



Right to Know Hazardous Substance Fact Sheet

Common Name: **1,1,2-TRICHLORO-1, 2, 2-TRIFLUOROETHANE**

Synonyms: Freon®113; Genetron®113

Chemical Name: Ethane, 1,1,2-Trichloro-1,2,2,-Trifluoro-

Date: June 2000

Revision: March 2010

CAS Number: 76-13-1

RTK Substance Number: 1904

DOT Number: None

Description and Use

1,1,2-Trichloro-1,2,2-Trifluoroethane is a colorless liquid with a faint, sweet or *Ether*-like odor at high concentrations. It is used as a refrigerant, heat transfer medium, solvent and chemical intermediate.

▶ **ODOR THRESHOLD = 45 ppm**

- ▶ Odor thresholds vary greatly. Do not rely on odor alone to determine potentially hazardous exposures.

Reasons for Citation

- ▶ **1,1,2-Trichloro-1,2,2-Trifluoroethane** is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, NIOSH, DEP, IRIS and EPA.

[SEE GLOSSARY ON PAGE 5.](#)

FIRST AID

Eye Contact

- ▶ Immediately flush with large amounts of water for at least 15 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while rinsing.

Skin Contact

- ▶ Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.
▶ Immerse affected part in warm water. Seek medical attention.

Inhalation

- ▶ Remove the person from exposure.
▶ Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
▶ Transfer promptly to a medical facility.
▶ Medical observation is recommended for 24 to 48 hours after overexposure, as pulmonary edema may be delayed.

EMERGENCY NUMBERS

Poison Control: 1-800-222-1222

CHEMTREC: 1-800-424-9300

NJDEP Hotline: 1-877-927-6337

National Response Center: 1-800-424-8802

EMERGENCY RESPONDERS >>>> SEE LAST PAGE

Hazard Summary

Hazard Rating	NJDOH	NFPA
HEALTH	2	-
FLAMMABILITY	0	-
REACTIVITY	0	-
DOES NOT BURN POISONOUS GASES ARE PRODUCED IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

- ▶ **1,1,2-Trichloro-1,2,2-Trifluoroethane** can affect you when inhaled.
- ▶ Contact can irritate and burn the skin and cause frostbite. Prolonged or repeated contact can cause a skin rash, dryness and redness.
- ▶ Exposure to **1,1,2-Trichloro-1,2,2-Trifluoroethane** can irritate the eyes, nose and throat.
- ▶ Inhaling **1,1,2-Trichloro-1,2,2-Trifluoroethane** can irritate the lungs. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency.
- ▶ **1,1,2-Trichloro-1,2,2-Trifluoroethane** can cause headache, dizziness, lightheadedness and passing out. Exposure to very high levels can cause trouble breathing, collapse, and even death.
- ▶ Higher exposure may affect the heartbeat causing irregular rhythms (arrhythmia).
- ▶ **1,1,2-Trichloro-1,2,2-Trifluoroethane** may affect the liver.

Workplace Exposure Limits

OSHA: The legal airborne permissible exposure limit (PEL) is **1,000 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit (REL) is **1,000 ppm** averaged over a 10-hour workshift and **1,250 ppm**, not to be exceeded during any 15-minute work period.

ACGIH: The threshold limit value (TLV) is **1,000 ppm** averaged over an 8-hour workshift and **1,250 ppm** as a STEL (short-term exposure limit).

