

Ethylene Oxide ([CH₂]₂O) CAS 75-21-8; UN 1040

Synonyms include dimethylene oxide, 1,2-epoxyethane, EtO, EO, ethene oxide, and oxirane.

- **Persons exposed only to ethylene oxide gas do not pose substantial risks of secondary contamination. Persons whose clothing or skin is contaminated with ethylene oxide liquid or solution can secondarily contaminate personnel by direct contact or through off-gassing vapor.**
- **Ethylene oxide is a flammable, explosive, and highly penetrating gas; its sweet, ether-like odor does not provide sufficient warning of hazardous concentrations.**
- **Ethylene oxide is rapidly absorbed after inhalation, and solutions of ethylene oxide can penetrate human skin.**

Description

Ethylene oxide is a colorless gas at room temperature and a colorless liquid below 51 °F (10.7 °C). It is shipped as a liquefied, compressed gas. Both the gas and liquid are potential fire and explosion hazards. Ethylene oxide has a sweet, ether-like odor at air concentrations above 500 ppm. Ethylene oxide is soluble in water and organic solvents.

Routes of Exposure

Inhalation

Most ethylene oxide exposures occur by inhalation or skin contact. The gas is readily absorbed by the lungs. **Odor is not a reliable indicator of ethylene oxide's presence and does not provide adequate warning of hazardous concentrations.** The odor threshold is 500 ppm, while the OSHA PEL is 1 ppm. The gas is heavier than air and can cause asphyxiation in enclosed, poorly ventilated, or low-lying areas.

Children exposed to the same levels of ethylene oxide as adults may receive 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 ethylene oxide found nearer to the ground.

Skin/Eye Contact

Skin contact with concentrated solutions of ethylene oxide, liquid ethylene oxide, or high vapor concentrations may cause chemical burns. Contact with liquefied ethylene oxide may result in frostbite. Exposure to high levels of the gas may cause corneal burns and cataracts. Prolonged skin contact with dilute solutions

of ethylene oxide (e.g., from contaminated clothing) can cause irritation and dermatitis.

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

Ingestion

Ingestion is unlikely to occur because ethylene oxide is a gas at room temperature.

Sources/Uses

Ethylene oxide is produced by catalytically reacting ethylene and oxygen. Ethylene oxide ranks 26th in volume among the major industrial chemicals produced in the United States. About 65% of ethylene oxide is used for synthesis of ethylene glycol, an antifreeze product. A mixture of 88% Freon and 12% ethylene oxide is used as a cold sterilizing agent for foods and medical equipment and supplies. Ethylene oxide is also used as a fumigant and fungicide in the manufacture of medical products and spices, and as a chemical intermediate.

Standards and Guidelines

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

OSHA STEL (short-term exposure limit) = 5 ppm (15 minute exposure)

NIOSH IDLH (immediately dangerous to life or health) = 800 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 gas above 51 °F (10.7 °C); colorless liquid below 51 °F.

Warning properties: Inadequate; sweet, ether-like odor detectable at about 500 ppm. Sensitized persons may experience symptoms below the odor threshold and at levels that do not affect others.

Molecular weight: 44.1 daltons

Boiling point (760 mm Hg): 51 °F (10.7 °C)

Freezing point: -171 °F (-113 °C)

Specific gravity: 0.82 (liquid at 50 °F)

Vapor pressure: 1,110 mm Hg at 68 °F (20 °C)

Gas density: 1.49 (air = 1)

Water solubility: Miscible with water.

Flammability: -20 °F (-29 °C). Extremely flammable liquid; may be ignited by heat, sparks, or flames, vapors may travel to a source of ignition and flash back.

Flammable range: Flammable gas between 3% and 100% (concentration in air).

Incompatibilities

Ethylene oxide reacts with water, strong acids, alkalies, and oxidizers; chlorides of iron, tin, and aluminum; and oxides of iron and aluminum.

