



Right to Know Hazardous Substance Fact Sheet

Common Name: **CADMIUM**

Synonyms: None

Chemical Name: Cadmium

Date: December 1999 Revision: December 2007

CAS Number: 7440-43-9

RTK Substance Number: 0305

DOT Number: UN 2570

Description and Use

Cadmium is a soft, blue-white solid, gray-black metal, or gray or white powder. It is used in silver solder, making batteries and metal plating, for plastics and pigments, and as a catalyst. It is a byproduct of *Zinc* production.

Reasons for Citation

- ▶ **Cadmium** is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, NTP, DEP, IARC, IRIS and EPA.
- ▶ 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

- ▶ Remove contaminated clothing and wash contaminated skin with 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.

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 BACK PAGE

Hazard Summary

Hazard Rating	NJDOH	NFPA
HEALTH	4	-
FLAMMABILITY	3	-
REACTIVITY	1	-
CARCINOGEN TERATOGEN FLAMMABLE DUST OR POWDER POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

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

- ▶ **Cadmium** can affect you when inhaled.
- ▶ **Cadmium** is a CARCINOGEN and a TERATOGEN. HANDLE WITH EXTREME CAUTION.
- ▶ Contact can irritate the skin and eyes.
- ▶ Exposure to **Cadmium** may cause a flu-like illness called *metal fume fever*.
- ▶ **Cadmium** can cause nausea, vomiting, diarrhea and abdominal pain.
- ▶ Inhaling **Cadmium** can irritate the lungs. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency.
- ▶ Repeated low exposures can cause liver and kidney damage, anemia and loss of smell.
- ▶ **Cadmium dust or powder** is FLAMMABLE and EXPLOSIVE and may ignite spontaneously in air or when exposed to heat.

Workplace Exposure Limits

OSHA: The legal airborne permissible exposure limit (PEL) is **0.005 mg/m³** averaged over an 8-hour workshift.

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

ACGIH: The threshold limit value (TLV) is **0.01 mg/m³** (as *total particulates*), and **0.002 mg/m³** (as the *respirable fraction*), averaged over an 8-hour workshift.

- ▶ **Cadmium** is a CARCINOGEN and TERATOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

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 **Cadmium**:

- ▶ Contact can irritate the skin and eyes.
- ▶ Exposure to **Cadmium** may cause "*metal fume fever*." This is a flu-like illness with symptoms of metallic taste in the mouth, headache, fever and chills, aches, chest tightness and cough. The symptoms may be delayed for several hours after exposure and usually last for a day or two.
- ▶ **Cadmium** can cause nausea, vomiting, diarrhea and abdominal pain.
- ▶ Inhaling **Cadmium** 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.

Chronic Health Effects

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

Cancer Hazard

- ▶ **Cadmium** is a CARCINOGEN in humans. It has been shown to cause lung and prostate cancer.
- ▶ Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

- ▶ **Cadmium** is a PROBABLE TERATOGEN in humans.
- ▶ **Cadmium** may damage the male reproductive system (testes) and affect the female reproductive cycle.

Other Effects

- ▶ **Cadmium** can irritate the lungs. Repeated exposure may cause bronchitis to develop with coughing, phlegm, and/or shortness of breath.
- ▶ Repeated low exposures can cause liver and kidney damage.
- ▶ **Cadmium** can cause anemia, loss of sense of smell (anosmia) and/or discoloration of teeth.

Medical

Medical Testing

Before first exposure and every 12 months thereafter, OSHA requires your employer to provide (for persons exposed to greater than or equal to **0.0025 mg/m³** of *Cadmium*) a work and medical history and exam which shall include:

- ▶ Blood test for **Cadmium** (levels should be less than **5 micrograms per liter** of whole blood)
- ▶ Urine test for **Cadmium** (levels should be less than **3 micrograms per liter** of urine)
- ▶ Urine test for Beta-2 microglobulin to detect kidney damage
- ▶ Liver and kidney function tests
- ▶ Lung function tests
- ▶ Complete blood count

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

- ▶ Consider chest x-ray after acute overexposure

OSHA requires your employer to provide you and your doctor with a copy of the OSHA *Cadmium* Standards (29 CFR 1910.1027 and 1926.1127).

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

- ▶ 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 may increase the liver damage caused by **Cadmium**.
- ▶ Cigarette smoke contains some **Cadmium**. Because it is hard for the body to eliminate **Cadmium**, it tends to build up in the body. Any workplace exposure adds to these 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:

- ▶ Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA *Cadmium* Standards (29 CFR 1910.1027 and 1926.1127).
- ▶ Use a vacuum or a wet method to reduce dust during clean-up. **DO NOT DRY SWEEP.**
- ▶ Use a high efficiency particulate air (HEPA) filter when vacuuming. Do not use a standard shop vacuum.
- ▶ Before entering a confined space where **Cadmium dust** or **powder** 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 **Cadmium**. 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 *Nitrile* or *Neoprene* for gloves and DuPont *Tyvek*® as protective material 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.
- ▶ Do not wear contact lenses when working with this substance.

