

1,1,1-Trichloroethane (CH₃CCl₃) CAS 71-55-6; UN 2831

Synonyms include α -T, α -trichloroethane, chloroethene, methylchloroform, methyltrichloromethane, TCEA, and trichloromethylmethane.

Persons exposed only to 1,1,1-trichloroethane vapor pose no risk of secondary contamination. Persons whose skin or clothing is contaminated with liquid 1,1,1-trichloroethane can contaminate response personnel by direct contact or through off-gassing of vapor.

1,1,1-Trichloroethane is a colorless, volatile, nonflammable liquid with a sweet, chloroform-like odor. The vapor is heavier than air and can collect to toxic levels in poorly ventilated spaces. Odor generally provides adequate warning of hazardous concentrations.

**1,1,1-Trichloroethane is rapidly absorbed if inhaled or ingested. Dermal absorption is slow and does not contribute significantly to systemic toxicity.
1,1,1-Trichloroethane crosses the placenta and is excreted in breast milk.**

Description

1,1,1-Trichloroethane is a colorless, nonflammable liquid. It evaporates quickly and has a sweet, chloroform-like odor. It has only negligible solubility in water, but it is miscible in most organic solvents. It can explode if concentrations of 7.5% to 15.5% in air are ignited by a spark or flame. At temperatures higher than 500 °F (>260 °C), 1,1,1-trichloroethane decomposes to form hydrogen chloride and trace amounts of phosgene, which are severe pulmonary irritants. 1,1,1-Trichloroethane should be stored at ambient temperature in a well-ventilated area away from metals, open flames, and moisture.

Routes of Exposure

Inhalation

Inhalation is the most important route of exposure, and 1,1,1-trichloroethane is readily absorbed from the lungs. The odor threshold for 1,1,1-trichloroethane is 44 ppm, which is about one-eighth of the OSHA PEL. Odor is an adequate warning of hazardous concentrations. The vapor is heavier than air and can collect to toxic levels in poorly ventilated or low-lying spaces. A one hour exposure to 1,000 ppm can cause dizziness and loss of coordination. Central nervous system (CNS) depression generally begins at 5,000 ppm. Levels of 10,000 ppm or higher can cause sedation, hypotension, cardiac dysrhythmia, coma, and death.

Children exposed to the same levels of 1,1,1-trichloroethane vapor 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 1,1,1-trichloroethane vapor found nearer to the ground.

Skin/Eye Contact

Transient chemical conjunctivitis can result from exposure to high levels of vapor or direct contact with liquid 1,1,1-trichloroethane. The liquid is mildly irritating to the skin. Because absorption across intact skin is slow, systemic toxicity is unlikely unless liquid on the skin is prevented from evaporating by heavy clothing or other impermeable covering.

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

Ingestion

Gastrointestinal absorption is rapid and can cause systemic effects similar to those seen with inhalation exposure.

Sources/Uses

1,1,1-Trichloroethane is a synthetic chemical that was first developed as a safer substitute for other chlorinated and flammable solvents. The most common method for industrial production of 1,1,1-trichloroethane is the reaction of hydrochloric acid with vinyl chloride to obtain 1,1-dichloroethane, followed by either thermal or photochemical chlorination. In industry, it has been widely used as a solvent and as a cold cleaning and vapor degreasing agent. It was used in many household products, including aerosol sprays, spot cleaners, glues, and lubricants. While it is no longer used for such products, it is likely that some of these may still be found in homes, garages, workshops, and hazardous waste sites. It has been intentionally abused for its CNS-intoxicating effects. At one time, it was used as an anesthetic agent. Because 1,1,1-trichloroethane damages the ozone layer, production in the United States was phased out in 1996, but supplies as a raw material will be available until the year 2002.

Standards and Guidelines

OSHA PEL (permissible exposure limit) = 350 ppm (averaged over an 8-hour workshift)

NIOSH IDLH (immediately dangerous to life or health) = 700 ppm

AIHA ERPG-2 (emergency response planning guideline) (maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without

experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action) = 700 ppm.

Physical Properties

Description: colorless, nonflammable liquid with a sweet, chloroform-like odor

Warning properties: odor detectable at 44 ppm; generally adequate warning to avoid acute, high-level exposure.