Health Effects

- Ethylene oxide gas may produce immediate local irritation of the skin, eyes, and upper respiratory tract. At high concentrations, it may cause an immediate or delayed accumulation of fluid in the lungs.
- Inhalation of ethylene oxide can produce CNS depression, and in extreme cases, respiratory distress and coma.
- In some persons, ethylene oxide exposure may result in allergic sensitization, and future exposure may cause hives or a life-threatening allergic reaction.

Acute Exposure

Ethylene oxide is a highly reactive alkylating agent that reacts with many constituents of tissue resulting in cellular and tissue dysfunction and destruction. Evidence for human exposure to this chemical is the presence of ethylene oxide adducts of DNA and hemoglobin. Direct contact with liquid ethylene oxide or solutions of ethylene oxide produces immediate local irritation of skin and mucous membranes. Inhalation of high concentrations of ethylene oxide can cause CNS depression or pulmonary edema. The onset of symptoms may be delayed for up to 72 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

Initially, ethylene oxide affects the nose and throat. Concentrations as low as 200 ppm produce rapid onset of nose and throat irritation. Higher concentrations may cause inflammation of the lining in the trachea and bronchi, narrowing of the bronchi, and partial lung collapse. Accumulation of fluid in the lungs may evolve up to 72 hours after exposure. Severe respiratory distress may lead to cardiovascular collapse.

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

CNS

Ethylene oxide is a CNS depressant. High-dose exposures can result in diverse neurologic manifestations including seizures, loss of consciousness, and coma. Onset of neurologic signs and symptoms may be delayed 6 hours or more after exposure. Respiratory paralysis and delayed peripheral nerve damage have been reported after massive exposure.

Gastrointestinal

Exposure to low vapor concentrations of ethylene oxide can result in nausea and vomiting, which is often delayed.

Dermal

Skin contact with concentrated vapor or aqueous solutions of ethylene oxide may cause inflammation with redness of the skin, blisters, and crusted ulcerations. Initially, lesions are painless, but later can become painful and itchy. Skin reactions may be delayed 5 hours or more after exposure. Exposure to liquefied ethylene oxide can cause frostbite due to rapid evaporation and consequent cooling.

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

Ocular

Exposure to high concentrations of ethylene oxide vapor or eye splashes of concentrated solutions can cause eye irritation, inflammation of the eye membrane and corneal injury. Exposure to ethylene oxide has also been linked to the development of cataracts.

Potential Sequelae

Inhalation and skin exposure may cause exposed individuals to become sensitized to ethylene oxide which could result in allergic contact dermatitis following subsequent skin exposures. Skin burns may result in scarring or increased pigment. Cataracts may develop after a serious eye exposure. Repeated contact of patients with medical equipment sterilized with ethylene oxide (e.g., dialysis patients) may lead to sensitization and an immediate, life-threatening allergic reaction.

Inhalation does not normally lead to permanent neurological damage, but in one case, coma was followed by an irreversible parkinsonism.

Survivors of severe inhalation injury may suffer residual chronic lung disease.

Chronic Exposure

Chronic ethylene oxide exposure may cause delayed peripheral nerve damage (neuropathy), especially in the lower extremities. Although the results are inconclusive, some data suggest that chronic ethylene oxide exposure impairs cognitive function. Ethylene oxide may also damage the liver and kidneys. Skin allergy can occur, and some persons may become sensitized to the chemical. Cataracts and corneal burns have been reported from occupational exposure.

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

Carcinogenicity

The DHHS has determined that ethylene oxide may reasonably be anticipated to be a human carcinogen (NTP 2000). In animals, chronic exposure causes leukemia and intra-abdominal cancer, and there is some evidence that it increases the risk of leukemia in human workers. The International Agency for Research on Cancer has determined that ethylene oxide is carcinogenic to humans.

*Reproductive and
Developmental Effects*

Shepard's Catalog of Teratogenic Agents describes one study in which the spontaneous abortion frequency in hospital workers exposed to ethylene oxide during pregnancy was average for the general population (6.7%); however, the frequency for appropriate hospital controls was below average for the general population (5.6%). Ethylene oxide is 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.

