Right to Know

# Hazardous Substance Fact Sheet

Common Name: **CYCLONITE**

Synonyms: Hexogen; RDX

Chemical Name: 1,3,5-Triazine, Hexahydro-1,3,5-Trinitro-

Date: January 1999 Revision: July 2008

CAS Number: 121-82-4

RTK Substance Number: 0579

DOT Number: UN 0483

EMERGENCY RESPONDERS >>>> SEE BACK PAGE

## Description and Use

**Cyclonite** is a white, crystalline (sand-like) powder. It is used as a rat poison (rodenticide) and as a powerful military explosive. It is also used as a base charge for detonators and in plastic explosives.

## Hazard Summary

| Hazard Rating | NJDOH | NFPA |
|---|---|---|
| HEALTH | 2 | - |
| FLAMMABILITY | * | - |
| REACTIVITY | * | - |

* EXPLOSIVE
CARCINOGEN
POISONOUS GASES ARE PRODUCED IN FIRE

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

## Reasons for Citation

- **Cyclonite** is on the Right to Know Hazardous Substance List because it is cited by ACGIH, DOT, NIOSH and IRIS.
- This chemical is on the Special Health Hazard Substance List**.**

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.

**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.

## 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**

- **Cyclonite** can affect you by inhalation and may be absorbed through the skin.
- **Cyclonite** should be handled as a CARCINOGEN--WITH EXTREME CAUTION.
- **Cyclonite** can irritate the skin causing a rash or burning feeling on contact.
- Exposure can irritate the eyes, nose and throat.
- Exposure to **Cyclonite** can cause headache, nausea, vomiting and loss of appetite.
- **Cyclonite** can cause weakness, confusion, dizziness and seizures (fits).
- **Cyclonite** may affect the liver and kidneys.
- Exposure to high levels may damage the nervous system.

## Workplace Exposure Limits

NIOSH: The recommended airborne exposure limit (REL) is **1.5 mg/m$^3$** averaged over a 10-hour workshift and **3 mg/m$^3$**, not to be exceeded during any 15-minute work period.

ACGIH: The threshold limit value (TLV) is **0.5 mg/m$^3$** averaged over an 8-hour workshift.

- **Cyclonite** may be a 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.

## 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, 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 **Cyclonite**:

- **Cyclonite** can irritate the skin causing a rash or burning feeling on contact.
- Exposure can irritate the eyes, nose and throat.
- Exposure to **Cyclonite** can cause headache, nausea, vomiting and loss of appetite.
- **Cyclonite** can cause weakness, confusion, irritability, dizziness, fatigue, and seizures (fits).

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

***Cancer Hazard***
- **Cyclonite** may be a CARCINOGEN in humans since it has been shown to cause liver cancer in animals.
- Many scientists believe there is no safe level of exposure to a carcinogen.

***Reproductive Hazard***
- There is limited evidence that **Cyclonite** may damage the male reproductive system (including decreasing the sperm count) in animals.

***Other Effects***
- **Cyclonite** may affect the liver and kidneys
- Exposure to high levels may damage the nervous system.

## Medical

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

- Liver and kidney function tests

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

- Exam of the nervous system

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 **Cyclonite**.

## 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:

- Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA *Explosive and Blasting Agents* Standard (29 CFR 1910.109).
- Use only in a closed system to prevent deposition of dust.
- Use shoe cleaning mats to prevent bringing metal or gritty dirt into the workplace. Keep floors clean.
- Before entering a confined space where **Cyclonite** may be present, check to make sure that an explosive concentration does not exist.

## 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 **Cyclonite**. Wear personal protective equipment made from material that 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 Neoprene for gloves and DuPont Tyvek®, or the equivalent, as protective materials for clothing.
- All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

**Eye Protection**

- Wear eye protection with side shields or goggles.
- Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

**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 **0.5 mg/m$^3$**, use a NIOSH approved air-purifying, particulate filter respirator with an N100 filter. 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 **Cyclonite**, (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 **5 mg/m$^3$**, 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 operated in a pressure-demand or other positive-pressure mode.

## 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).

- **Cyclonite** is an EXPLOSIVE.
- Evacuate and let the fire burn or use large amounts of water from a sheltered position.
- POISONOUS GASES ARE PRODUCED IN FIRE, including *Nitrogen Oxides*.
- Use water spray to keep fire-exposed containers cool.
- **Cyclonite** may ignite combustibles (wood, paper and oil).

