at least 5 minutes. Wash exposed area extremely thoroughly with soap and water. Use caution to avoid hypothermia when decontaminating children or the elderly. Use blankets or warmers when appropriate.

Flush exposed or irritated eyes with copious amounts of 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 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**. Victims who are conscious and able to swallow should be given 4 to 8 ounces of milk or water. If the victim is symptomatic, delay decontamination until other emergency measures have been instituted. Activated charcoal has not been shown to absorb hydrogen peroxide and will interfere with endoscopy which will be necessary to assess tissue damage.

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.

*Transfer to Support Zone*

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 *Decontamination Zone* above). Victims who have undergone decontamination or who have been exposed only to vapor pose no serious risks of secondary contamination. In such cases, Support Zone personnel require no specialized protective gear.

*ABC Reminders*

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.

*Additional Decontamination*

Continue irrigating exposed skin and eyes, as appropriate.

In cases of ingestion, **do not induce emesis**. Victims who are conscious and able to swallow should be given 4 to 8 ounces of milk or water. If the victim is symptomatic, delay decontamination until other emergency measures have been instituted. Activated charcoal has not been shown to absorb hydrogen peroxide and will interfere with endoscopy which will be necessary to assess tissue damage.

*Advanced Treatment*

In cases of respiratory compromise secure airway and respiration via endotracheal intubation. If not possible, perform cricothyroidotomy if equipped and trained to do so.

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). Hydrogen peroxide poisoning is not known to pose additional risk during the use of bronchial or cardiac sensitizing agents.

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 are 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 a chemical 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 Wagon**

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

Patients who have obvious injury, such as severe wheezing, dyspnea, or skin or eye burns, should be transported immediately to a medical facility for evaluation. Patients who have ingested hydrogen peroxide solutions (except minor ingestions of household strength solutions (3% to 5%)) should also be transported for medical evaluation.

Persons who have no eye, skin, or throat irritation or who have mild or transient symptoms are unlikely to develop severe complications. They 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 of toxicity develop (see *Patient Information Sheet* below).

## Emergency Department Management

**Hospital personnel can be secondarily contaminated by direct contact or from vapor off-gassing from heavily soaked clothing or from the vomitus of victims who have ingested hydrogen peroxide. Patients do not pose contamination risks after contaminated clothing is removed and the skin is thoroughly washed.**

**Hydrogen peroxide is corrosive to skin, eyes, and mucous membranes at high concentrations (>10%); lower concentrations may cause irritation. Symptoms become more severe as the concentration of hydrogen peroxide increases.**

**Other effects occur from inhalation or ingestion and may include gas embolism, gastric irritation, gastric distension, gastric rupture and emesis, an accumulation of fluid in the lungs, unconsciousness, and respiratory arrest.**

**There is no antidote for hydrogen peroxide poisoning. Treatment consists of support of respiratory and cardiovascular functions.**

### Decontamination Area

Previously decontaminated patients and patients exposed only to hydrogen peroxide vapor who have no skin or eye irritation may be transferred immediately to the Critical Care Area. Other patients will require decontamination as described below.

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 affecting 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. Children may be more vulnerable to corrosive agents than adults because of the smaller diameter of their airways. 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). Hydrogen peroxide poisoning is not known to pose additional risk during the use of bronchial or cardiac sensitizing agents.

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 may assist with their own decontamination.

Because concentrated hydrogen peroxide can cause burns, ED staff should don chemical resistant jumpsuits (e.g., of Tyvek or Saranax) or butyl rubber aprons, rubber gloves, and eye protection if the patient's clothing or skin is wet with hydrogen peroxide. After the patient has been decontaminated, no special protective clothing or equipment is required for ED personnel.

Quickly remove contaminated clothing while flushing the exposed skin with water (preferably under a shower). Double-bag the contaminated clothing and personal belongings. Wash skin thoroughly with soap and water. Use caution to avoid hypothermia when decontaminating children or the elderly. Use blankets or warmers when appropriate.

Irrigate exposed or irritated eyes with copious amounts of 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**. Victims who are conscious and able to swallow should be given 4 to 8 ounces of milk or water if this has not been done already. If the victim is symptomatic, delay decontamination until other emergency measures have been instituted. Activated charcoal has not been shown to absorb hydrogen peroxide and will interfere with endoscopy which will be necessary to assess tissue damage.

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**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. Children may be more vulnerable to corrosive agents than adults because of the relatively smaller diameter of their airways. 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*

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). Hydrogen peroxide poisoning is not known to pose additional risk during the use of bronchial or cardiac sensitizing agents.

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 concentrated hydrogen peroxide solution was in contact with the skin, chemical burns may result; treat as thermal burns.

