**Common Name:** CADMIUM SULFIDE

**Synonyms:** Cadmium Monosulfide; Cadmium Yellow; Orange Cadmium

**Chemical Name:** Cadmium Sulfide

**Date:** March 2008  
**Revision:** February 2017

**CAS Number:** 1306-23-6

**RTK Substance Number:** 3081

**DOT Number:** UN 2570

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**Description and Use**

Cadmium Sulfide is an odorless, lemon yellow to orange crystal or yellow to brown powder. It is used in photoconductors, dandruff shampoos, pigments, electronic components, and solar cells.

**Reasons for Citation**

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

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**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 several days after exposure or if symptoms are present, as some symptoms may be delayed.

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**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

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**Hazard Summary**

<table>
<thead>
<tr>
<th>Hazard Rating</th>
<th>NJDHSS</th>
<th>NFPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEALTH</td>
<td>4</td>
<td>-</td>
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<tr>
<td>FLAMMABILITY</td>
<td>1</td>
<td>-</td>
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<tr>
<td>REACTIVITY</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>CARCINOGEN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**POISONOUS GASES ARE PRODUCED IN FIRE**

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

- Cadmium Sulfide can affect you when inhaled.
- Cadmium Sulfide is a CARCINOGEN. HANDLE WITH EXTREME CAUTION.
- Contact can irritate the skin and eyes.
- Inhaling Cadmium Sulfide can irritate the nose and throat.
- Exposure to Cadmium Sulfide may cause a flu-like illness called metal fume fever.
- Cadmium Sulfide can cause nausea, vomiting, diarrhea and abdominal pain.
- Inhaling Cadmium Sulfide 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 sense of smell.

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**Workplace Exposure Limits**

The following exposure limits are for Cadmium:

- **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 particulate), and 0.002 mg/m³ (as the respirable fraction), averaged over an 8-hour workshift.

- Cadmium Sulfide is 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.
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 Program website (http://nj.gov/health/workplacehealthandsafety/right-to-know/) 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 and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) 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) requires private 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 Sulfide:

- Contact can irritate the skin and eyes.
- Inhaling Cadmium Sulfide can irritate the nose and throat.
- Exposure to Cadmium Sulfide 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 Sulfide can cause nausea, vomiting, diarrhea and abdominal pain.
- Inhaling Cadmium Sulfide 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 Sulfide and can last for months or years:

- Cancer Hazard
  - Cadmium Sulfide is a CARCINOGEN in humans. There is evidence that Cadmium and Cadmium compounds cause lung and prostate cancer in humans and cause lung cancer in animals.
  - Many scientists believe there is no safe level of exposure to a carcinogen.

- Reproductive Hazard
  - While Cadmium Sulfide has not been identified as a teratogen or a reproductive hazard, Cadmium and Cadmium compounds are teratogens and may also cause reproductive damage to the male reproductive system (including decrease of the sperm count). Cadmium Sulfide should be handled WITH EXTREME CAUTION.

- Other Effects
  - Cadmium Sulfide 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.
  - Exposure 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 Standard (29 CFR 1910.1027 or 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).
## 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 Sulfide**. Wear personal protective equipment made from material which 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.
- Safety equipment manufacturers recommend **Nitrile** and **Neoprene** for gloves and DuPont **Tyvek®**, or the equivalent, as a 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** (as **Cadmium**), 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 **0.25 mg/m³** (as **Cadmium**), use a NIOSH approved full facepiece air-purifying respirator with high efficiency filters.
- Where the potential exists for exposure less than or equal to **1.25 mg/m³** (as **Cadmium**), use a NIOSH approved powered-air purifying respirator equipped with a tight-fitting full facepiece and high efficiency filters.
- Leave the area immediately if (1) while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Cadmium Sulfide**, (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.

## Workplace Controls and Practices

### 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 **Cadmium Sulfide**.
- 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 irritant or corrosive chemicals,**
3. **Using general ventilation to control ventilation for chemicals that may be harmful with a single irritant or corrosive chemicals,**
4. **Including various work practices,**
5. **Labeling process containers,**
6. **Providing employees with hazard information and training,**
7. **Providing eye wash fountains and emergency showers,**
8. **Wearing protective clothing,**
9. **Using respirators,**
10. **Providing medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).**

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 chemical.**
- **Always wash at the end of the work shift.**
- **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 Standard (29 CFR 1910.1027 or 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.**
CADMIUM SULFIDE

- Where the potential exists for exposure over 5 mg/m$^3$, (as Cadmium) 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/m$^3$ (as Cadmium) is immediately dangerous to life and health. If the possibility of exposure above 9 mg/m$^3$ 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).