Special consideration regarding the exposure of pregnant women is warranted, since ethylene oxide has been shown to be a teratogen and genotoxin; thus, medical counseling is recommended for the acutely exposed pregnant woman.

Prehospital Management

- **Victims exposed only to ethylene oxide gas do not pose substantial risks of secondary contamination to personnel outside the Hot Zone. Victims whose clothing or skin is contaminated with ethylene oxide liquid or solution can secondarily contaminate personnel by direct contact or through off-gassing vapor.**
- **Ethylene oxide can produce CNS depression and immediate eye, skin, and respiratory-tract irritation and may lead to seizures, coma, or respiratory paralysis. Noncardiogenic pulmonary edema may evolve up to 72 hours after exposure.**
- **There is no antidote for ethylene oxide poisoning. Treatment is supportive 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

Ethylene oxide is a severe respiratory tract and skin irritant and can also produce CNS depression and injuries.

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

Skin Protection: Chemical-protective clothing is recommended because ethylene oxide 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 ethylene oxide gas 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. If the exposure involved liquid ethylene oxide (ambient temperature below 51 °F) and there is evidence of wet clothing, remove and double-bag the contaminated clothing and personal belongings.

If liquid is spilled on the skin ethylene oxide should be washed off with water as quickly as possible. Flush exposed skin and hair with plain water for 3 to 5 minutes. 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 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.

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. If possible, seek assistance from a child separation expert.

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 have been exposed only to ethylene oxide gas 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.

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). Ethylene oxide 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.

Multi-Casualty Triage

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

Because some effects may occur several hours after exposure, all patients who have potential exposure should be transported to a medical facility for evaluation.

Emergency Department Management

- **Patients exposed only to ethylene oxide gas do not pose substantial risks of secondary contamination to personnel outside the Hot Zone. Patients whose clothing or skin is contaminated with ethylene oxide liquid or solution can secondarily contaminate personnel by direct contact or through off-gassing vapor. Patients do not pose serious contamination risks after contaminated clothing is removed and the skin is thoroughly washed.**
- **Ethylene oxide can produce CNS depression and immediate eye, skin, and respiratory tract irritation and may lead to seizures, coma, or respiratory paralysis. Non-cardiogenic pulmonary edema may evolve up to 72 hours after exposure.**
- **There is no antidote for ethylene oxide poisoning. Treatment is supportive of respiratory and cardiovascular functions.**

Decontamination Area

Previously decontaminated patients and patients exposed only to ethylene oxide gas 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 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). Ethylene oxide 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 in their own decontamination. Because contact with ethylene oxide may cause burns, ED staff should don chemical-resistant jumpsuits (e.g., of Tyvek or Saranex) or butyl rubber aprons, rubber gloves, and eye protection if the patient's clothing or skin is wet with ethylene oxide solution. After the patient has been decontaminated, no special protective clothing or equipment is required for ED personnel.

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

Flush exposed eyes with water for at least 15 minutes. Remove contact lenses if easily removable without additional trauma to the eye. An ophthalmic anesthetic, such as tetracaine, may be necessary to alleviate blepharospasm, and lid retractors may be required to allow adequate irrigation under the eyelids. If a corrosive material is suspected or if pain or injury is evident, continue irrigation while transferring the patient to the Critical Care Area.

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. Establish intravenous access in seriously ill patients if this has not already been done. Continuously monitor cardiac rhythm.

Patients who are comatose, hypotensive, or are having 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). Ethylene oxide 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 0.25–0.7 mL of 2.25% racemic epinephrine solution in 2.5 cc water, repeat every 20 minutes as needed, cautioning for myocardial variability.

Observe patients who are in respiratory distress for up to 72 hours and periodically reexamine their chests and order other appropriate studies. Follow up as clinically indicated.

Skin Exposure

If ethylene oxide 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 absorbed through the skin.