Molecular weight: 133.40 daltons

Boiling point (760 mm Hg): 165.38 °F (74.1 °C)

Freezing point: -23 °F (-30.56 °C)

Specific gravity: 1.34 at 68 °F (20 °C) (water = 1)

Vapor pressure: 100 mm Hg at 68 °F (20 °C)

Gas density: 4.63 (air = 1)

Water solubility: Negligible, 0.4% at 68 °F (20 °C)

Flammability: considered nonflammable and usually requires preheating before it will burn. Under extraordinary circumstances of high-energy ignition (e.g., blasting cap) or a high-oxygen atmosphere, the vapors can be ignited and will burn or explode.

Flammable range: 7.5% to 15.5% (concentration in air).

Incompatibilities

1,1,1-Trichloroethane can decompose to form hydrogen chloride gas when it comes in contact with strong caustics, strong oxidizers, or chemically active metals like zinc, sodium or potassium, or aluminum and magnesium powders. 1,1,1-Trichloroethane reacts slowly with water to form hydrochloric acid and forms trace amounts of phosgene when ignited or burned above 260 °C.

Health Effects

1,1,1-Trichloroethane is irritating to the skin and eyes. Inhalation or ingestion of 1,1,1-trichloroethane can produce headache, dizziness, and lack of coordination (at moderate exposure levels, >1,000 ppm) and stupor or coma (at high exposure levels, >10,000 ppm).

CNS and respiratory depression or cardiac dysrhythmia (from high-level exposures) can result in death. Other effects include hypotension, nausea, vomiting, and diarrhea.

1,1,1-Trichloroethane sensitizes the heart to epinephrine, making it more susceptible to epinephrine-induced arrhythmias.

The effects of 1,1,1-trichloroethane on the CNS are thought to be due to direct interaction of 1,1,1-trichloroethane with proteinaceous components of membranes. 1,1,1-Trichloroethane crosses the placenta and is excreted in breast milk.

Acute Exposure

1,1,1-Trichloroethane is thought to depress the CNS via a solvent effect on lipids and protein components of neural membranes. It sensitizes the heart to epinephrine, making it more susceptible to epinephrine-induced arrhythmias. Direct exposure to liquid 1,1,1-trichloroethane degreases the skin, causing redness, blistering, and scaling.

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

CNS

1,1,1-Trichloroethane causes concentration-related CNS depression. Symptoms can include euphoria, headache, dizziness, malaise, hallucinations or distorted perceptions, behavioral changes, ataxia, seizures, sedation, coma, cerebral edema, and death. CNS effects resolve quickly when the victim is removed from further exposure.

Cardiovascular

Inhalation of high concentrations can cause hypotension and dysrhythmia. 1,1,1-Trichloroethane sensitizes the heart to epinephrine. Physical exertion, stress, or other stimuli resulting in epinephrine release can trigger dysrhythmia and result in sudden death.

Gastrointestinal

Nausea, vomiting, and diarrhea can occur following ingestion or inhalation of a high dose (3,000–10,000 ppm) of

1,1,1-trichloroethane. Ingestion can produce a burning sensation in the mouth, throat, and esophagus.

Respiratory

Inhalation of 1,1,1-trichloroethane can lead to respiratory arrest due to CNS depression and may also cause pulmonary edema.

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

Hydrocarbon pneumonitis may be a problem in children.

Hepatic

Although there are no reports of toxicity at low concentrations, hepatic lipidosis, macronodular cirrhosis, and transient hepatitis have been reported following high-level inhalation exposures.

Dermal

Direct skin exposure to liquid 1,1,1-trichloroethane can cause a burning sensation, erythema, and blistering.

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

Ocular

Exposure to 1,1,1-trichloroethane vapor (>500 ppm for 1 hour) and direct contact with the liquid can cause irritation or transient conjunctivitis.

Potential Sequelae

Some survivors of severe, acute exposures (e.g., involving coma or respiratory arrest) suffer brain or cardiac damage due to hypoxia.

Chronic Exposure

Chronic exposure can cause lethargy, impaired memory, and impaired balance. Chronic skin exposure can cause irritant contact dermatitis.

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

Carcinogenicity

1,1,1-Trichloroethane has been assessed for carcinogenic effects; the International Agency for Research on Cancer (IARC) has assigned 1,1,1-trichloroethane to Group 3 (not classifiable as to carcinogenicity in humans) and the Environmental Protection Agency (EPA) has assigned it to Group D (not classifiable as to carcinogenicity in humans) based on inadequate evidence of cancer for humans and experimental animals.

*Reproductive and
Developmental Effects*

1,1,1-Trichloroethane 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. Adverse reproductive or developmental effects in humans have not been reported and animal studies do not suggest that 1,1,1-trichloroethane is a reproductive or developmental toxicant although it crosses the placenta and is excreted in breast milk.

