

Phosphine (PH₃)**CAS 7803-51-2; UN 2199*****Also: Aluminum Phosphide (CAS 20859-73-B; UN 1397)
and Zinc Phosphide (CAS 1314-84-7; UN 1714)***

Synonyms of phosphine include hydrogen phosphide, phosphorus hydride, phosphorus trihydride, and phosphoretted hydrogen.

Persons exposed only to phosphine gas do not pose substantial risks of secondary contamination; however, persons exposed to solid phosphides may present such risks. Metallic phosphides on clothes, skin, or hair can react with water or moisture to generate phosphine gas. Vomitus containing phosphides can also off-gas phosphine.

Phosphine is extremely flammable and explosive; it may ignite spontaneously on contact, with air. Phosphine has a fish- or garlic-like odor, but may not provide adequate warning of hazardous concentrations. When phosphine burns it produces a dense white cloud of phosphorus pentoxide, P₂O₅ fume. This fume is a severe respiratory tract irritant due to the rapid formation of orthophosphoric acid, H₃PO₄, on contact with water.

- **Phosphine is a respiratory tract irritant that attacks primarily the cardiovascular and respiratory systems causing peripheral vascular collapse, cardiac arrest and failure, and pulmonary edema.**

Most phosphine exposures occur by inhalation of the gas or ingestion of metallic phosphides, but dermal exposure to phosphides can also cause systemic effects.

Description

Phosphine is a colorless, flammable, and toxic gas with an odor of garlic or decaying fish. It can ignite spontaneously on contact with air. The gas is shipped as a liquefied, compressed gas.

Aluminum phosphide (Celphos, Phostoxin, Quick Phos) and zinc phosphide are solids used as grain fumigants and as a rodenticide, respectively. Zinc phosphide is often mixed with bait food such as cornmeal, which can be a danger to pets and children. When phosphides are ingested or exposed to moisture, they release phosphine gas. Phosphine gas may also be released when acetylene is made by the action of water on calcium carbide which is contaminated with calcium phosphide as is commonly the case.

Routes of Exposure

Inhalation

Inhalation is the major route of phosphine toxicity. **Odor is not an adequate indicator of phosphine's presence and may not provide reliable warning of hazardous concentrations.** The OSHA PEL of 0.3 ppm is within the range of reported odor thresholds. Phosphine is heavier than air and may cause asphyxiation in enclosed, poorly ventilated, or low-lying areas.

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

Skin/Eye Contact

Phosphides may be absorbed dermally, especially through broken skin, and can cause systemic toxicity by this route. Phosphine gas produces no adverse effects on the skin or eyes, and contact does not result in systemic toxicity. Contact with liquefied or compressed phosphine gas may cause frostbite.

Ingestion

Ingestion of phosphine is unlikely because it is a gas at room temperature. Ingestion of metallic phosphides can produce phosphine intoxication when the solid phosphide contacts gastric acid.

Sources/Uses

Phosphine is produced when metallic phosphides (e.g., aluminum, calcium, or zinc phosphides) react with water or acid. Both aluminum and zinc phosphides are used as rodenticides. Phosphine may be produced during the generation of acetylene gas. Phosphine is used in the semiconductor industry to introduce phosphorus into silicon crystals as an intentional impurity. Phosphine is also used as a fumigant and a polymerization initiator.

Standards and Guidelines

OSHA PEL (permissible exposure limit) = 0.3 ppm (averaged over an 8-hour workshift)

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

ERPG-2 (Emergency Response Planning Guideline) (maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious adverse health effects or symptoms that could impair an individual's ability to take protective action) = 0.5 ppm

Physical Properties

Description: Colorless gas; odor of garlic or decaying fish

Warning properties: Inadequate; nonirritating and garlic-like or fishy odor at 1 to 3 ppm.

Molecular weight: 34.0 daltons

Melting point: -209 °F (-134 °C)

Boiling point (760 mm Hg): = -126 °F (- 87.7 °C)

Vapor pressure: >760 mm Hg at 68 °F (20 °C)

Gas density: 1.17 (air = 1)

Water solubility: Slightly water soluble (0.3% at 68 °F) (20 °C)

Flammability: Extremely flammable and explosive; may ignite spontaneously on contact with air.

Incompatibilities

Phosphine reacts with air, oxidizers, chlorine, acids, moisture, halogenated hydrocarbons, and copper.

