

1,4-Dichlorobenzene (C₆H₄Cl₂)

CAS 106-46-7; UN 1592, 3077

Synonyms include *p*-dichlorobenzene, *p*-dichlorobenzol, *para*-dichlorobenzene, *p*-chlorophenyl chloride, PDB, and PDCB.

- **Persons exposed only to 1,4-dichlorobenzene vapor do not pose risk of secondary contamination to others. Persons whose clothing or skin is contaminated with liquid 1,4-dichlorobenzene can cause secondary contamination by direct contact or through off-gassing vapor.**
- **1,4-Dichlorobenzene is a colorless to white combustible crystalline solid at room temperature that slowly vaporizes when exposed to air and has a penetrating, mothball-like odor. 1,4-Dichlorobenzene vapors are heavier than air and may accumulate in low-lying areas. Odor detection may not provide adequate warning of hazardous concentrations of 1,4-dichlorobenzene.**
- **1,4-Dichlorobenzene is absorbed rapidly and distributed extensively after inhalation and ingestion. Dermal absorption does not appear to be a major route of absorption. 1,4-Dichlorobenzene has been detected in breast milk.**

Description

At room temperature, 1,4-dichlorobenzene is a colorless to white combustible crystalline solid that slowly vaporizes when exposed to air. 1,4-Dichlorobenzene has a penetrating mothball-like odor. 1,4-Dichlorobenzene is partially soluble in water and soluble in organic solvents including alcohol, ether, benzene, chloroform, and carbon disulfide. 1,4-Dichlorobenzene vapor concentrations ranging from 6.2 to 16% in air are explosive in the presence of an ignition source. When 1,4-dichlorobenzene is heated to decomposition, it produces toxic hydrogen chloride gas, a severe pulmonary irritant. 1,4-Dichlorobenzene should be stored at ambient temperature in a well-ventilated area away from heat and sources of ignition such as smoking and open flames (HSDB 2007; ICSC 2003; NIOSH 2005; NJDHSS 1998).

Routes of Exposure

Inhalation

Inhalation is the most prevalent route of significant exposure to 1,4-dichlorobenzene, which is readily absorbed from the lungs. Acute exposure to 1,4-dichlorobenzene vapors may result in irritation of the eyes and respiratory

tract. The odor threshold for 1,4-dichlorobenzene is 0.18 ppm, but varies widely and may not always warn of potentially hazardous concentrations. The vapor is heavier than air and can collect to toxic levels in poorly ventilated or low-lying spaces (ATSDR 2006; HSDB 2007).

Children exposed to the same levels of 1,4-dichlorobenzene vapor as adults may receive larger doses because they have greater lung surface area:body weight ratios and higher 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 benzene vapor found nearer to the ground.

Skin/Eye Contact

1,4-Dichlorobenzene may cause ocular irritation. Prolonged contact with the skin may result in a burning sensation in the absence of dermal irritation. Because absorption across intact skin is slow, systemic toxicity is unlikely (ATSDR 2006; HSDB 2007).

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

Ingestion

Gastrointestinal absorption of 1,4-dichlorobenzene is rapid. Ingestion of vary large amounts of 1,4-dichlorobenzene could result in liver damage (ATSDR 2006; HSDB 2007).

Sources/Uses

1,4-Dichlorobenzene is produced by reacting liquid benzene with gaseous chlorine in the presence of a catalyst at moderate temperature and atmospheric pressure. 1,4-Dichlorobenzene has principally been used as a space deodorant for toilets and refuse containers and a fumigant for control of moths, molds, and mildews. 1,4-Dichlorobenzene is also used in the production of polyphenylene sulphide resin, as an intermediate in the production of other chemicals such as 1,2,4-trichlorobenzene, and in control of blue mold in tobacco seed beds and tree-boring insects and ants (ATSDR 2006; HSDB 2007).

Standards and Guidelines

OSHA PEL (permissible exposure limit) = 75 ppm (averaged over an 8-hour workshift) (OSHA 1999).

Physical Properties

Description: colorless to white combustible crystalline solid that tends to sublime (ATSDR 2006; NIOSH 2005)

Warning properties: odor threshold 0.18 ppm, but varies widely and may not always warn of potentially hazardous concentrations (ATSDR 2006; NJDHSS 2006)

Molecular weight: 147.00 daltons (Lide 2000)

Boiling point: 174 EC (345.2 EF) (Lide 2005)

Melting point: 53.09 EC (127.6 EF) (Lide 2005)

Vapor pressure: 1.77 mm Hg at 25 EC (77 EF) (ATSDR 2006)

Relative Vapor density: 5.07 (air = 1) (Verschueren 2001)

Specific gravity: 1.46 at 20 EC (68 EF) (relative to water at 4 EC) (Budavari et al. 2001)

Water solubility: 79 mg/L at 25 EC (77 EF) (Verschueren 2001)

Flammability: LEL 6.2%; UEL 16% (ICSC 2003)

Incompatibilities

1,4-Dichlorobenzene forms hydrogen chloride gas when in the presence of strong oxidizers or chemically active metals like aluminum, or when heated to decomposition (HSDB 2007).