- Use dry chemical, water spray, or foam as extinguishing agents.
- POISONOUS GASES ARE PRODUCED IN FIRE, including Cadmium Oxide and Sulfur 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 Cadmium Sulfide is spilled, take the following steps:

- Evacuate personnel and secure and control entrance to the area.
- Eliminate all ignition sources.
- Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
- Ventilate and wash area after clean-up is complete.
- DO NOT wash into sewer.
- It may be necessary to contain and dispose of Cadmium Sulfide 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 Sulfide you should be trained on its proper handling and storage.

- A regulated, marked area should be established where Cadmium Sulfide is handled, used or stored as required by the OSHA Cadmium Standard (29 CFR 1910.1027 or 1926.1127).
- Cadmium Sulfide reacts with WATER; MOISTURE; STEAM or STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to produce toxic and flammable Hydrogen Sulfide gas.

- Cadmium Sulfide reacts violently or explosively with IODINE MONOCHLORIDE 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 HEAT.

**Occupational Health Information Resources**

The New Jersey Department of Health, Occupational Health Service, 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 Program
PO Box 368
Trenton, NJ 08625-0368
Phone: 609-984-2202
Fax: 609-984-7407
E-mail: rtk@doh.nj.gov
Web address: http://nj.gov/health/workplacehealthandsafety/right-to-know/

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 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.

PEOSH 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 SULFIDE**

**Synonyms:** Cadmium Monosulfide; Cadmium Yellow; Orange Cadmium

**CAS No:** 1306-23-6

**Molecular Formula:** CdS

**RTK Substance No:** 3081

**Description:** Odorless, lemon yellow to orange crystal or yellow to brown powder

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**HAZARD DATA**

<table>
<thead>
<tr>
<th>Hazard Rating</th>
<th>Firefighting</th>
<th>Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - Health</td>
<td>Use dry chemical, water spray or foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Cadmium Oxide and Sulfur Oxides. Use water spray to keep fire-exposed containers cool.</td>
<td>Cadmium Sulfide reacts with WATER; MOISTURE: STEAM or STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) to produce toxic and flammable Hydrogen Sulfide gas. Cadmium Sulfide reacts violently or explosively with IODINE MONOCHLORIDE and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE).</td>
</tr>
<tr>
<td>1 - Fire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - Reactivity</td>
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</table>

**DOT#: UN 2570**

**ERG Guide #: 154**

**Hazard Class:** 6.1 (Poison)

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**SPILL/LEAKS**

**Isolation Distance:**

- Small Spills: 25 meters (75 feet)
- Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
- Hazardous to the environment and persists in the environment.
- Marine pollutant.

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**PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Odor Threshold</td>
<td>Odorless</td>
</tr>
<tr>
<td>Flash Point</td>
<td>Nonflammable</td>
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<tr>
<td>Specific Gravity</td>
<td>4.5 to 4.8 (water = 1)</td>
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<tr>
<td>Water Solubility</td>
<td>Insoluble</td>
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<tr>
<td>Melting Point</td>
<td>1,796°F (980°C)</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>145</td>
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**EXPOSURE LIMITS**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Limit</th>
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<tbody>
<tr>
<td>OSHA</td>
<td>0.005 mg/m³, 8-hr TWA</td>
</tr>
<tr>
<td>NIOSH</td>
<td>Lowest feasible concentration</td>
</tr>
<tr>
<td>ACGIH</td>
<td>0.01 mg/m³, 8-hr TWA (total particulate)</td>
</tr>
<tr>
<td></td>
<td>0.002 mg/m³, 8-hr TWA (respirable fraction)</td>
</tr>
<tr>
<td>IDLH</td>
<td>9 mg/m³ (All of the above are for Cadmium)</td>
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<tr>
<td>PAC LEVELS</td>
<td>PAC-1 = 0.13 mg/m³; PAC-2 = 0.98 mg/m³; PAC-3 = 6 mg/m³</td>
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**HEALTH EFFECTS**

<table>
<thead>
<tr>
<th>Exposure Type</th>
<th>Effect</th>
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<tbody>
<tr>
<td>Eyes</td>
<td>Irritation</td>
</tr>
<tr>
<td>Skin</td>
<td>Irritation</td>
</tr>
<tr>
<td>Inhalation</td>
<td>Nose, throat and lung irritation with coughing and/or shortness of breath; Nausea, vomiting, headache, fever and chills, aches, and chest tightness</td>
</tr>
<tr>
<td>Chronic</td>
<td><strong>Cadmium and Cadmium compounds</strong> cause lung and prostate cancer in humans</td>
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**PROTECTIVE EQUIPMENT**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloves</td>
<td>Nitrile and Neoprene</td>
</tr>
<tr>
<td>Coveralls</td>
<td>DuPont Tyvek®</td>
</tr>
<tr>
<td>Respirator</td>
<td>&gt;0.005 mg/m³ - APR with High efficiency filters</td>
</tr>
<tr>
<td></td>
<td>&gt;0.05 mg/m³ - Supplied air</td>
</tr>
</tbody>
</table>

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**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.

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February 2017