Health Effects

Symptoms of phosphine intoxication are primarily related to the cardiovascular and pulmonary systems and may include restlessness, irritability, drowsiness, tremors, vertigo, diplopia, ataxia, cough, dyspnea, retrosternal discomfort, abdominal pain, and vomiting.

The same symptoms may occur after ingestion of phosphide salts. Multiple signs may be seen representing various stages of cardiovascular collapse.

Phosphine interferes with enzymes and protein synthesis, primarily in the mitochondria of heart and lung cells. As a result, effects may include hypotension, reduction in cardiac output, tachycardia, oliguria, anuria, cyanosis, pulmonary edema, tachypnea, jaundice, hepatosplenomegaly, ileus, seizures, and diminished reflexes.

Acute Exposure

Phosphine interferes with enzymes and protein synthesis, primarily in the mitochondria of heart and lung cells. Metabolic changes in heart muscle cause cation disturbances that alter transmembrane potentials. Ultimately, cardiac arrest, peripheral vascular collapse and pulmonary edema can occur. Pulmonary edema and pneumonitis are believed to result from direct cytotoxicity to the pulmonary cells. In fatal cases, centrilobular necrosis of the liver has also been reported.

Most deaths occur within the first 12 to 24 hours after exposure and are cardiovascular in origin. If the patient survives the initial 24 hours, the ECG typically returns to normal, indicating that heart damage is reversible. Deaths after 24 hours are usually due to liver failure.

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

CNS

Phosphine is a CNS depressant. Initial effects may include headache, restlessness, dizziness, loss of feeling, impaired gait, trembling of the extremities during movement, and double vision. Severe exposure can cause seizures and coma.

Respiratory

Toxicity that occurs after inhalation is characterized by chest tightness, cough, and shortness of breath. Severe exposure can cause accumulation of fluid in the lungs, which may have a delayed onset of 72 hours or more after exposure. Pulmonary symptoms can

also result from ingestion of metallic phosphides (e.g., aluminum or zinc phosphide).

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

<i>Cardiovascular</i>	Cardiovascular manifestations include hypotension, reduction in cardiac output, tachycardia, irregular heart beat, or cardiac arrest. Laboratory tests may reveal abnormal myocardial enzymes. Phosphine affects the small peripheral vessels, causing a profound decrease in systemic vascular resistance. Vascular changes may lead to marked low blood pressure that does not respond well to pressor agents.
<i>Gastrointestinal</i>	Gastrointestinal symptoms are usually the first to occur after exposure. Symptoms may include nausea, vomiting, abdominal pain, and diarrhea.
<i>Hepatic</i>	Typically, liver injury does not become evident until 48 to 72 hours after exposure. Findings may include jaundice, enlarged liver, elevated serum transaminases, and increased bilirubin in the blood.
<i>Renal</i>	Blood and protein in the urine, and acute kidney failure can occur.
<i>Electrolyte</i>	Analysis of blood gases may reveal combined respiratory and metabolic acidosis. Also, there have been reports of significant hypomagnesemia and hypermagnesemia associated with massive focal myocardial damage.
<i>Potential Sequelae</i>	Although most survivors of acute phosphine exposure show no permanent disabilities, damage due to insufficient blood supply to the heart and brain have been reported. Subacute poisoning resulting from exposure for a few days may cause reactive airways dysfunction syndrome (RADS) months later.
Chronic Exposure	Chronic exposure to very low concentrations may result in anemia, bronchitis, gastrointestinal disturbances, and visual, speech, and motor disturbances. Chronic exposure may be more serious for children because of their potential longer latency period.
<i>Carcinogenicity</i>	The EPA has determined that phosphine is not classifiable as to its human carcinogenicity.

*Reproductive and
Developmental Effects*

Phosphine is not contained in the TERIS or Reprotex databases, nor is it mentioned in *Shepards Catalog of Teratogenic Agents*. Phosphine 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 form acute exposure are known.

Prehospital Management

Victims exposed only to phosphine gas do not pose substantial risks of secondary contamination to personnel outside the Hot Zone. Victims exposed to solid phosphides, which react with moisture to produce phosphine, can pose such risks if phosphides are on clothes, skin, or hair. Protect personnel through the use of rubber gloves and aprons.

Phosphine is a multisystem toxicant that can cause pulmonary irritation, CNS depression, and cardiovascular collapse.

There is no antidote for phosphine poisoning. 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

Phosphine is a highly toxic systemic poison and a severe respiratory tract irritant.

