

Crotonaldehyde (C₄H₆O)
CAS 4170-30-3; CAS 123-73-9 (*trans* isomer);
CAS 15798-64-8 (*cis* isomer); UN 1143

Synonyms include beta-methylacrolein; propylene aldehyde; ethylene propionate; crotonic aldehyde; but-2-enal; 2-butenal; crotonal; topanel; methyl acrolein; butenal; crotonaldehyde inhibited; (E)-crotonaldehyde; (E)-2-butenal; trans-2-butenal.

- ▼ **Persons exposed only to crotonaldehyde vapor do not pose secondary contamination risks. Persons whose clothing or skin is contaminated with liquid crotonaldehyde can secondarily contaminate others by direct contact or off-gassing vapor.**
- ▼ **At room temperature, crotonaldehyde is a clear, colorless to straw-colored liquid with a pungent, suffocating odor. It is highly flammable and burns to produce toxic gases (carbon dioxide and carbon monoxide). It is volatile, producing toxic concentrations at room temperature. Vapors may travel to a source of ignition and flash back. The odor of crotonaldehyde provides adequate warning of hazardous concentrations.**
- ▼ **Crotonaldehyde is highly toxic by all routes. Exposure causes inflammation and irritation of the skin, respiratory tract, and mucous membranes. Delayed pulmonary edema may occur after inhalation. Systemic effects occur in animals after oral exposure, but have not been reported in humans.**

Description

Crotonaldehyde exists in two isomeric forms (*cis* and *trans*) that have similar properties and effects. Crotonaldehyde is produced commercially as a mixture of the two isomers (>95% *trans* and <5% *cis*). At room temperature, the mixture is a clear, colorless liquid that turns yellow upon contact with air or exposure to light. It has a pungent, suffocating odor. Crotonaldehyde should be stored in a cool, dry, well-ventilated area in tightly sealed containers. It is very flammable and may polymerize violently. Crotonaldehyde should be stored separately from alkaline materials such as caustics, ammonia, organic amines, or mineral acids, strong oxidizers, and oxygen. Crotonaldehyde is soluble in water, alcohol, ether, acetone, and benzene.

Routes of Exposure

Inhalation

Inhaled crotonaldehyde is highly toxic. Crotonaldehyde is irritating to the upper respiratory tract even at low concentrations. Its odor threshold of 0.035 to 0.12 ppm is lower than the OSHA permissible exposure limit (2 ppm); thus, odor provides an adequate warning of potentially hazardous concentrations. Crotonaldehyde vapor is

heavier than air, but asphyxiation in enclosed, poorly ventilated, or low-lying areas is unlikely due to its strong odor.

Children exposed to the same levels of crotonaldehyde vapor as adults may receive a larger dose because they have greater lung surface area:body weight ratios and higher minute volume: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 crotonaldehyde vapor found nearer to the ground.

Skin/Eye Contact

Crotonaldehyde is highly toxic by the dermal route. Direct contact with liquid crotonaldehyde causes rapid and severe eye and skin irritation or burns. Exposure to vapor produces inflammation of mucous membranes and it is a potent lacrimator.

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

Ingestion

No information was located pertaining to ingestion of crotonaldehyde by humans. Crotonaldehyde is very irritating; thus, ingestion would probably produce chemical burns of the lips, mouth, throat, esophagus, and stomach. In animal studies, ingestion has led to systemic toxicity.

Sources/Uses

Crotonaldehyde is generally produced by aldol condensation of acetaldehyde, followed by dehydration. A process involving direct oxidation of 1,3-butadiene to crotonaldehyde with palladium catalysis has also been reported. Crotonaldehyde is produced during the combustion of paper, cotton, and plastics, and is a component of cigarette smoke.

Crotonaldehyde was formerly used in the manufacture of n-butanol, but currently, the most extensive use of crotonaldehyde is in the manufacture of sorbic acid. Crotonaldehyde has also been used as a warning agent in fuel gases, in the preparation of rubber accelerators, in leather tanning, as an alcohol denaturant, and as a stabilizer for tetraethyl-lead.

Standards and Guidelines

OSHA PEL (permissible exposure limit) = 2 ppm.

NIOSH IDLH (immediately dangerous to life or health) = 50 ppm.

AIHA ERPG-2 (maximum airborne concentration below which it is believed that nearly all persons could be exposed for up to 1 hour

without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action) = 10 ppm.

Physical Properties

Description: Clear, colorless liquid that becomes yellow with exposure to light or air.

Warning properties: Sharp, pungent odor at 0.035 to 0.12 ppm; adequate warning of acute or chronic exposures.