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 less than or equal to **0.05 mg/m³**, use a NIOSH approved air-purifying, particulate filter respirator with an N100, R100 or P100 filter.
- ▶ Where the potential exists for exposure less than or equal to **0.250 mg/m³**, use a NIOSH approved full facepiece air-purifying respirator with high-efficiency filters. 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 **Cadmium**, (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/m³**, 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.

- ▶ Exposure to **9 mg/m³** (*dust or fume*) is immediately dangerous to life and health. If the possibility of exposure above **9 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).

- ▶ **Cadmium dust or powder** is FLAMMABLE and EXPLOSIVE and may ignite spontaneously in air or when exposed to heat.
- ▶ Use dry chemicals appropriate for extinguishing metal fires.
- ▶ DO NOT USE water, foam, CO₂ or Halons.
- ▶ POISONOUS GASES ARE PRODUCED IN FIRE.
- ▶ CONTAINERS MAY EXPLODE IN FIRE.
- ▶ Use water spray to keep fire-exposed containers cool.
- ▶ **Cadmium powder** 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 **Cadmium** is spilled, take the following steps:

- ▶ Evacuate personnel and secure and control entrance to the area.
- ▶ Eliminate all ignition sources.
- ▶ Moisten *powdered* spilled material first or use a HEPA-filter vacuum for clean-up.
- ▶ Collect solid material in the most convenient and safe manner and deposit in sealed containers.
- ▶ Ventilate and wash area after clean-up is complete.
- ▶ It may be necessary to contain and dispose of **Cadmium** 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 **Cadmium** you should be trained on its proper handling and storage.

- ▶ A regulated, marked area should be established where **Cadmium** is handled, used or stored as required by the OSHA *Cadmium* Standards (29 CFR 1910.1027 and 1926.1127).
- ▶ **Cadmium** reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form flammable and explosive *Hydrogen gas*.
- ▶ **Cadmium dust or powder** reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); HYDROGEN AZIDE; AMMONIUM NITRATE; AMMONIA; POTASSIUM; ZINC; SULFUR; SELENIUM; and TELLURIUM to cause fires and explosions.
- ▶ Sources of ignition, such as smoking and open flames, are prohibited where **Cadmium powder** is used, handled, or stored.
- ▶ Metal containers involving the transfer of **Cadmium powder** should be grounded and bonded.
- ▶ Use explosion-proof electrical equipment and fittings wherever **Cadmium powder** is used, handled, manufactured, or stored.
- ▶ Store **Cadmium powder** under *Nitrogen*.

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 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/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.

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.

Common Name: **CADMIUM**

Synonyms: None

CAS No: 7440-43-9

Molecular Formula: Cd

RTK Substance No: 0305

Description: Soft, blue-white solid, gray-black metal, or gray or white powder

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
4 - Health 3 - Fire 1 - Reactivity DOT#: UN 2570 ERG Guide #: 154 Hazard Class: 6.1 (Poison)	Use dry chemicals appropriate for extinguishing metal fires. DO NOT USE water, foam, CO ₂ or Halons. POISONOUS GASES ARE PRODUCED IN FIRE. CONTAINERS MAY EXPLODE IN FIRE Use water spray to keep fire-exposed containers cool. Cadmium powder may ignite combustibles (wood, paper and oil).	Cadmium reacts with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to form flammable and explosive <i>Hydrogen gas</i> . Cadmium dust or powder reacts with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); HYDROGEN AZIDE; AMMONIUM NITRATE; AMMONIA; POTASSIUM; ZINC; SULFUR; SELENIUM; and TELLURIUM to cause fires and explosions.

SPILL/LEAKS
Isolation Distance: 25 meters (75 feet)

 Moisten *powdered* spilled material first or use a HEPA-filter vacuum for clean-up.

Collect solid material in the most convenient and safe manner and deposit in sealed containers.

DO NOT wash into sewer.

PHYSICAL PROPERTIES

Odor Threshold:	None
Flash Point:	Non-combustible solid, flammable powder/dust
Vapor Pressure:	0 mm at Hg 68°F (20°C)
Specific Gravity:	8.65
Water Solubility:	Insoluble
Melting Point:	610°F (321°C)
Boiling Point:	1,409°F (765°C)
Molecular Weight:	112.4

EXPOSURE LIMITS

OSHA:	0.005 mg/m ³ , 8-hr TWA
NIOSH:	Lowest feasible concentration
ACGIH:	0.01 mg/m ³ , 8-hr TWA (total particulates)
	0.002 mg/m ³ , 8-hr TWA (respirable fraction)
IDLH LEVEL:	9 mg/m ³ (dust or fume)

PROTECTIVE EQUIPMENT

Gloves:	Nitrile or Neoprene
Coveralls:	DuPont Tyvek®
Respirator:	>0.005 mg/m ³ - APR with High efficiency filters >5 mg/m ³ - Supplied air

HEALTH EFFECTS

Eyes:	Irritation
Skin:	Irritation
Inhalation:	Lung irritation with coughing and/or shortness of breath Nausea, vomiting, Headache, fever and chills, aches and chest tightness
Chronic:	Carcinogen (lung and prostate) in humans Teratogen in humans

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.
Remove	contaminated clothing and wash contaminated skin with soap and water.
Begin	artificial respiration if breathing has stopped and CPR if necessary.
Transfer	to a medical facility.
Medical	observation is recommended as symptoms may be delayed.