Health Effects

- **1,4-Dichlorobenzene is irritating to the eyes and respiratory tract. Acute inhalation or oral exposure to high concentrations of 1,4-dichlorobenzene may result in liver damage.**
- **Repeated ingestion of products such as mothballs that consist primarily of 1,4-dichlorobenzene has resulted in skin blotches and anemia.**
- **Lifetime inhalation and oral exposure of mice to 1,4-dichlorobenzene resulted in liver cancer.**

Acute Exposure

The effects of acute exposure to 1,4-dichlorobenzene include irritation of the eyes and respiratory tract that typically resolves on removal from exposure. Acute inhalation or oral exposure to high levels of 1,4-dichlorobenzene may cause liver damage. Prolonged dermal contact may result in a burning sensation in the absence of dermal irritation.

1,4-Dichlorobenzene appears to be metabolized mainly in the liver where reactive products are formed; its metabolites are predominantly excreted by the kidney. 1,4-Dichlorobenzene hepatotoxicity is thought to be caused by reactive metabolites produced in the liver (ATSDR 2006).

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

Respiratory

Irritation of the nose and throat, coughing, and difficulty breathing have been reported following acute exposure to 1,4-dichlorobenzene vapor concentrations as low as 50 ppm (ATSDR 2006; HSDB 2007).

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

<i>Dermal</i>	<p>Prolonged skin contact may result in a burning sensation in the absence of dermal irritation (ATSDR 2006).</p> <p>Because of their larger surface area:body weight ratio, children are more vulnerable than adults to toxicants absorbed through the skin.</p>
<i>Ocular/Ophthalmic</i>	<p>Acute exposure to 1,4-dichlorobenzene vapors may result in ocular irritation and tearing (ATSDR 2006; HSDB 2007).</p>
<i>Hepatic</i>	<p>Acute inhalation or oral exposure to high levels of 1,4-dichlorobenzene may cause liver damage (ATSDR 2006).</p>
<i>CNS</i>	<p>Inhalation exposure to high concentrations of 1,4-dichlorobenzene has resulted in reported headaches and dizziness (ATSDR 2006).</p>
<i>Gastrointestinal</i>	<p>Acute exposure to high 1,4-dichlorobenzene vapor concentrations may result in upset stomach (ATSDR 2006).</p>
<i>Potential Sequelae</i>	<p>There are no known long-term effects from acute exposure to 1,4-dichlorobenzene.</p>
Chronic Exposure	<p>Long-term oral exposure to 1,4-dichlorobenzene has resulted in skin blotches and anemia. Liver tumors were associated with inhalation and oral exposure of mice to 1,4-dichlorobenzene for a lifetime (ATSDR 2006).</p>
<i>Carcinogenicity</i>	<p>In mice, lifetime inhalation or oral exposure to 1,4-dichlorobenzene resulted in liver cancer (ATSDR 2006). The International Agency for Research on Cancer (IARC 1999) has assigned 1,4-dichlorobenzene to Group 2B (possibly carcinogenic to humans) based on liver cancer in mice exposed to 1,4-dichlorobenzene by inhalation or oral administration for a lifetime. The U.S. EPA (IRIS 2006) does not include a cancer assessment for 1,4-dichlorobenzene.</p>

*Reproductive and
Developmental Effects*

Adverse reproductive or developmental effects in humans have not been reported and animal studies do not suggest that 1,4-dichlorobenzene is a reproductive or developmental toxicant (ATSDR 2006).

Prehospital Management

- **Victims exposed only to 1,4-dichlorobenzene vapor do not pose significant risks of secondary contamination to rescuers outside the Hot Zone. Victims whose clothing or skin is contaminated with 1,4-dichlorobenzene can secondarily contaminate response personnel by direct contact or through off-gassing vapor. Vomitus from patients who have ingested 1,4-dichlorobenzene can also off-gas the vapor.**
- **Airborne 1,4-dichlorobenzene is irritating to the eyes, nose, and throat. Prolonged skin contact may result in a burning sensation in the absence of dermal irritation. Other effects of high-level acute exposure to 1,4-dichloroethane include dizziness, headache, difficulty breathing, and upset stomach. Signs of long-term overexposure to 1,4-dichlorobenzene may include blotchy skin and anemia.**
- **There is no specific antidote for 1,4-dichlorobenzene. Treatment is supportive, with particular attention to the respiratory system.**

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

1,4-Dichlorobenzene is absorbed well by inhalation and is a respiratory-tract irritant. Prolonged skin contact may result in a burning sensation in the absence of notable irritation or dermal absorption (ATSDR 2006; HSDB 2007).