Molecular weight: 70.09 daltons

Boiling point (760 mm Hg): 215.6 °F (102 °C)

Freezing point: -105.7 °F (-76.5 °C)

Vapor pressure: 19 mm Hg at 68 °F (20 °C)

Gas density: 2.41 (air = 1)

Specific gravity: 0.85 (water = 1)

Water solubility: 181 g/L at 20 °C

Flammability: 55 °F (13 °C)

Flammable range: 2.1% to 15.5% (concentration in air)

Incompatibilities

Crotonaldehyde reacts with caustics, ammonia, organic amines, or mineral acids, strong oxidizers, and oxygen.

Health Effects

- ▼ **Crotonaldehyde is severely irritating to skin, eyes, and mucous membranes. Inhalation of crotonaldehyde may result in respiratory distress and delayed pulmonary edema. Contact with the skin or eyes produces irritation and lacrimation, and can result in chemical burns.**
- ▼ **The mechanism by which crotonaldehyde produces toxic symptoms is not known, but the compound is highly reactive. No information was found as to whether the health effects of crotonaldehyde in children are different than in adults. Exposure to crotonaldehyde produces severe respiratory problems and individuals with pre-existing breathing difficulties or skin disease may be more susceptible to its effects.**

Acute Exposure

The mechanism by which crotonaldehyde produces toxic symptoms is not known, but the compound is highly reactive, cross-links DNA, and inhibits the activities of some enzymes *in vitro*, including cytochrome P450 and aldehyde dehydrogenase. *In vitro* treatment of human polymorphonuclear leukocytes with crotonaldehyde produced a dose-related decrease in surface sulfhydryl and soluble sulfhydryl groups and inhibition of superoxide production. Onset of irritation is immediate, but pulmonary edema may be delayed.

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

Respiratory

Crotonaldehyde produces irritation of the respiratory-tract. Relatively high-concentration inhalation can lead to pulmonary edema.

Clinical cases of sensitization have been reported.

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

Dermal

Crotonaldehyde is a skin irritant. Contact with the liquid may cause second- and third-degree skin burns. Skin contact may also result in allergic contact dermatitis.

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

Ocular/Ophthalmic Crotonaldehyde liquid or vapor can cause eye irritation and damage to the cornea.

Gastrointestinal No cases involving ingestion were located. Because crotonaldehyde is a known irritant, it is likely to cause burns of the lips, mouth, throat, esophagus, and stomach.

Potential Sequelae After an acute, relatively high-concentration exposure, persons may become sensitized to crotonaldehyde.

Chronic Exposure Apart from rare cases of sensitization, no adverse effects in humans chronically exposed to relatively low concentrations of crotonaldehyde have been reported.

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

Carcinogenicity The Department of Health and Human Services has determined that crotonaldehyde may possibly be a human carcinogen. The International Agency for Research on Cancer has determined that crotonaldehyde is not classifiable as to its carcinogenicity to humans.

Reproductive and Developmental Effects No studies were located that address reproductive or developmental effects of crotonaldehyde in humans. Crotonaldehyde can cause degeneration of spermatocytes in mice. No information was found as to whether crotonaldehyde crosses the placenta, but it has been measured in breast milk. Crotonaldehyde 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 teratogenic effects from acute exposure have been reported.

Prehospital Management

- ▼ **Victims exposed only to crotonaldehyde vapor do not pose contamination risks to rescuers. Victims whose clothing or skin is contaminated with liquid crotonaldehyde can secondarily contaminate response personnel by direct contact or by off-gassing vapor.**
- ▼ **Crotonaldehyde is a direct irritant to mucous membranes, skin, eyes, and the respiratory system. Acute inhalation exposure may lead to respiratory distress and noncardiogenic pulmonary edema.**
- ▼ **There is no antidote for crotonaldehyde. Treatment consists of 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

Crotonaldehyde is highly toxic via all routes, and it is severely irritating to the eyes, mucous membranes, respiratory tract, and skin. Crotonaldehyde is highly flammable, can form explosive mixtures with air, and burns to produce irritating, corrosive, and/or toxic gases. Crotonaldehyde vapor may travel to a source of ignition and flash back.

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

Skin Protection: Chemical-protective clothing is recommended because crotonaldehyde can cause skin irritation, burns, and sensitization. Fully encapsulating, vapor protective clothing should be worn to deal with spills or leaks with no fire.

ABC Reminders

Quickly establish 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 anxiety in victims with chemically-induced acute disorders, especially children who may suffer separation anxiety if separated from a parent or other adult.

Decontamination Zone

Patients exposed only to crotonaldehyde 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 establish 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 copious amounts of water. Use caution to avoid hypothermia when decontaminating victims, particularly children or the elderly. Use blankets or warmers after decontamination as needed.