Because of their relatively 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.** Victims who are conscious and able to swallow should be given 4 to 8 ounces of milk or water if this has not been done already. If the victim is symptomatic, delay decontamination until other emergency measures have been instituted. Activated charcoal has not been shown to absorb

hydrogen peroxide and will interfere with endoscopy which will be necessary to assess tissue damage.

Consider endoscopy to evaluate the extent of gastrointestinal tract injury. Extreme throat swelling may require endotracheal intubation or cricothyroidotomy. 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 1 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).

Large ingestions may produce gastritis from hydrogen peroxide decomposition, which releases large volumes of oxygen and causes gastric distention. Gently place a small nasogastric tube to relieve distention or to perform lavage on an obtunded patient. Most ingestions of dilute hydrogen peroxide are benign, and mild irritation is self-limited.

*Antidotes and  
Other Treatments*

There is no antidote for hydrogen peroxide poisoning. Enhanced elimination methods are neither necessary nor effective. Hyperbaric oxygen has been used in severe embolization cases, but there are no controlled studies of the efficacy of this treatment. Careful aspiration of air through a central venous line may be attempted for patients in extremis.

*Laboratory Tests*

The diagnosis of acute hydrogen peroxide toxicity is primarily clinical based on eye and skin irritation or burns, white foam from the mouth, and gastric irritation. Routine laboratory studies for all exposed patients include CRC, glucose, and electrolyte determinations. For patients exposed through inhalation, useful studies include chest radiography, pulse oximetry (or ABG measurements), spirometry, and peak flow measurements. A radiograph of the abdomen and chest is advised if there are

symptoms, or if a high concentration is ingested to detect intravascular oxygen embolization. Ingestion of hydrogen peroxide can be assessed by adding 1 drop of 15% titanium chloride to an acidified mixture of equal parts of gastric contents and ethyl ether. A yellow to deep orange coloration of the aqueous layer indicates the formation of  $H_2TiO_4$  which is an indication of ingested peroxide.

**Disposition and  
Follow-up**

Consider hospitalizing symptomatic patients who have histories of substantial inhalation exposure and patients who have ingested a concentrated solution of hydrogen peroxide.

*Delayed Effects*

Patients who have complaints of chest pain, chest tightness, or cough should be observed for 24 to 72 hours and reexamined periodically to detect delayed-onset pulmonary edema or respiratory failure.

*Patient Release*

Patients who remain asymptomatic for 4 to 6 hours may be discharged with instructions to seek medical care promptly if symptoms develop (see the *Hydrogen Peroxide—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.

Patients who have corneal injuries or severe skin burns 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.



## **Hydrogen Peroxide Patient Information Sheet**

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

### **What is hydrogen peroxide?**

Hydrogen peroxide is used widely in industry to bleach cloth and paper and to manufacture other chemicals. It is also an ingredient of some rocket fuels. Hydrogen peroxide is found in dilute form (3% to 10%) in the home and in concentrated form (30% or greater) in industry. In the home, 3% solutions of hydrogen peroxide are used as disinfectants for cuts and scrapes, and slightly more concentrated solutions (10%) are used in hair bleaches. Dilute solutions have almost no odor, but stronger solutions have a sharp odor. Hydrogen peroxide is not flammable, but concentrated solutions may cause combustion of organic materials.

### **What immediate health effects can result from hydrogen peroxide exposure?**

Depending on the concentration, breathing hydrogen peroxide vapor can cause eye and throat irritation, coughing, and breathing difficulty. Serious eye or skin burns and bleaching of the hair may result from contact with hydrogen peroxide solutions. Drinking a concentrated hydrogen peroxide solution can cause vomiting and severe burns of the throat and stomach. Generally, the more serious the exposure, the more severe the symptoms.

### **Can hydrogen peroxide poisoning be treated?**

There is no proven antidote for hydrogen peroxide poisoning, but its effects can be treated, and most persons get well. Persons who have experienced serious symptoms may need to be hospitalized.

### **Are any future health effects likely to occur?**

A single small exposure from which a person recovers quickly is not likely to cause delayed or long-term effects. After a severe exposure, a person may not notice any symptoms for up to 24 hours, but may develop lung damage.

### **What tests can be done if a person has been exposed?**

There are no specific blood and urine tests that can show whether a person has been exposed to hydrogen peroxide. However, blood tests and a chest x-ray may be used to evaluate lung injury. Testing is not needed in every case.

### **Where can more information about hydrogen peroxide be obtained?**

More information about hydrogen peroxide 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, difficulty breathing or shortness of breath
- wheezing, chest pain or tightness
- increased redness or pain or a pus-like discharge from injured skin, eyes, or other wound
- stomach pain or vomiting

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 \_\_\_\_\_