Prehospital Management

Victims exposed only to 1,1,1-trichloroethane vapor pose no risk of secondary contamination to rescuers. Victims whose skin or clothing is contaminated with liquid 1,1,1-trichloroethane can contaminate rescuers by direct contact or through off-gassing of vapor. Vomitus from patients who have ingested 1,1,1-trichloroethane can also off-gas the vapor.

1,1,1-Trichloroethane is irritating to the skin and eyes. Inhalation or ingestion of 1,1,1-trichloroethane can lead to headache, dizziness, lack of coordination, stupor, coma, CNS and respiratory depression, and cardiac dysrhythmia. Other effects include hypotension, nausea, vomiting, and diarrhea.

There is no antidote for 1,1,1-trichloroethane. 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 the rescuers have not been trained in its use, call for assistance from a local or regional HAZMAT team or other properly equipped response organization.

Rescuer Protection

1,1,1-Trichloroethane vapor is readily absorbed by inhalation and is a respiratory tract irritant. The liquid is a mild skin irritant with minimal absorption through the skin.

Respiratory protection: Positive-pressure, self-contained breathing apparatus (SCBA) is recommended in response situations that involve exposure to potentially unsafe levels of 1,1,1-trichloroethane vapor.

Skin protection: Chemical-protective clothing is not generally required when only vapor exposure is expected: 1,1,1-Trichloroethane vapor is only mildly irritating and is not absorbed well through the skin. Chemical-protective clothing is recommended when extensive skin contact with the liquid might occur.

ABC Reminders

Quickly access for a patent airway, ensure adequate respiration and pulse. Provide supplemental oxygen if cardiopulmonary compromise is suspected. 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 should 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.

Care should be taken that victims (particularly children) do not have problems due to 1,1,1-trichloroethane being heavier than air and settling in pockets close to the ground.

Decontamination Zone

Patients exposed only to 1,1,1-trichloroethane vapor who have no skin or eye irritation may be transferred immediately to the Support Zone. Other patients will require decontamination as described below.

Rescuer Protection

If exposure levels are determined to be safe, decontamination may be conducted by personnel wearing a lower level of protection than that worn in the Hot Zone (described above).

ABC Reminders

Quickly access for a patent airway, ensure adequate respiration and pulse. Stabilize the cervical spine with a collar and a backboard if trauma is suspected. Administer supplemental oxygen as required. Assist ventilation with a bag-valve-mask device if necessary.

Basic Decontamination

Victims who are able may assist with their own decontamination. Quickly remove and double-bag contaminated clothing and personal belongings.

Flush exposed skin and hair with water for 3 to 5 minutes. Wash with mild soap and water (preferably under a shower). Rinse thoroughly with water. Use caution to avoid hypothermia when decontaminating children or the elderly. Use blankets or warmers when appropriate.

Flush exposed eyes with plain water or saline for at least 15 minutes. Remove contact lenses if easily removable without additional trauma to the eye. If a corrosive material is suspected or if pain or injury is evident, continue irrigation while transferring the victim to the Support Zone.

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 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g).

A soda can and straw may be of assistance when offering charcoal to a child.

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

ABC Reminders

Quickly access for a patent airway. If trauma is suspected, maintain cervical immobilization manually and apply a cervical collar and a backboard when feasible. Ensure adequate respiration and pulse. Administer supplemental oxygen as required and establish intravenous access if necessary. Place on a cardiac monitor.

Additional Decontamination

Continue irrigating exposed skin and eyes, as appropriate.

In cases of ingestion, **do not induce emesis**. If activated charcoal has not been given previously and the victim is alert, asymptomatic, and has a gag reflex, 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 straw may be of assistance when offering charcoal to a child.

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. However, the use of sympathomimetic agents such as epinephrine and isoproterenol could precipitate fatal dysrhythmias and should be avoided. Selective beta-2 agonists would be preferred, but clinical reports of their use are lacking. Theophylline derivatives have not been studied. Use all catecholamines with caution because of the enhanced risk of cardiac arrhythmias.

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

Transport to Medical Facility

Only decontaminated patients or patients not requiring decontamination should be transported to a medical facility. "Body bags" are not recommended.

Report to the base station and the receiving medical facility the condition of the patient, treatment given, and estimated time of arrival at the medical facility.