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

Skin Protection: Chemical-protective clothing is not generally required because phosphine gas is not absorbed through the skin, and skin irritation is unlikely. Use rubber gloves and aprons with victims exposed to phosphides.

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.

Brush powder from the skin, hair, and clothes of victims before leaving the Hot Zone.

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

Victims exposed only to phosphine gas do not need decontamination. They may be transferred immediately to the Support Zone. Victims exposed to metallic phosphides 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. Brush all visible particles from clothes, skin, and hair. Remove and double-bag contaminated clothing and personal belongings.

Thoroughly flush exposed skin and hair with water for 3 to 5 minutes, then wash with mild soap. Rinse thoroughly with water. Use caution to avoid hypothermia when decontaminating children or the elderly. Use blankets or warmers when appropriate.

If phosphides have been ingested, **do not induce emesis**. Phosphides will release phosphine in the stomach; therefore, watch for signs similar to those produced by phosphine inhalation. Administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g). A soda can and a straw may be of assistance when offering charcoal to a child.

Consider appropriate management of chemically contaminated children at the exposure site. Also, provide reassurance to the child during decontamination, especially if separation from a parent occurs. 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 exposed to metallic phosphides have been decontaminated properly (see *Decontamination Zone* above). Victims who have been exposed only to phosphine gas or who have

undergone decontamination pose no serious risks of secondary contamination. Support Zone personnel require no specialized protective gear in such cases.

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.

If phosphides have been ingested, **do not induce emesis**. If it has not been given previously and the patient is alert and able to swallow, administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g). A soda can and a straw may be of assistance when offering charcoal to a child. Phosphides will release phosphine in the stomach; therefore, watch for signs similar to those produced by phosphine inhalation.

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).

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

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

If evidence of shock or hypotension is observed begin fluid administration. For adults, bolus 1,000 mL/hour intravenous saline or lactated Ringer's solution if blood pressure is under 80 mm Hg; if systolic pressure is over 90 mm Hg, an infusion rate of 150 to 200 mL/hour is sufficient. 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 metallic phosphides have 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 further advice regarding triage of multiple victims.

Because it is difficult to determine at the scene which patients have had the most serious inhalation exposure, and because some systemic symptoms may be delayed for up to 72 hours after exposure, all patients who have potentially significant exposures should be transported to a medical facility for evaluation. Those who have had massive exposures and those who have experienced a garlic- or fish-like odor should be transported first.

All patients who have ingested phosphides should be transported to a medical facility without delay.

Emergency Department Management

Victims exposed only to phosphine gas do not pose substantial risks of secondary contamination to personnel outside the Hot Zone. However, solid phosphides, which react with moisture to produce phosphine, may present secondary contamination risks on clothes, skin, or hair.

Phosphine is a multisystem toxicant that causes acute pulmonary irritation, CNS depression, and cardiovascular collapse. Fatal outcomes after the initial 24 hours are usually due to hepatic or renal failure.

There is no antidote for phosphine poisoning. Treatment consists of support of respiratory and cardiovascular functions.

Decontamination Area

Previously decontaminated patients and patients exposed only to phosphine gas 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. Rubber gloves and aprons should be used with non-decontaminated victims exposed to phosphides.

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).

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.

Correct acidosis in the patient who has coma, seizures or cardiac dysrhythmias by administering intravenously sodium bicarbonate (adult dose = 1 ampule; pediatric dose = 1 Eq/kg). Further bicarbonate therapy should be guided by ABG measurements.

Basic Decontamination

Patients who are able may assist with their own decontamination. If the patient has been exposed to solid phosphides, brush the powder from skin, hair, and clothes. Remove and double-bag the patient's clothing and personal belongings. Flush the skin and hair with water (preferably under a shower). Remove contact lenses if easily removable without additional trauma to the eye. Use caution to avoid hypothermia when decontaminating children or the elderly. Use blankets or warmers when appropriate.

In cases of phosphide ingestion, **do not induce emesis**. If activated charcoal has not been given previously, administer a slurry of it at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g). Phosphides will release phosphine in the stomach; therefore, watch for signs similar to those produced by phosphine inhalation. (More information is provided in *Ingestion Exposure* under *Critical Care Area* below).

Critical Care Area

Be certain that patients who have ingested solid phosphides have been decontaminated as described above. Decontamination is not necessary for patients exposed only to phosphine gas.

ABC Reminders

Evaluate and support airway, breathing, and circulation as in *ABC Reminders* above. Watch for signs of airway compromise. Monitor cardiac rhythm.

