Common Name: **TETRACHLOROETHYLENE**

Description and Use

Tetrachloroethylene is a clear, colorless liquid with a sweet Ether-like odor. It is used as a dry cleaning solvent, heat transfer medium, degreaser, solvent, and drying agent for metals.

- ODOR THRESHOLD = 5 to 50 ppm
- Odor thresholds vary greatly. Do not rely on odor alone to determine potentially hazardous exposures.

Reasons for Citation

- Tetrachloroethylene is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, NTP, DEP, IARC, IRIS, NFPA and EPA.
- This chemical is on the Special Health Hazard Substance List.

**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.

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.

**WORKPLACE EXPOSURE LIMITS**

OSHA: The legal airborne permissible exposure limit (PEL) is 100 ppm averaged over an 8-hour workshift, 200 ppm, not to be exceeded during any 15-minute work period, and 300 ppm as a maximum peak for 5-minutes during any 3-hour period.

NIOSH: Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.

ACGIH: The threshold limit value (TLV) is 25 ppm averaged over an 8-hour workshift and 100 ppm as a STEL (short-term exposure limit).

Tetrachloroethylene is a PROBABLE CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

**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
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 Tetrachloroethylene:
- Contact can irritate and burn the skin and eyes.
- Exposure can irritate the eyes, nose and throat.
- Inhaling Tetrachloroethylene 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.
- Exposure can cause headache, dizziness, lightheadedness, incoordination, nausea, vomiting, and passing out.

Chronic Health Effects
The following chronic (long-term) health effects can occur at some time after exposure to Tetrachloroethylene and can last for months or years:

Cancer Hazard
- Tetrachloroethylene is a PROBABLE CARCINOGEN in humans. There is evidence that it causes cancer of the liver, esophagus, bladder, and other types of cancer in humans. It has also been shown to cause cancer of the liver and leukemia in animals.

Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard
- Tetrachloroethylene may damage the developing fetus.
- Tetrachloroethylene may decrease fertility in males and females and may damage the male (testes) and female (ovaries) reproductive systems in animals.
- There is limited evidence that Tetrachloroethylene causes spontaneous abortions.

Other Effects
- Prolonged or repeated exposure can cause drying and cracking of the skin with rash, redness and blisters.
- Tetrachloroethylene may damage the liver and kidneys and affect the nervous system and heart.

Medical

Medical Testing
For frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

- Liver and kidney function tests
- Consider chest x-ray after acute overexposure
- Exam of the nervous system
- EKG

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.

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

Mixed Exposures
- Smoking can cause heart disease, lung cancer, emphysema, and other respiratory problems. It may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.
- More than light alcohol consumption can cause liver damage. Drinking alcohol can increase the liver damage caused by Tetrachloroethylene.
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/ctlrbanding/.

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:

▶ Where possible, transfer Tetrachloroethylene from drums or other containers to process containers in an enclosed system.

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 Tetrachloroethylene. Wear personal protective equipment made from material that cannot 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.
▶ The recommended glove materials for Tetrachloroethylene are Polyvinyl Alcohol, Silver Shield®/4H®, Viton, Viton/Butyl and Barrier®.
▶ The recommended protective clothing materials for Tetrachloroethylene are Tychem® F, CPF3, BR, CSM and TK; and Trellchem® HPS and VPS, or the equivalent.
▶ All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

▶ Wear indirect vent goggles when working with liquids that may splash, spray or mist. A face shield is also required if the liquid is severely irritating or corrosive to the skin and eyes.

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 to Tetrachloroethylene, use a NIOSH approved respirator with an organic vapor cartridge. More protection is provided by a full facepiece respirator than by a half-mask respirator, and even greater protection is provided by a powered-air purifying respirator.
▶ Leave the area immediately if (1) while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect Tetrachloroethylene, (2) while wearing particulate filters abnormal resistance to breathing is experienced, or (3) eye irritation occurs while wearing a full facepiece respirator.
▶ Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
▶ Consider all potential sources of exposure in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
▶ Where the potential exists for exposure over 25 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 150 ppm is immediately dangerous to life and health. If the possibility of exposure above 150 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. Tetrachloroethylene itself does not burn.
▶ POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride 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 Tetrachloroethylene 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.
- Ventilate area of spill or leak.
- DO NOT wash into sewer.
- It may be necessary to contain and dispose of Tetrachloroethylene 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 Tetrachloroethylene you should be trained on its proper handling and storage.