Determining Your Exposure

- ▶ Read the product manufacturer's Material Safety Data Sheet (MSDS) and the label to determine product ingredients and important safety and health information about the product mixture.
- ▶ For each individual hazardous ingredient, read the New Jersey Department of Health Hazardous Substance Fact Sheet, available on the RTK website (www.nj.gov/health/eoh/rtkweb) or in your facility's RTK Central File or Hazard Communication Standard file.
- ▶ You have a right to this information under the New Jersey Worker and Community Right to Know Act and the Public Employees Occupational Safety and Health (PEOSH) Act if you are a public worker in New Jersey, and under the federal Occupational Safety and Health Act (OSHA) if you are a private worker.
- ▶ The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) require employers to provide similar information and training to their employees.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Health Hazard Information

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **1,1,2-Trichloro-1,2,2-Trifluoroethane**:

- ▶ Contact can irritate and burn the skin and cause frostbite. Prolonged or repeated contact can cause a skin rash, dryness and redness.
- ▶ Exposure **1,1,2-Trichloro-1,2,2-Trifluoroethane** can irritate the eyes, nose and throat.
- ▶ Inhaling **1,1,2-Trichloro-1,2,2-Trifluoroethane** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
- ▶ **1,1,2-Trichloro-1,2,2-Trifluoroethane** can cause headache, dizziness, lightheadedness, fatigue, confusion, recent memory loss, convulsions and passing out. Exposure to very high levels can cause trouble breathing, collapse, and even death.
- ▶ Higher exposure may affect the heartbeat causing irregular rhythms (arrhythmia), which can be fatal.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **1,1,2-Trichloro-1,2,2-Trifluoroethane** and can last for months or years:

Cancer Hazard

- ▶ While **1,1,2-Trichloro-1,2,2-Trifluoroethane** has been tested, it is not classifiable as to its potential to cause cancer.

Reproductive Hazard

- ▶ There is no evidence that **1,1,2-Trichloro-1,2,2-Trifluoroethane** affects reproduction. This is based on test results presently available to the NJDOH from published studies.

Other Effects

- ▶ **1,1,2-Trichloro-1,2,2-Trifluoroethane** can irritate the lungs. Repeated exposure may cause bronchitis to develop with coughing, phlegm, and/or shortness of breath.
- ▶ **1,1,2-Trichloro-1,2,2-Trifluoroethane** may affect the liver.

Medical

Medical Testing

Before beginning employment and at regular times thereafter, (at least annually), the following are recommended:

- ▶ Liver function tests

If symptoms develop or overexposure is suspected, the following are recommended:

- ▶ Consider chest x-ray after acute overexposure
- ▶ Special 24-48 hours EKG (Holter monitor) to observe and record abnormal heart rhythms
- ▶ Neurological evaluation

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

Mixed Exposures

- ▶ More than light alcohol consumption can cause liver damage. Drinking alcohol may increase the liver damage caused by **1,1,2-Trichloro-1,2,2-Trifluoroethane**.

Workplace Controls and Practices

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at www.cdc.gov/niosh/topics/ctrlbanding/.

The following work practices are also recommended:

- ▶ Label process containers.
- ▶ Provide employees with hazard information and training.
- ▶ Monitor airborne chemical concentrations.
- ▶ Use engineering controls if concentrations exceed recommended exposure levels.
- ▶ Provide eye wash fountains and emergency showers.
- ▶ Wash or shower if skin comes in contact with a hazardous material.
- ▶ Always wash at the end of the workshift.
- ▶ Change into clean clothing if clothing becomes contaminated.
- ▶ Do not take contaminated clothing home.
- ▶ Get special training to wash contaminated clothing.
- ▶ Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- ▶ Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

- ▶ Before entering a confined space where **1,1,2-Trichloro-1,2,2-Trifluoroethane** is present, check to make sure sufficient *Oxygen* (19.5%) exists.

Personal Protective Equipment

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Gloves and Clothing

- ▶ Avoid skin contact with **1,1,2-Trichloro-1,2,2-Trifluoroethane**. Wear personal protective equipment made from material which can not be permeated or degraded by this substance. Safety equipment suppliers and manufacturers can provide recommendations on the most protective glove and clothing material for your operation.
- ▶ Safety equipment manufacturers recommend Butyl, Nitrile, Neoprene and Viton for gloves, and Tychem® CPF 3, BR, Responder®, and TK, or the equivalent, as protective materials for clothing.

