



Right to Know Hazardous Substance Fact Sheet

Common Name: **MERCURIC CYANIDE**

Synonyms: Dicyanomercurey

Chemical Name: Mercury Cyanide ($\text{Hg}(\text{CN})_2$)

Date: February 2000 Revision: May 2009

CAS Number: 592-04-1

RTK Substance Number: 1171

DOT Number: UN 1636

Description and Use

Mercuric Cyanide is an odorless, clear, or white, crystalline (sand-like) powder. It is used in germicidal soaps, photography, and making *Cyanogen gas*.

Reasons for Citation

- ▶ **Mercuric Cyanide** is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, DEP, NFPA 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 flushing. Seek medical attention.

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.
- ▶ Use *Amyl Nitrite* capsules if symptoms develop. All area employees should be trained regularly in emergency treatment of *Cyanide* poisoning and in CPR. A *Cyanide* antidote kit MUST be rapidly available and ingredients replaced every 1 to 2 years to ensure freshness.

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	-	3
FLAMMABILITY	-	0
REACTIVITY	1	0
POISONOUS GASES ARE PRODUCED IN FIRE		

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

- ▶ **Mercuric Cyanide** can affect you when inhaled and may be absorbed through the skin.
- ▶ Contact can irritate and burn the skin and eyes with possible eye damage.
- ▶ Inhaling **Mercuric Cyanide** can irritate the nose, throat and lungs.
- ▶ Exposure can cause metallic taste in the mouth, nausea, vomiting and abdominal pain.
- ▶ **Mercuric Cyanide** may cause a skin allergy and make the skin turn gray.
- ▶ Repeated exposure can cause *Mercury* poisoning with tremors, personality changes, trouble remembering and concentrating, and gum problems.
- ▶ **Mercuric Cyanide** may damage the kidneys.
- ▶ If **Mercuric Cyanide** is involved in a fire it can release *Hydrogen Cyanide gas*. Consult the *Right to Know Hazardous Substance Fact Sheet on HYDROGEN CYANIDE*.

Workplace Exposure Limits

- OSHA: The legal airborne permissible exposure limit (PEL) is **0.1 mg/m³**, not to be exceeded at any time.
- NIOSH: The recommended airborne exposure limit (REL) is **0.05 mg/m³** (as *Mercury vapor*) averaged over a 10-hour workshift and **0.1 mg/m³** (as *Mercury*), not to be exceeded at any time.
- ACGIH: The threshold limit value (TLV) is **0.025 mg/m³** (as *Mercury*) averaged over an 8-hour workshift.

The following exposure limits are for *Hydrogen Cyanide*:

- OSHA: The legal airborne permissible exposure limit (PEL) is **11 mg/m³ (10 ppm)** averaged over an 8-hour workshift.
- NIOSH: The recommended airborne exposure limit (REL) is **5 mg/m³ (4.7 ppm)**, which should not be exceeded during any 15-minute work period.
- ACGIH: The threshold limit value (TLV) is **5 mg/m³ (4.7 ppm)**, which should not be exceeded at any time.

- ▶ 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 **Mercuric Cyanide**:

- ▶ Contact can irritate and burn the skin and eyes with possible eye damage.
- ▶ Inhaling **Mercuric Cyanide** can irritate the nose, throat and lungs causing coughing, wheezing and/or shortness of breath.
- ▶ Exposure can cause metallic taste in the mouth, nausea, vomiting and abdominal pain.

Chronic Health Effects

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

Cancer Hazard

- ▶ There is no evidence that **Mercuric Cyanide** causes cancer in animals. This is based on test results presently available to the NJDOH from published studies.

Reproductive Hazard

- ▶ While **Mercuric Cyanide** has not been tested for its ability to affect reproduction, it should be HANDLED WITH CAUTION since several related *Mercury compounds* have caused reproductive damage.

Other Effects

- ▶ **Mercuric Cyanide** may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a skin rash.
- ▶ Repeated contact can cause the skin to turn gray, brown staining in the eyes, and may affect peripheral vision (ability to see to the sides).
- ▶ Repeated exposure or a very high single exposure can cause *Mercury poisoning*. Symptoms include tremors (shaking), trouble remembering and concentrating, gum problems, increased salivation, loss of appetite and weight, and changes in mood and personality. These can be severe and cause hallucinating and psychosis.
- ▶ **Mercuric Cyanide** may damage the kidneys.

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:

- ▶ Exam of the nervous system (including handwriting test to detect early hand tremor)
- ▶ Urine *Mercury* level (usually less than **0.02 mg/liter**)
- ▶ Kidney function tests

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

- ▶ Exam of the eyes and vision
- ▶ Evaluation by a qualified allergist can help diagnose skin allergy.
- ▶ Consider neurobehavioral, nerve conduction and urinary enzyme testing

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

- ▶ Creams to whiten or bleach skin may contain *Mercury*. If you use them, you may be at increased risk of *Mercury* poisoning. A high fish diet, especially of marine predatory fish (fish-eating fish), also may increase your blood *Mercury* levels.

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:

- ▶ For clean-up, use a specialized charcoal-filtered vacuum to avoid generating *Mercury vapor*. Do not disturb spilled material.

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 **Mercuric Cyanide**. 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 Neoprene, Nitrile, Barrier® and Silver Shield®/4H® as glove materials for *Mercury* and *Hydrogen Cyanide*; and Tychem® BR, Responder® and TK, or the equivalent, as clothing materials for *Mercury* and *Hydrogen Cyanide*. Tyvek® can be worn for **Mercuric Cyanide** in work environments where **Mercuric Cyanide** is not heated or decomposed by light or water.