Flush exposed or irritated eyes with tepid water 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 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 a dose of 1 g/kg (infant, child, and adult dose). 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.

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 vapor pose no serious risks of secondary contamination to rescuers. In such cases, Support Zone personnel require no specialized protective gear.

ABC Reminders

Quickly establish 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. 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**. If the victim is alert, asymptomatic, and has a gag reflex, administer a slurry of activated charcoal at a dose of 1 g/kg (infant, child, and adult dose) 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. If the victim is symptomatic, delay decontamination until other emergency measures have been instituted.

Advanced Treatment

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

Treat patients who have bronchospasm with an aerosolized bronchodilator such as albuterol. 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, 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.

If evidence of shock or hypotension is observed, begin fluid administration. For adults with systolic pressure less than 80 mmHg, bolus perfusion of 1,000 mL/hour intravenous saline or lactated Ringer's solution may be appropriate. Higher adult systolic pressures may necessitate lower perfusion rates. For children with compromised perfusion, administer a 20 mL/kg bolus of normal saline over 10 to 20 minutes, then infuse at 2 to 3 mL/kg/hour.

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 crotonaldehyde 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 crotonaldehyde 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.**
- ▼ **Crotonaldehyde is irritating to mucous membranes, skin, eyes, and the respiratory tract. Acute inhalation exposure may lead to respiratory distress and noncardiogenic pulmonary edema.**
- ▼ **There is no antidote for crotonaldehyde. Treatment consists of respiratory and cardiovascular support.**

Decontamination Area

Unless previously decontaminated, all patients suspected of contact with crotonaldehyde liquid and all victims with skin or eye irritation require decontamination as described below. Because crotonaldehyde reacts with the skin, don gloves and/or protective clothing before treating patients. All other patients may be transferred immediately to the Critical Care Area.

Be aware that use of protective equipment by the provider may cause anxiety, particularly 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 that affect 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 an aerosolized bronchodilator such as albuterol. 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, 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. Remove and double-bag contaminated clothing and all personal belongings.

Because crotonaldehyde can 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. After the patient has been decontaminated, no special protective clothing or equipment is required for ED personnel.

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 to avoid hypothermia when decontaminating victims, particularly children or the elderly. Use blankets or warmers after decontamination as needed.

Flush exposed eyes with plain tepid water for at least 15 minutes. Remove contact lenses if easily removable without additional trauma to the eye. 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 a dose of 1 g/kg (infant, child, and adult dose) 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 an aerosolized bronchodilator such as albuterol. 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, repeat every 20 minutes as needed, cautioning for myocardial variability.

Skin Exposure

If the skin was in contact with liquid crotonaldehyde, chemical burns may occur; 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. If the victim is alert, asymptomatic, and has a gag reflex, administer a slurry of activated charcoal at a dose of 1 g/kg (infant, child, and adult dose) 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 cricothyrotomy. Gastric lavage is useful in certain circumstances to remove caustic material and prepare for endoscopic examination. Consider gastric lavage with a small nasogastric (NG) 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 crotonaldehyde. Treatment is supportive of respiratory and cardiovascular 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 crotonaldehyde.

Delayed Effects

Pulmonary edema may be delayed 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 *Crotonaldehyde—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. In rare cases individuals may be permanently sensitized and may need to be removed from future work with crotonaldehyde; patients should consult an occupational medicine or pulmonary specialist before returning to work that entails exposure to crotonaldehyde.

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 Appendix III for a list of agencies that may be of assistance.

Crotonaldehyde Patient Information Sheet

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

What is crotonaldehyde?

Crotonaldehyde is a colorless to pale-yellow liquid with a strong, pungent odor. It is used most extensively in the manufacture of sorbic acid, but has also been used as a warning agent in fuel gases, in the preparation of rubber accelerators, in leather tanning, as an alcohol denaturant, and as a stabilizer for tetraethyl-lead.

What immediate health effects can be caused by exposure to crotonaldehyde?

Low levels of crotonaldehyde 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 crotonaldehyde 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 crotonaldehyde poisoning be treated?

There is no antidote for crotonaldehyde, 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?

In rare cases, after exposure to crotonaldehyde, certain persons can become sensitized so that even small exposures to crotonaldehyde or other irritants can trigger skin irritation. Therefore, it is important to tell your doctor that you have been exposed to crotonaldehyde. The Department of Health and Human Services has determined that crotonaldehyde may possibly be a human carcinogen.

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

Specific tests for the presence of crotonaldehyde 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. Testing is not needed in every case; however, lung complications such as pulmonary edema may develop some time after exposure.

Where can more information about crotonaldehyde be found?

More information about crotonaldehyde 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
- 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 _____