Respiratory Protection: Positive-pressure, self-contained breathing apparatus (SCBA) is recommended in response situations that involve exposure to 1,4-dichlorobenzene (NIOSH 2005).

Skin Protection: Although 1,4-dichlorobenzene vapor is not a dermal irritant and is not readily absorbed through the skin, chemical-protective clothing is recommended when extensive dermal contact with 1,4-dichlorobenzene is anticipated because the chemical is a possible human carcinogen.

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.

Victims with chemically-induced acute disorders may suffer from anxiety, especially children who may be separated from a parent or other adult.

Decontamination Zone

Victims exposed only to 1,4-dichlorobenzene vapor do not need decontamination. They may be transferred immediately to the Support Zone. All others 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 and cooperative may assist with their own decontamination. Remove and double-bag contaminated clothing and personal belongings.

Flush 1,4-dichlorobenzene-contaminated skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading the material to unaffected skin (HSDB 2007). Remove contact lenses if easily removable without additional trauma to the eye. Use caution to avoid hypothermia when decontaminating victims, particularly children or the elderly. Use blankets or warmers after decontamination as needed.

Do not induce emesis following ingestion of chemicals (such as 1,4-dichlorobenzene) with potential for causing contact irritation. If the victim is alert, asymptomatic, and has a gag reflex, consider prompt dilution with 4–8 oz (120–240 mL) of water (not to exceed 4 oz in a child). Activated charcoal treatment is not recommended for victims who have ingested irritative or corrosive chemicals because it may cause vomiting (HSDB 2007).

Provide reassurance to chemically-contaminated victims during decontamination, particularly children who may suffer separation anxiety 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). Persons who have undergone decontamination or have been exposed only to vapor pose no serious risks of secondary contamination. Support Zone personnel require no specialized protective gear in such cases.

ABC Reminders

Quickly establish 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. Establish intravenous access if necessary. Place on a cardiac monitor.

Additional Decontamination

Continue irrigating exposed skin and eyes, as appropriate.

Do not induce emesis following ingestion of chemicals (such as 1,4-dichlorobenzene) with potential for causing contact irritation. If not already done, and the victim is alert, asymptomatic, and has a gag reflex, consider prompt dilution with 4–8 oz (120–240 mL) of water (not to exceed 4 oz in a child). Activated charcoal treatment is not recommended for victims who have ingested irritative or corrosive chemicals because it may cause vomiting (HSDB 2007).

Advanced Treatment

In cases of respiratory compromise, secure airway and support respiration according to advanced life support (ALS) protocols.

Treat patients who have bronchospasm with an aerosolized bronchodilator such as albuterol. 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). 1,4-Dichlorobenzene 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; repeat every 20 minutes as needed while observing for myocardial variability.

Patients who are comatose, hypotensive, or having seizures or cardiac arrhythmias should be treated according to ALS protocols when clinically indicated.

If evidence of shock or hypotension is observed, begin fluid administration. For adults with systolic pressure less than 80 mm Hg, 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 10–20 minutes, followed by reassessment of perfusion and further management as clinically appropriate.

Transport to Medical Facility

Only decontaminated patients or patients not requiring decontamination should be transported to a medical facility. "Body bags" can increase exposure and 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 1,4-dichlorobenzene has been ingested, prepare the ambulance in case the victim vomits. Have ready several towels and open plastic bags to quickly clean up and isolate vomitus. Take measures to avoid pulmonary aspiration, i.e., place patient in lateral position.

Multi-Casualty Triage

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

Patients with evidence of significant inhalation exposure (breathing difficulties, dizziness, headache) and patients who ingested 1,4-dichlorobenzene should be transported to a medical facility for evaluation.

Patients who have inhalation exposure who did not experience breathing difficulties, dizziness, or headache are not likely to have had a significant exposure. After their names, addresses, and telephone numbers are recorded, these patients may be released from the scene with instructions to rest and to seek medical care promptly if symptoms develop (see *Patient Information Sheet* below).