Eye Exposure

Ensure that adequate eye irrigation has been completed. Examine the eyes for corneal damage and treat appropriately. Immediately consult an ophthalmologist for patients who have corneal injuries.

Antidotes and Other Treatments

There is no antidote for ethylene oxide poisoning. Treatment is supportive of respiratory and cardiovascular functions.

Laboratory Tests

The diagnosis of acute ethylene oxide toxicity is primarily clinical, based on symptoms of CNS depression or irritation. Routine laboratory studies for all exposed patients include CBC, glucose, and electrolyte determinations. Depending on the initial evaluation, additional studies for patients exposed to ethylene oxide might include renal-function tests and liver-function tests. Chest radiography and pulse oximetry (or ABG measurements) are also recommended for severe inhalation exposure.

**Disposition and
Follow-up**

Consider hospitalizing patients who have evidence of systemic toxicity from any route of exposure.

Patients who have symptoms of severe respiratory distress or extensive skin burns should be admitted to an intensive care unit.

Delayed Effects

Because neurologic and respiratory signs and symptoms may not be evident for as long as 72 hours after exposure, patients suspected to have serious exposure should be observed and reexamined periodically. Patients who have bronchospasm or pulmonary edema should be admitted and watched for signs of impending respiratory failure and treated accordingly.

Patient Release

Patients who have mild exposure and those who are asymptomatic initially should be observed for 4 to 6 hours, then discharged if no symptoms occur during this period. Advise discharged patients to seek medical care promptly if symptoms develop (see the *Ethylene Oxide—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.

Inhalation and skin exposure may cause dermatitis and skin burns may result in scarring or increased pigmentation. A single acute exposure does not normally lead to permanent neurological damage, but in one case, coma was followed by an irreversible parkinsonism. Survivors of severe inhalation injury may suffer residual chronic lung disease. Cataracts may develop after a serious eye exposure.

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.

Ethylene Oxide ($[\text{CH}_2]_2\text{O}$) Patient Information Sheet

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

What is ethylene oxide?

Ethylene oxide is a colorless liquid at temperatures below 51 °F and a colorless gas at room temperature. It is used in the sterilization of hospital supplies and cosmetics; as a fumigant for such products as spices, tobacco, furs, and bedding; and in the manufacture of antifreeze and other chemicals. At high concentrations, ethylene oxide may have a sweet, ether-like odor. However, dangerous exposures may occur at levels too low to smell.

What immediate health effects can result from ethylene oxide: exposure?

Most people are exposed to ethylene oxide by breathing the gas. Exposure to small amounts can cause eye, nose, and throat irritation; and skin rash. More serious exposure can cause severe breathing difficulty, skin burns, weakness, twitching, convulsions, and coma. Generally, the more serious the exposure, the more severe the symptoms.

Can ethylene oxide poisoning be treated?

There is no antidote for ethylene oxide, but its effects can be treated, and most exposed persons get well. Persons who have had serious exposures may need to be hospitalized.

Are any future health effects likely to occur?

A single, small exposure from which a person quickly recovers is not likely to cause delayed or long-term effects. After a severe exposure, symptoms may not develop for 12 hours (see *Follow-up Instructions*). Ethylene oxide is suspected of causing cancer of the blood, and birth defects may occur in infants whose mothers were repeatedly and excessively exposed during pregnancy.

What tests can be done if a person has been exposed to ethylene oxide?

Specific tests for the presence of ethylene oxide in blood or urine generally are not useful to the doctor. If a severe exposure has occurred, blood and urine analyses and other tests may show whether the blood, heart, lungs, liver, or kidneys have been injured. Testing is not needed in every case.

Where can more information about ethylene oxide be found?

More information about ethylene oxide 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:
 - difficulty breathing, shortness of breath, or chest pain
 - increased pain or a discharge from eyes
 - increased redness or pain, or a pus-like discharge in the area of a skin burn
 - fever
 - numbness or weakness in the arms or legs
 - unexplained drowsiness, fatigue, or headache
 - stomach pain, vomiting, or diarrhea

- 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 _____