- ▶ Where exposure to cold equipment, vapors, or liquid may occur, employees should be provided with *insulated* gloves and special clothing designed to prevent the freezing of body tissues.
- ▶ All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- ▶ Wear indirect-vent, impact and splash resistant goggles when working with liquids.
- ▶ If additional protection is needed for the entire face, use in combination with a face shield. A face shield should not be used without another type of eye protection.

Respiratory Protection

Improper use of respirators is dangerous. Respirators should only be used if the employer has implemented a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- ▶ Where the potential exists for exposure over **1,000 ppm**, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus or an emergency escape air cylinder.
- ▶ Exposure to **2,000 ppm** is immediately dangerous to life and health. If the possibility of exposure above **2,000 ppm** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

Fire Hazards

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

- ▶ Extinguish fire using an agent suitable for type of surrounding fire. **1,1,2-Trichloro-1,2,2-Trifluoroethane** itself does not burn.
- ▶ POISONOUS GASES ARE PRODUCED IN FIRE, including *Hydrogen Chloride*, *Hydrogen Fluoride*, and *Phosgene*.
- ▶ Use water spray to keep fire-exposed containers cool.

Spills and Emergencies

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

If **1,1,2-Trichloro-1,2,2-Trifluoroethane** is spilled or leaked, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Eliminate all ignition sources.
- ▶ Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal.
- ▶ Wash all contaminated surfaces with *Alcohol* followed by washing with a strong soap and water solution.
- ▶ Ventilate area of spill or leak.
- ▶ DO NOT wash into sewer.
- ▶ It may be necessary to contain and dispose of **1,1,2-Trichloro-1,2,2-Trifluoroethane** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

Handling and Storage

Prior to working with **1,1,2-Trichloro-1,2,2-Trifluoroethane** you should be trained on its proper handling and storage.

- ▶ **1,1,2-Trichloro-1,2,2-Trifluoroethane** may react violently with CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC) and their ALLOYS.
- ▶ Contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) releases toxic *Chlorine gas*.
- ▶ **1,1,2-Trichloro-1,2,2-Trifluoroethane** is not compatible with FINELY POWDERED METALS and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).
- ▶ Store in tightly closed containers in a cool, well-ventilated area away from SUNLIGHT.

Occupational Health Information Resources

The New Jersey Department of Health offers multiple services in occupational health. These services include providing informational resources, educational materials, public presentations, and industrial hygiene and medical investigations and evaluations.

For more information, please contact:

New Jersey Department of Health
Right to Know
PO Box 368
Trenton, NJ 08625-0368
Phone: 609-984-2202
Fax: 609-984-7407
E-mail: rtk@doh.state.nj.us
Web address: <http://www.nj.gov/health/eoh/rtkweb>

The Right to Know Hazardous Substance Fact Sheets are not intended to be copied and sold for commercial purposes.

GLOSSARY

ACGIH is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

Acute Exposure Guideline Levels (AEGs) are established by the EPA. They describe the risk to humans resulting from once-in-a-lifetime, or rare, exposure to airborne chemicals.

Boiling point is the temperature at which a substance can change its physical state from a liquid to a gas.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is a unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

CFR is the Code of Federal Regulations, which are the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes destruction of human skin or severe corrosion of containers.

The **critical temperature** is the temperature above which a gas cannot be liquefied, regardless of the pressure applied.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

ERG is the Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

Emergency Response Planning Guideline (ERPG) values provide estimates of concentration ranges where one reasonably might anticipate observing adverse effects.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group.

Ionization Potential is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

IRIS is the Integrated Risk Information System database on human health effects that may result from exposure to various chemicals, maintained by federal EPA.

LEL or Lower Explosive Limit, is the lowest concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the federal Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the New Jersey Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

Permeated is the movement of chemicals through protective materials.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

Protective Action Criteria (PAC) are values established by the Department of Energy and are based on AEGs and ERPGs. They are used for emergency planning of chemical release events.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

STEL is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

UEL or Upper Explosive Limit is the highest concentration in air above which there is too much fuel (gas or vapor) to begin a reaction or explosion.

