1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name: Cadmium

Product Number: 00623
Brand: Sigma-Aldrich
Index-No.: 048-002-00-0

CAS-No.: 7440-43-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO  63103
USA

Telephone: +1 800-325-5832
Fax: +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Inhalation (Category 2), H330
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - repeated exposure (Category 1), H372
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)
H330 Fatal if inhaled.
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H361 Suspected of damaging fertility or the unborn child.
H372 Causes damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.
Precautionary statement(s)

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284 Wear respiratory protection.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P391 Collect spillage.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

| Formula | Cd |
| Molecular weight | 112.41 g/mol |
| CAS-No. | 7440-43-9 |
| EC-No. | 231-152-8 |
| Index-No. | 048-002-00-0 |

Hazardous components

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>Acute Tox. 2; Muta. 2; Carc. 1B; Repr. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H341, H350, H361, H372, H410</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remarks</td>
<td>Sub. Listed; for more information see OSHA document 1910.1027</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cadmium</td>
<td>7440-43-9</td>
<td>TWA 0.1 mg/m3</td>
<td>USA, Occupational Exposure Limits (OSHA) - Table Z-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Z37.5-1970</td>
<td></td>
</tr>
</tbody>
</table>
This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>USA. Occupational Exposure Limits (OSHA) - Table Z-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA</td>
<td>0.2 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Z37.5-1970
This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>USA. Occupational Exposure Limits (OSHA) - Table Z-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIL</td>
<td>0.3 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Z37.5-1970
This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>USA. Occupational Exposure Limits (OSHA) - Table Z-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIL</td>
<td>0.6 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Z37.5-1970
This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.

Potential Occupational Carcinogen
See Appendix A

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>USA. ACGIH Threshold Limit Values (TLV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA</td>
<td>0.01 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Kidney damage
Substances for which there is a Biological Exposure Index or Indices (see BEI® section)
Suspected human carcinogen varies

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>USA. ACGIH Threshold Limit Values (TLV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWA</td>
<td>0.002 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Kidney damage
Substances for which there is a Biological Exposure Index or Indices (see BEI® section)
Suspected human carcinogen varies

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>OSHA Specifically Regulated Chemicals/Carcinogens</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL</td>
<td>0.005 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
</tr>
</tbody>
</table>

see Sections 1532 & 5207

**Biological occupational exposure limits**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>7440-43-9</td>
<td>cadmium</td>
<td>5 µg/l</td>
<td>In blood</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
</tr>
<tr>
<td>Remarks</td>
<td>Not critical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>cadmium</td>
<td>5µg/g creatinine</td>
<td>Urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not critical</td>
</tr>
</tbody>
</table>
8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z6777272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z6777272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>a) Appearance</th>
<th>Form: powder</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Odour</td>
<td>odourless</td>
</tr>
<tr>
<td>c) Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>No data available</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>Melting point/range: 320.9 °C (609.6 °F)</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>765 °C (1,409 °F) at 1,013 hPa (760 mmHg)</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
h) Evaporation rate  
   No data available
i) Flammability (solid, gas)  
   No data available
j) Upper/lower flammability or explosive limits  
   No data available
k) Vapour pressure  
   No data available
l) Vapour density  
   No data available
m) Relative density  
   8.650 g/cm³
n) Water solubility  
   0.0023 g/l at 20 °C (68 °F)
o) Partition coefficient: n-octanol/water  
   No data available
p) Auto-ignition temperature  
   No data available
q) Decomposition temperature  
   No data available
r) Viscosity  
   No data available
s) Explosive properties  
   No data available
t) Oxidizing properties  
   No data available

9.2 Other safety information  
   No data available

10. STABILITY AND REACTIVITY
10.1 Reactivity  
   No data available
10.2 Chemical stability  
   Stable under recommended storage conditions.
10.3 Possibility of hazardous reactions  
   No data available
10.4 Conditions to avoid  
   No data available
10.5 Incompatible materials  
   Oxidizing agents, acids
10.6 Hazardous decomposition products  
   Hazardous decomposition products formed under fire conditions. - Cadmium/cadmium oxides
   Other decomposition products - No data available
   In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION
11.1 Information on toxicological effects

   Acute toxicity
   LD50 Oral - Rat - 2,330 mg/kg
   Inhalation: No data available
   Dermal: No data available
   No data available
   Skin corrosion/irritation
   No data available
Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: 1 - Group 1: Carcinogenic to humans (Cadmium)
NTP: Known to be human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Cadmium)
OSHA: OSHA specifically regulated carcinogen (Cadmium)

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: EU9800000
Damage to the lungs., Kidney injury may occur., prolonged or repeated exposure can cause.; Vomiting, Diarrhoea, Lung irritation

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity
Toxicity to fish
LC50 - Pimephales promelas (fathead minnow) - 0.001 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia magna (Water flea) - 0.024 mg/l - 48 h

Toxicity to algae
static test EC50 - Selenastrum capricornutum (green algae) - 0.023 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Bioaccumulation
Oncorhynchus mykiss (rainbow trout) - 72 d - 1.27 µg/l

Bioconcentration factor (BCF): 55

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Very toxic to aquatic life with long lasting effects.
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

**DOT (US)**
UN number: 3288
Class: 6.1
Packing group: II
Proper shipping name: Toxic solid, inorganic, n.o.s. (Cadmium)
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

**IMDG**
UN number: 3288
Class: 6.1
Packing group: II
Proper shipping name: TOXIC SOLID, INORGANIC, N.O.S. (Cadmium)
Marine pollutant: yes

**IATA**
UN number: 3288
Class: 6.1
Packing group: II
Proper shipping name: Toxic solid, inorganic, n.o.s. (Cadmium)

15. REGULATORY INFORMATION

**SARA 302 Components**
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>7440-43-9</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

**SARA 311/312 Hazards**
Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>7440-43-9</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

**Pennsylvania Right To Know Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>7440-43-9</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

**New Jersey Right To Know Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>7440-43-9</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause cancer.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>7440-43-9</td>
<td>2009-02-01</td>
</tr>
</tbody>
</table>

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>7440-43-9</td>
<td>2009-02-01</td>
</tr>
</tbody>
</table>
16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.  Acute toxicity
Aquatic Acute  Acute aquatic toxicity
Aquatic Chronic  Chronic aquatic toxicity
Carc.  Carcinogenicity
H330  Fatal if inhaled.
H341  Suspected of causing genetic defects.
H350  May cause cancer.
H361  Suspected of damaging fertility or the unborn child.
H372  Causes damage to organs through prolonged or repeated exposure.
H400  Very toxic to aquatic life.
H410  Very toxic to aquatic life with long lasting effects.

**HMIS Rating**
- Health hazard: 4
- Chronic Health Hazard: *
- Flammability: 0
- Physical Hazard: 0

**NFPA Rating**
- Health hazard: 4
- Fire Hazard: 0
- Reactivity Hazard: 0

**Further information**
Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.13  Revision Date: 06/02/2016  Print Date: 06/29/2016