- Tetrachloroethylene reacts violently with finely dispersed or finely divided METALS (such as ALUMINUM, BARIUM, LITHIUM, BERYLLIUM and ZINC).
- Tetrachloroethylene is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); SULFURIC ACID; NITRIC ACID; SODIUM HYDROXIDE; and POTASSIUM HYDROXIDE.
- Tetrachloroethylene slowly decomposes in WATER to form acids such as Hydrogen Chloride.
- Tetrachloroethylene decomposes slowly with heating, and with exposure to ultraviolet light or on contact with hot surfaces, to form toxic Hydrogen Chloride and Phosgene gases.
- Store in tightly closed containers in a cool, well-ventilated area.

**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

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TETRACHLOROETHYLENE

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 (AEGLS) 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 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 AEGLS 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: **TETRACHLOROETHYLENE**

Synonyms: Ethene, Tetrachloro-; Ethylene Tetrachloride; Perchloroethylene

CAS No: 127-18-4

Molecular Formula: \( \text{Cl}_2\text{C} = \text{CCl}_2 \)

RTK Substance No: 1810

Description: Clear, colorless liquid with a sweet *Ether*-like odor

### HAZARD DATA

<table>
<thead>
<tr>
<th>Hazard Rating</th>
<th>Firefighting</th>
<th>Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - Health</td>
<td>Extinguish fire using an agent suitable for type of surrounding fire. <strong>Tetrachloroethylene</strong> itself does not burn. <strong>POISONOUS GASES ARE PRODUCED IN FIRE</strong>, including <em>Hydrogen Chloride</em> and <em>Phosgene</em>. Use water spray to keep fire-exposed containers cool.</td>
<td><strong>Tetrachloroethylene</strong> reacts violently with <em>finely dispersed or finely divided METALS</em> (such as ALUMINUM, BARIUM, LITHIUM, BERYLLIUM and ZINC). <strong>Tetrachloroethylene</strong> is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, NITRATES, CHLORINE, FLUORINE); SULFURIC ACID; NITRIC ACID; SODIUM HYDROXIDE; and POTASSIUM HYDROXIDE. <strong>Tetrachloroethylene</strong> slowly decomposes in WATER to form acids such as Hydrogen Chloride. <strong>Tetrachloroethylene</strong> decomposes slowly with heating, and with exposure to ultraviolet light or on contact with hot surfaces, to form toxic <em>Hydrogen Chloride</em> and <em>Phosgene</em> gases.</td>
</tr>
<tr>
<td>0 - Fire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - Reactivity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DOT#:** UN 1897  
**ERG Guide #:** 160  
**Hazard Class:** 6.1 (Toxic)

### SPILL/LEAKS

**Isolation Distance:**
- **Spill:** 50 meters (150 feet)
- **Fire:** 800 meters (1/2 mile)

Absorb liquids in dry sand, earth, or a similar material and place into sealed containers for disposal. DO NOT wash into sewer.

**Tetrachloroethylene** is toxic to aquatic organisms and may cause long term effects on the aquatic environment.

### PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odor Threshold</td>
<td>5 to 50 ppm</td>
</tr>
<tr>
<td>Flash Point</td>
<td>Noncombustible</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>5.8 (air = 1)</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>14 mm Hg at 68°F (20°C)</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.62 (water = 1)</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>Very slightly soluble</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>250°F (121°C)</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>-2°F (-19°C)</td>
</tr>
<tr>
<td>Ionization Potential</td>
<td>9.32 eV</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>165.8</td>
</tr>
</tbody>
</table>

### EXPOSURE LIMITS

**OSHA:** 100 ppm, 8-hr TWA; 200 ppm, Ceiling; 300 ppm, Peak  
**NIOSH:** Lowest feasible concentration  
**ACGIH:** 25 ppm, 8-hr TWA; 100 ppm, STEL  
**IDLH:** 150 ppm

The Protective Action Criteria values are:
- PAC-1 = 35 ppm  
- PAC-2 = 230 ppm  
- PAC-3 = 1,200 ppm

### PROTECTIVE EQUIPMENT

**Gloves:** Polyvinyl Alcohol, Silver Shield®/4H®, Viton, Viton/Butyl and Barrier® (>8-hr breakthrough)  
**Coveralls:** Tychem® F, CPF3, BR and CSM; Trellchem® HPS and VPS (>8-hr breakthrough)  
**Respirator:** <25 ppm - full facepiece APR with Organic vapor filters Spills or Fire - SCBA

### HEALTH EFFECTS

**Eyes:** Irritation and burns  
**Skin:** Irritation and burns (skin absorbable)  
**Inhalation:** Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)  
- Headache, dizziness, lightheadedness, and passing out  
**Chronic:** Cancer (liver, esophagus and bladder)

### 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.  
Begin artificial respiration if breathing has stopped and CPR if necessary.  
Transfer promptly to a medical facility.  
Medical observation is recommended as symptoms may be delayed.