Vapor Density is the ratio of the weight of a given volume of one gas to the weight of another (usually *Air*), at the same temperature and pressure.

The **vapor pressure** is a force exerted by the vapor in equilibrium with the solid or liquid phase of the same substance. The higher the vapor pressure the higher concentration of the substance in air.

Common Name: **1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE**

Synonyms: Freon®113; Genetron®113

CAS No: 76-13-1

Molecular Formula: C₂Cl₃F₃

RTK Substance No: 1904

Description: Colorless liquid with a faint, sweet or *Ether*-like odor at high concentrations

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
<p>2 - Health</p> <p>0 - Fire</p> <p>0 - Reactivity</p> <p>DOT#: None</p> <p>ERG Guide #: 171</p> <p>Hazard Class: None</p>	<p>Extinguish fire using an agent suitable for type of surrounding fire. 1,1,2-Trichloro-1,2,2-Trifluoroethane itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Hydrogen Chloride</i>, <i>Hydrogen Fluoride</i>, and <i>Phosgene</i>.</p> <p>Use water spray to keep fire-exposed containers cool.</p>	<p>1,1,2-Trichloro-1,2,2-Trifluoroethane may react violently with CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC) and their ALLOYS.</p> <p>Contact with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) releases toxic <i>Chlorine gas</i>.</p> <p>1,1,2-Trichloro-1,2,2-Trifluoroethane is not compatible with FINELY POWDERED METALS and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).</p>

SPILL/LEAKS

Isolation Distance:

Spill: 50 meters (150 feet)

Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, or a similar material and place into sealed containers for disposal.

Wash all contaminated surfaces with *alcohol* followed by washing with a strong soap and water solution.

DO NOT wash into sewer.

1,1,2-Trichloro-1,2,2-Trifluoroethane is toxic to aquatic life and impacts the ozone layer.

PHYSICAL PROPERTIES

Odor Threshold:	45 ppm
Flash Point:	Noncombustible
Auto Ignition Temp:	1,256°F (680°C)
Vapor Density:	6.5 (air = 1)
Vapor Pressure:	285 mm Hg at 68°F (20°C)
Specific Gravity:	1.57 (water = 1)
Water Solubility:	Insoluble
Boiling Point:	118°F (48°C)
Freezing Point:	-31°F (-35°C)
Ionization Potential:	11.99 eV
Molecular Weight:	187.4

EXPOSURE LIMITS

OSHA: 1,000 ppm, 8-hr TWA

NIOSH: 1,000 ppm, 10-hr TWA; 1,250 ppm STEL

ACGIH: 1,000 ppm, 8-hr TWA; 1,250 ppm STEL

IDLH: 2,000 ppm

The Protective Action Criteria values are:

PAC-1 = 1,250 ppm PAC-2 = 1,500 ppm

PAC-3 = 2,000 ppm

PROTECTIVE EQUIPMENT

Gloves:	Insulated Butyl, Nitrile, Neoprene and Viton (>8-hr breakthrough)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough)
Respirator:	>1,000 ppm - SCBA

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation, frostbite, burns, rash and redness
Inhalation:	Nose, throat and lung irritation, with coughing, and severe shortness of breath (pulmonary edema)
	Headache, dizziness, confusion, recent memory loss, convulsions, and passing out. Very high levels can cause trouble breathing, irregular heart rhythms collapse and even death.

FIRST AID AND DECONTAMINATION

Remove	the person from exposure.
Flush	eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn.
Quickly	remove contaminated clothing and wash contaminated skin with large amounts of soap and water.
Immerse	affected part in warm water. Seek medical attention.
Transfer	promptly to a medical facility.
Medical	observation is recommended as symptoms may be delayed.