- ▶ 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.
- ▶ 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 **0.05 mg/m³** (as *Mercury vapor*), or over **0.1 mg/m³** but less than **1 mg/m³** (as *Mercury*), use a NIOSH approved half-mask respirator with cartridges specific for *Mercury vapor*. These cartridges have end of service life indicators (ESLI) which visually indicate when filters must be changed.
- ▶ If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect *Mercury*, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. 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.
- ▶ Be sure to consider all potential exposures 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 **0.5 mg/m³** (as *Mercury vapor*) or over **1 mg/m³** (as *Mercury*), 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.
- ▶ Where the potential exists for exposure over **5 mg/m³** (as *Hydrogen Cyanide*), 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 **10 mg/m³** (as *Mercury*) is immediately dangerous to life and health. If the possibility of exposure above **10 mg/m³** 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. **Mercuric Cyanide** itself does not burn.
- ▶ POISONOUS GASES ARE PRODUCED IN FIRE, including *Mercury, Mercury Oxides, Hydrogen Cyanide* and *Nitrogen Oxides*.
- ▶ 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 **Mercuric Cyanide** is spilled, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Eliminate all ignition sources.
- ▶ For clean-up, use a specialized charcoal-filtered vacuum or suction pump to avoid generating *Mercury vapor*. Do not disturb spilled material.
- ▶ Ventilate and wash area after clean-up is complete.
- ▶ DO NOT wash into sewer.
- ▶ It may be necessary to contain and dispose of **Mercuric Cyanide** 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 **Mercuric Cyanide** you should be trained on its proper handling and storage.

- ▶ **Mercuric Cyanide** is slowly decomposed by WATER and LIGHT, and reacts rapidly with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form flammable and poisonous *Hydrogen Cyanide gas*.
- ▶ **Mercuric Cyanide** reacts violently or explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); MAGNESIUM; LIQUID HYDROGEN CYANIDE; SODIUM NITRATE; and SODIUM NITRITE.
- ▶ Store in tightly closed containers in a cool, well-ventilated area away from METALS, MOISTURE, HEAT and LIGHT.

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 (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 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 *Hydrogen*), 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: **MERCURIC CYANIDE**

Synonyms: Dicyanomercury; Mercury Cyanide

CAS No: 592-04-1

 Molecular Formula: C_2HgN_2

RTK Substance No: 1171

Description: Odorless, clear or white, crystalline powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 - Health 0 - Fire 1 - Reactivity DOT#: UN 1636 ERG Guide #: 154 Hazard Class: 6.1 (Poison)	Extinguish fire using an agent suitable for type of surrounding fire. Mercuric Cyanide itself does not burn. POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Mercury, Mercury Oxides, Hydrogen Cyanide</i> and <i>Nitrogen Oxides</i> . Use water spray to keep fire-exposed containers cool.	Mercuric Cyanide is slowly decomposed by WATER and LIGHT, and reacts rapidly with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC), to form flammable and poisonous <i>Hydrogen Cyanide gas</i> . Mercuric Cyanide reacts violently or explosively with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); MAGNESIUM; LIQUID HYDROGEN CYANIDE; SODIUM NITRATE; and SODIUM NITRITE.

SPILL/LEAKS
Isolation Distance:

Spill: 25 meters (75 feet)

Fire: 800 meters (1/2 mile)

For clean-up, use a specialized charcoal-filtered vacuum. Do not disturb spilled material.

DO NOT wash into sewer.

Mercuric Cyanide is harmful to aquatic life at low concentrations.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Specific Gravity:	4 (water = 1)
Water Solubility:	Slightly soluble (mixes slowly)
Boiling Point:	Decomposes
Melting Point:	Decomposes
Ionization Potential:	11.6 eV (for <i>Hydrogen Cyanide</i>)
Molecular Weight:	252.6

EXPOSURE LIMITS
NIOSH: 0.05 mg/m³, 10-hr TWA (as *Mercury vapor*)
 0.1 mg/m³, Ceiling (as *Mercury*)
 5 mg/m³ (4.7 ppm), 15-min STEL (as *Hydrogen Cyanide*)

IDLH: 10 mg/m³ (as *Mercury*); 50 ppm (as *Hydrogen Cyanide*)

 The Protective Action Criteria values for **Mercuric Cyanide** are:

 PAC-1 = 1.5 mg/m³ PAC-3 = 12.6 mg/m³
 PAC-2 = 12.6 mg/m³
PROTECTIVE EQUIPMENT

Gloves:	Neoprene, Nitrile, Barrier® and Silver Shield®/4H® (>8-hr breakthrough for <i>Mercury</i> and <i>Hydrogen Cyanide</i>)
Coveralls:	Tychem® BR, Responder® and TK (>8-hr breakthrough for <i>Mercury</i> and <i>Hydrogen Cyanide</i>)
Respirator:	>1.5 mg/m ³ - SCBA (for <i>solid Mercuric Cyanide</i>) Use SCBA for fires or if Mercuric Cyanide is heated

HEALTH EFFECTS

Eyes:	Irritation and burns
Skin:	Irritation and burns, skin rash, itching and gray skin color
Inhalation:	Nose, throat and lung irritation with coughing, wheezing and shortness of breath Nausea, vomiting and tremors

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. Seek medical attention.

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.

Use *Amyl Nitrite* capsules if symptoms of *Cyanide* poisoning develop.

Transfer promptly to a medical facility.