Hypotension may develop and may respond poorly to pressor agents.

Patients who are comatose or have seizures should be treated in the conventional manner. Correct acidosis in the patient who has coma, seizures or cardiac dysrhythmias by administering intravenously sodium bicarbonate (adult dose = 1 ampule; pediatric dose = 1 Eq/kg).

Inhalation Exposure

Symptomatic patients should receive supplemental oxygen for dyspnea and should be observed for at least 72 hours with repeated

chest examinations and other appropriate studies. Follow-up as clinically indicated.

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).

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.

Ingestion Exposure

Remove phosphides from the stomach as soon as possible because most phosphides release phosphine gas on contact with water or acids. Administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g), if it has not been given previously. A mineral oil cathartic (100 mL) is recommended rather than a saline cathartic. Watch for signs and symptoms similar to those produced by inhalation exposure; treat accordingly.

Gastric lavage with a potassium permanganate solution (1:10,000) is recommended if ingestion occurred. Permanganate oxidizes phosphine in the stomach to form phosphate, thus reducing the available phosphine.

Antidotes and Other Treatments

There is no antidote for phosphine poisoning. Treatment consists of supportive measures. Hemodialysis is recommended only if renal failure develops. The effectiveness of exchange transfusions is questionable. The value of steroids for phosphine-exposed patients who develop acute pulmonary symptoms has not been proven.

Laboratory Tests

Routine laboratory studies for all exposed patients include CBC, glucose, and electrolyte determinations. Additional studies for patients exposed to phosphine include ECG monitoring, renal function tests, and liver-function tests. Chest radiography, pulse oximetry (or ABG measurements), and PFI3 are recommended to establish baseline for pulmonary status. Serial myocardial enzyme levels may also be helpful.

Phosphine is metabolized to phosphite and hypophosphite, which are excreted in the urine. Although analysis for these metabolites is not clinically useful in an emergency setting, urine samples can be collected and frozen for future analysis, particularly if questions on the nature or extent of exposure are likely.

**Disposition and
Follow-up**

Decisions to admit or discharge a patient should be based on exposure history, physical examination, and test results.

Delayed Effects

Because onset of pulmonary edema and liver damage may be delayed for 72 hours or more after exposure, all patients who have significant exposure should be admitted and observed carefully.

Patient Release

Asymptomatic patients who have normal initial examinations, minimal exposure, and no signs of toxicity after observation for 4 to 6 hours may be discharged with instructions to return to the ED if symptoms develop (see the *Phosphine—Patient Information Sheet* below).

Follow-up

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

Patients exposed to phosphine should be monitored for pulmonary dysfunction.

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.

Phosphine Patient Information Sheet

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

What is phosphine? How are phosphides related?

Phosphine is a toxic gas that has no color and smells like garlic or fish. A serious exposure to phosphine could occur, however, even if a person does not smell it. Phosphine is used widely in the semiconductor industry. Phosphine may be encountered in grain storage silos where it has been used as a fumigant, or zinc phosphide has been put down as a rat poison.

Certain pesticides containing zinc phosphide or aluminum phosphide can release phosphine when they come in contact with water or acid. The phosphine formed in the stomach when these solid phosphides are swallowed can result in phosphine poisoning.

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

Exposure to even small amounts of phosphine can cause headache, dizziness, nausea, vomiting, diarrhea, drowsiness, cough, and chest tightness. More serious exposure can cause shock, convulsions, coma, irregular heartbeat, and liver and kidney damage. Generally, the more serious the exposure, the more severe the symptoms.

Can phosphine poisoning be treated?

There is no antidote for phosphine, but its effects can be treated, and most exposed 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, symptoms usually begin immediately but might not appear for 72 hours or more.

Some severely exposed persons have experienced long-term brain, heart, lung, and liver injury.

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

There are no specific blood or urine tests for phosphine itself. Breakdown products of phosphine can be measured in urine, but the result of this test is generally not useful to the doctor. If a severe exposure has occurred, blood and urine analyses and other tests may also show whether the brain, lungs, heart, liver, or kidneys have been damaged. Testing is not needed in every case.

Where can more information about phosphine be found?

More information about phosphine and phosphides 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 or wheezing
 - difficulty breathing or shortness of breath
 - chest pain or tightness
 - headache, dizziness, tremor, or double vision
 - difficulty walking
 - nausea, vomiting, diarrhea, or stomach pain

- 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 _____