Emergency Department Management

- **Hospital personnel can be secondarily exposed by direct contact or by vapor off-gassing from contaminated clothing or skin. Patients do not pose contamination risks after clothing is removed and the skin is washed. Toxic vomitus from patients who have ingested 1,4-dichlorobenzene may off-gas 1,4-dichlorobenzene vapor.**
- **Airborne 1,4-dichlorobenzene is irritating to the eyes, nose, and throat. Prolonged skin contact may result in a burning sensation in the absence of dermal irritation. Other effects of high-level acute exposure to 1,4-dichloroethane include dizziness, headache, difficulty breathing, and upset stomach. Signs of long-term overexposure to 1,4-dichlorobenzene may include blotchy skin and anemia.**
- **There is no specific antidote for 1,4-dichlorobenzene. Treatment is supportive, with particular attention to the respiratory system.**

Decontamination Area

Previously decontaminated patients and patients exposed only to 1,4-dichlorobenzene vapor who have no respiratory 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 anxiety, particularly in children, resulting in decreased compliance with further management efforts.

Because of their relatively larger surface area: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 according to ALS protocols. Children may be more vulnerable to irritative agents than adults because of the smaller diameter of their airways.

Treat patients who have bronchospasm with an aerosolized bronchodilator such as albuterol. 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). 1,4-Dichlorobenzene 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; repeat every 20 minutes as needed while observing for myocardial variability.

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

Basic Decontamination

Patients who are able and cooperative may assist with their own decontamination. If the patient's clothing is wet with 1,4-dichlorobenzene, remove and double-bag the contaminated clothing and personal belongings.

Flush 1,4-dichlorobenzene-exposed skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading the chemical to unexposed skin (HSDB 2007). Remove contact lenses if easily removable without additional trauma to the eye. Use caution to avoid hypothermia when decontaminating victims, particularly children or the elderly. Use blankets or warmers after decontamination as needed.

Do not induce emesis following ingestion of chemicals (such as 1,4-dichlorobenzene) with potential for causing contact irritation. Activated charcoal treatment is not recommended for victims who have ingested irritative or corrosive chemicals because it may cause vomiting (HSDB 2007).

Critical Care Area

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

ABC Reminders

Evaluate and support airway, breathing, and circulation as in ABC Reminders above. Children may be more

vulnerable to irritative agents than adults because of the smaller diameter of their airways. Establish intravenous access in seriously ill patients.

Patients who are comatose, hypotensive, or have seizures or cardiac arrhythmia 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. 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). 1,4-Dichlorobenzene poisoning is not known to pose additional risk during the use of bronchial or cardiac sensitizing agents.

Skin Exposure

If the skin was in prolonged contact with liquid 1,4-dichlorobenzene, a burning sensation may result; rinse the skin in running water.

Because of their larger surface area:weight ratio, children are more vulnerable to toxicants that affect 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.

Ingestion Exposure

Do not induce emesis following ingestion of chemicals (such as 1,4-dichlorobenzene) with potential for causing contact irritation. Activated charcoal treatment is not recommended for victims who have ingested irritative or corrosive chemicals because it may cause vomiting (HSDB 2007).

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

Gastric lavage is useful in certain circumstances to remove caustic material and prepare for endoscopic examination. Because the risk of perforation from NG intubation is relatively high in children, lavage is discouraged in children unless intubation is performed under endoscopic guidance.

Consider endoscopy to evaluate the extent of gastrointestinal tract injury. Extreme throat swelling may require airway management using ALS protocols.

Antidotes and Other Treatments

There is no antidote for 1,4-dichlorobenzene. Treatment is supportive, with particular attention to the respiratory system.

Laboratory Tests

The diagnosis of acute 1,4-dichlorobenzene toxicity is primarily clinical for inhalation exposure, based on symptoms of respiratory tract irritation or respiratory distress. Ingestion of a large amount of 1,4-dichlorobenzene may result in compromised liver function. In symptomatic patients, monitor complete blood count and liver function (HSDB 2007).

1,4-Dichlorobenzene levels in blood or expired air are not clinically useful, but can be used to document an exposure. Exposure to 1,4-dichlorobenzene is also suggested by detection of 2,5-dichlorophenol in blood

or urine; however, these tests are not specific for 1,4-dichlorobenzene (ATSDR 2006).

Disposition and Follow-up

Consider hospitalizing symptomatic patients who have significant inhalation exposure and patients who have ingested large amounts of 1,4-dichlorobenzene.

Patient Release

Patients who have remained asymptomatic 6–12 hours

after exposure may be discharged, advised to rest and to seek medical care promptly if symptoms develop (see the *1,4-dichlorobenzene—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.

Follow-up laboratory evaluation of hepatic function should be arranged for severely exposed patients. Patients who have corneal damage should be re-examined 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.