If 1,1,1-trichloroethane has been ingested, prepare the ambulance in case the patient 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 physician or the regional poison control center for advice regarding triage of multiple victims

Patients with evidence of significant inhalation exposure such as CNS disruption, breathing difficulties, or cardiac dysrhythmia and patients who ingested 1,1,1-trichloroethane should be transported to a medical facility for evaluation. Others may be discharged from 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

Patients exposed only to 1,1,1-trichloroethane vapor pose no risk of secondary contamination to rescuers. Patients whose skin or clothing is contaminated with liquid 1,1,1-trichloroethane can contaminate rescuers by direct contact or through off-gassing of vapor. Vomitus from patients who have ingested 1,1,1-trichloroethane can also off-gas the vapor.

1,1,1-Trichloroethane is irritating to the skin and eyes. Inhalation or ingestion of 1,1,1-trichloroethane can lead to headache, dizziness, lack of coordination, stupor, coma, CNS and respiratory depression, and cardiac dysrhythmia. Other effects include hypotension, nausea, vomiting, and diarrhea.

There is no antidote for 1,1,1-trichloroethane. Treatment consists of support of respiratory and cardiovascular functions.

Decontamination Area

Unless previously decontaminated, all patients suspected of contact with liquid 1,1,1-trichloroethane and all victims with skin or eye irritation require decontamination as described below. All other patients may be transferred to the Critical Care area.

Be aware that use of protective equipment by the provider may cause fear in children, resulting in decreased compliance with further management efforts.

Because of their relatively larger surface area:body weight ratio, children are more vulnerable to toxicants affecting the skin. Also, emergency room personnel should examine children's mouths because of the frequency of hand-to-mouth activity among children.

ABC Reminders

Evaluate and support airway, breathing, and circulation. In cases of respiratory compromise secure airway and respiration via endotracheal intubation. If not possible, surgically create an airway. Provide supplemental oxygen if cardiopulmonary compromise is suspected.

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. However, the use of sympathomimetic agents such as epinephrine and isoproterenol could precipitate fatal dysrhythmias and should be avoided. Selective beta-2 agonists would be preferred, but clinical reports of

their use are lacking. Theophylline derivatives have not been studied. Use all catecholamines with caution because of the enhanced risk of cardiac arrhythmias.

Patients who are comatose, hypotensive, or have seizures or ventricular arrhythmias should be treated in the conventional manner. Avoid sympathomimetics or catecholamines or use them with caution. Beta-blockers may be more effective than lidocaine in cases of prolonged or resistant arrhythmias.

Basic Decontamination

Patients who are able may assist with their own decontamination. Remove and double-bag contaminated clothing and personal belongings.

Flush exposed skin and hair with water for 3 to 5 minutes. Wash with mild soap and water (preferably under a shower). Rinse thoroughly with water. Use caution to avoid hypothermia when decontaminating children or the elderly. Use blankets or warmers when appropriate.

Flush exposed eyes with plain water or saline for at least 15 minutes. Remove contact lenses if easily removable without additional trauma to the eye. If a corrosive material is suspected or if pain or injury is evident, continue irrigation while transferring the victim to the Critical Care Area.

In cases of ingestion, **do not induce emesis**. If activated charcoal has not been given previously and the victim is alert, asymptomatic, and has a gag reflex, 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 straw may be of assistance when offering charcoal to a child.

Critical Care Area

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

ABC Reminders

Evaluate and support airway, breathing, and circulation as in *ABC Reminders* above. Establish intravenous access in seriously ill patients if this has not been done previously. Continuously monitor cardiac rhythm.

Patients who are comatose, hypotensive, or have seizures or ventricular arrhythmias should be treated in the conventional manner. Avoid sympathomimetics or catecholamines or use them with caution. Beta-blockers may be more effective than lidocaine in cases of prolonged or resistant dysrhythmias.

Inhalation Exposure

Administer supplemental oxygen by mask to patients who have respiratory complaints. 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. However, the use of sympathomimetic agents such as epinephrine and isoproterenol could precipitate fatal dysrhythmias and should be avoided. Selective beta-2 agonists would be preferred, but clinical reports of their use are lacking. Theophylline derivatives have not been studied. Use all catecholamines with caution because of the enhanced risk of cardiac arrhythmias.

Skin Exposure

If the skin was in prolonged contact with liquified 1,1,1-trichloroethane, chemical burns might be present; treat these as thermal burns.

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

Eye Exposure

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

Ingestion Exposure

Do not induce emesis.