## 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 **Cyclonite** is spilled, take the following steps:

- Evacuate personnel and secure and control entrance to the area.
- Eliminate all sources of ignition and prevent friction and shock.
- Clean up spill using qualified specialists only.
- DO NOT wash into sewer.
- Keep **Cyclonite** out of confined spaces, such as sewers, because of the possibility of an explosion.
- It may be necessary to contain and dispose of **Cyclonite** 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 **Cyclonite** you should be trained on its proper handling and storage.

- **Cyclonite** detonates on contact with MERCURY FULMINATE. Detonation can also be initiated by SUDDEN SHOCK, HIGH TEMPERATURE and/or FRICTION.
- **Cyclonite** reacts violently with COMBUSTIBLES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES).
- Store in tightly closed containers in a cool, well-ventilated area away from HEAT (decomposes above 212$^{o}$F (100$^{o}$C)) and other EXPLOSIVES.
- Sources of ignition, such as smoking and open flames, are prohibited where **Cyclonite** is used, handled, or stored.
- Use explosion-proof electrical equipment and fittings wherever **Cyclonite** is used, handled, manufactured, or stored.
- Metal containers involving the transfer of **Cyclonite** should be grounded and bonded.
- Use only non-sparking tools and equipment, especially when opening and closing containers of **Cyclonite**.

## 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

## 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.

**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 are intended to 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 maintained by federal EPA. The database contains information on human health effects that may result from exposure to various chemicals in the environment.

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

**$mg/m^3$** 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.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

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

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 *Hydrogen*), at the same temperature and pressure.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

NJ Health New Jersey Department of Health

Right to Know Hazardous Substance Fact Sheet

Emergency Responders Quick Reference

Common Name: **CYCLONITE**

Synonyms: Hexogen; RDX
CAS No: 121-82-4
Molecular Formula: $C_3H_6N_6O_6$
RTK Substance No: 0579
Description: White, crystalline powder

## HAZARD DATA

| Hazard Rating | Firefighting | Reactivity |
|---|---|---|
| **2 - Health**<br>*** - Fire**<br>*** - Reactivity**<br>**DOT#:** UN 0483<br>**ERG Guide #:** 112<br>**Hazard Class:** 1.1 (Explosive) | * EXPLOSIVE<br>Evacuate and let the fire burn or use large amounts of water from a sheltered position.<br>POISONOUS GASES ARE PRODUCED IN FIRE, including *Nitrogen Oxides*.<br>Use water spray to keep fire-exposed containers cool.<br>**Cyclonite** may ignite combustibles (wood, paper and oil). | **Cyclonite** detonates on contact with MERCURY FULMINATE. Detonation can also be initiated by SUDDEN SHOCK, HIGH TEMPERATURE and/or FRICTION.<br>**Cyclonite** reacts violently with COMBUSTIBLES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES). |

## SPILL/LEAKS

**Isolation Distance:**

Small Spill: 500 meters (1/3 mile)

Large Spill: 800 meters (1/2 mile)

Fire: 1,600 meters (1 mile)

Use a cleanup specialist .
Keep **Cyclonite** out of confined spaces, such as sewers, because of the possibility of an explosion.
DO NOT wash into sewer.
This substance is harmful to aquatic organisms.

## PHYSICAL PROPERTIES

| | |
|---|---|
| **Odor Threshold:** | None |
| **Flash Point:** | Explodes |
| **Exothermic Decomp:** | 212°F (100°C) |
| **Vapor Pressure:** | $4.1 \times 10^{-9}$ mm Hg at 68°F (20°C) |
| **Specific Gravity:** | 1.82 (water = 1) |
| **Water Solubility:** | Insoluble |
| **Boiling Point:** | 528° to 536°F (276° to 280°C) |
| **Melting Point:** | 402°F (206°C) |
| **Molecular Weight:** | 222.2 |

## EXPOSURE LIMITS

| | |
|---|---|
| **OSHA:** | None |
| **NIOSH:** | 1.5 mg/m$^3$, 10-hr TWA; 3 mg/m$^3$, 15-min STEL |
| **ACGIH:** | 0.5 mg/m$^3$, 8-hr TWA |
| **IDLH:** | None |

## PROTECTIVE EQUIPMENT

| | |
|---|---|
| **Gloves:** | Neoprene |
| **Coveralls:** | DuPont Tyvek® |
| **Respirator:** | <0.5 mg/m$^3$ - Full facepiece APR with High efficiency filter<br>>0.5 mg/m$^3$ - Supplied air |

## HEALTH EFFECTS

| | |
|---|---|
| **Eyes:** | Irritation |
| **Skin:** | Irritation, rash or burning feeling |
| **Inhalation:** | Nose and throat irritation |
| | Headache, nausea, vomiting, weakness, confusion and seizures |
| **Chronic:** | Cancer (liver) in animals |

## 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. Immediately 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.