1,4-Dichlorobenzene Patient Information Sheet

This handout provides information and follow-up instructions for persons who have been exposed to 1,4-dichlorobenzene.

What is 1,4-dichlorobenzene?

At room temperature, 1,4-dichlorobenzene is a colorless to white combustible crystalline solid that slowly vaporizes when exposed to air. 1,4-Dichlorobenzene has a penetrating mothball-like odor. It is used to make other chemicals. 1,4-Dichlorobenzene has principally been used as a space deodorant for toilets and refuse containers and a fumigant for control of moths, molds, and mildews. 1,4-Dichlorobenzene is also used in the production of polyphenylene sulphide resin, as an intermediate in the production of other chemicals such as 1,2,4-trichlorobenzene, and in control of blue mold in tobacco seed beds and tree-boring insects and ants.

What immediate health effects can be caused by exposure to 1,4-dichlorobenzene?

Breathing 1,4-dichlorobenzene can cause irritation of the eyes, nose, and throat; dizziness; headache; and upset stomach. Breathing or swallowing very large amounts can cause liver damage. Generally, the more serious the exposure, the more severe the symptoms.

Can 1,4-dichlorobenzene poisoning be treated?

There is no antidote for 1,4-dichlorobenzene, but its acute effects can be treated and most exposed persons recover completely. Persons who have swallowed or inhaled large amounts of 1,4-dichlorobenzene might need to be hospitalized.

Are any future health effects likely to occur?

Delayed or long-term effects generally do not occur from single exposures to 1,4-dichlorobenzene. A high-dose exposure, or an exposure over many years, can affect the liver.

What tests can be done if a person has been exposed to 1,4-dichlorobenzene?

Because 1,4-dichlorobenzene is radiopaque, x-rays can be used to assess for suspected ingestion. Blood and urine can be tested for the presence of 1,4-dichlorobenzene breakdown products. However, these tests are generally not available to your doctor and have limited usefulness in treatment. If a severe exposure has occurred, blood and other tests might show whether the liver has been damaged. Testing is not needed in every case.

Where can more information about 1,4-dichlorobenzene be found?

More information about 1,4-dichlorobenzene can be obtained from your regional poison control center; the 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:

- irritation of eyes, nose, or throat
- shortness of breath, coughing
- dizziness or headache

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 _____

References

- ATSDR. 2006. Toxicological profile for dichlorobenzenes (update). U.S. Department of Health and Human Services. Agency for Toxic Substances and Disease Registry.
- Budavari S, O'Neil MJ, Smith A, et al., eds. 2001. *p*-Dichlorobenzene. The Merck index: An encyclopedia of chemicals, drugs, and biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 3082.
- HSDB. 2007. 1,4-Dichlorobenzene. Hazardous Substances Data Bank. National Library of Medicine. <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>. October 11, 2007.
- IARC. 1999. Some chemicals that cause tumours of the kidney or urinary bladder in rodents and some other substances. Dichlorobenzenes. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 73. Lyons: International Agency for Research on Cancer, 223. <http://monographs.iarc.fr/ENG/Monographs/vol73/volume73.pdf>. October 11, 2007.
- ICSC. 2003. 1,4-Dichlorobenzene. International Chemical Safety Cards. ICSC: 0037. <http://www.cdc.gov/niosh/ipcsneng/neng0037.html>. October 11, 2007.
- IRIS. 2006. 1,4-Dichlorobenzene. Integrated Risk Information System. Washington, DC: U.S. Environmental Protection Agency. <http://www.epa.gov/iris/subst/0552.htm>. October 11, 2007.
- Lide DR. 2005. *p*-Dichlorobenzene. CRC handbook of chemistry and physics. 86th edition. CRC Press, 3-150.
- NIOSH. 2005. *p*-Dichlorobenzene. NIOSH pocket guide to chemical hazards. National Institute for Occupational Safety and Health. <http://www.cdc.gov/niosh/npg/npgd0190.html>. October 11, 2007.
- NJDHHS. 1998. 1,4-Dichlorobenzene. Hazardous substance fact sheet. New Jersey Department of Health and Senior Services. <http://nj.gov/health/eoh/rtkweb/documents/fs/0643.pdf>. October 11, 2007.
- OSHA. 1999. *p*-Dichlorobenzene. U.S. Department of Labor. Occupational Safety and Health Administration. Code of Federal Regulations. 29 CFR 1910.1000. TableZ-1. Part Z. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992. October 11, 2007.
- Verschueren K. 2001. *p*-Dichlorobenzene. Handbook of environmental data on organic chemicals. 4th ed. New York, NY: John Wiley & Sons, Inc., 733-736.