If the patient is alert, administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g), if not done previously. A soda can and straw may be of assistance when offering charcoal to a child.

Consider endoscopy to evaluate the extent of gastrointestinal tract injury. Extreme throat swelling may require endotracheal intubation or cricothyroidotomy. Gastric lavage is useful in certain circumstances to remove toxic material and prepare for endoscopic examination. Consider gastric lavage with a small nasogastric tube if: (1) a large dose has been ingested; (2) the patient's condition is evaluated within 30 minutes; (3) the patient has oral lesions or persistent esophageal discomfort; and (4) the lavage can be administered within 1 hour of ingestion. Care must be taken when placing the gastric tube because blind gastric-tube placement may further injure the chemically damaged esophagus or stomach.

Because children do not ingest large amounts of toxic materials, and because of the risk of perforation from nasogastric 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 1,1,1-trichloroethane. Treatment is supportive of respiratory and cardiovascular functions.

Laboratory Tests

The diagnosis of acute 1,1,1-trichloroethane toxicity is primarily clinical, based on symptoms of CNS disruption or respiratory distress. However, laboratory testing is useful for monitoring the patient and evaluating complications. Routine laboratory studies for seriously exposed patients include CBC, glucose, electrolytes, and liver enzyme tests. Patients who have respiratory complaints should be evaluated with pulse oximetry or ABG measurements and chest radiography.

1,1,1-Trichloroethane levels in blood or expired air are not clinically useful but can be used to document an exposure. Exposure to 1,1,1-trichloroethane is also suggested by detection of trichloroethanol or trichloroacetic acid in blood or urine; these tests are not specific for 1,1,1-trichloroethane, however.

**Disposition and
Follow-up**

Consider hospitalizing patients who have had significant inhalation exposure (e.g., with loss of consciousness) and patients who have ingested significant amounts of 1,1,1-trichloroethane.

Patient Release

Patients who have not experienced alterations in mental status or had initially mild symptoms and are asymptomatic 6 to 8 hours later may be discharged. Discharged patients should be instructed to seek medical care promptly if symptoms develop (see the *1,1,1-Trichloroethane—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. Neurologic examination for post-hypoxic injury is recommended in cases of severe exposure. Patients who have skin burns or corneal damage should be re-examined within 24 hours.

Reporting

If a work-related incident has occurred, you might be legally required to file a report; contact your state or local health department.

Other persons might still be at risk at the place where this incident occurred. If the incident occurred in the workplace, discussing it with company personnel might 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 the Occupational Safety and health Administration (OSHA) or the National Institute for Occupational Safety and Health (NIOSH).

1,1,1-Trichloroethane (CH₃CCl₃)

Patient Information Sheet

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

What is 1,1,1-trichloroethane?

1,1,1-Trichloroethane is a colorless, volatile, nonflammable liquid with a sweet, chloroform-like odor. It is used to make other chemicals. It has been used to clean grease from metal parts. It used to be found in many household products, such as spot cleaners and glues. You may still have some of these products in your home, garage or workshop, although use of 1,1,1-trichloroethane has been phased out by the EPA because it damages the ozone layer. Sometimes people intentionally inhale it to get high.

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

Breathing or swallowing 1,1,1-trichloroethane can cause lightheadedness, dizziness, blurred vision, a feeling of excitement, nausea, and vomiting. Breathing or swallowing large amounts can cause irregular heart beat, fainting, coma, and even death. If the skin has been in contact with high levels of 1,1,1-trichloroethane for a long time, a skin rash or burns might develop. Generally, the more serious the exposure, the more severe the symptoms.

Can 1,1,1-trichloroethane poisoning be treated?

There is no antidote for 1,1,1-trichloroethane, but its effects can be treated and most exposed persons recover completely. Persons who have swallowed or inhaled large amounts of 1,1,1-trichloroethane 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 1,1,1-trichloroethane. A high-dose exposure, or an exposure over many years, can affect the brain, skin, liver, and heart.

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

Specific tests for the presence of 1,1,1-trichloroethane breakdown products in blood and urine are available, but they are not generally useful to your doctor. If a severe exposure has occurred, blood and other tests might show whether the heart or liver has been damaged. Testing is not needed in every case.

Where can more information about 1,1,1-trichloroethane be found?

More information about 1,1,1-trichloroethane 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:

- Sudden severe weakness, fainting, or dizziness
- irregular heartbeat
- shortness of breath, coughing, or wheezing
- increased pain or discharge from injured eyes

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 _____