1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Copper(II) sulfate
Product Number: 451657
Brand: Aldrich
Supplier: Sigma-Aldrich Corporation
3050 Spruce Street
SAINT LOUIS MO  63103
USA
Telephone: +1 800-325-5832
Fax: +1 800-325-5052
Emergency Phone #: (314) 776-6555
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Target Organ Effect, Toxic by ingestion, Irritant

Target Organs
Liver, Kidney, Blood

GHS Classification
Acute toxicity, Oral (Category 4)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Acute aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Warning

Hazard statement(s)
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H400 Very toxic to aquatic life.

Precautionary statement(s)
P273 Avoid release to the environment.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification
Health hazard: 2
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
  Health hazard: 2
  Fire: 0
  Reactivity Hazard: 0

Potential Health Effects
  Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
  Skin May be harmful if absorbed through skin. Causes skin irritation.
  Eyes Causes eye irritation.
  Ingestion Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

  Synonyms: Cupric sulfate
  Formula: CuO₄S
  Molecular Weight: 159.61 g/mol

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
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<tbody>
<tr>
<td>Copper sulphate</td>
<td></td>
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<tr>
<td>CAS-No.</td>
<td>7758-98-7</td>
</tr>
<tr>
<td>EC-No.</td>
<td>231-847-6</td>
</tr>
<tr>
<td>Index-No.</td>
<td>029-004-00-0</td>
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4. 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. Consult a physician.

  In case of eye contact
  Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

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

5. FIREFIGHTING MEASURES

  Conditions of flammability
  Not flammable or combustible.

  Suitable extinguishing media
  Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

  Special protective equipment for firefighters
  Wear self-contained breathing apparatus for fire fighting if necessary.

  Hazardous combustion products
  Hazardous decomposition products formed under fire conditions. - Sulphur oxides, Borane/boron oxides, Copper oxides

  Further information
  The product itself does not burn.

6. ACCIDENTAL RELEASE MEASURES

  Personal precautions
  Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
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.

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.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
Air sensitive. hygroscopic Store under inert gas. Keep in a dry place.

8. EXPOSURE CONTROLS/PERSOANAL PROTECTION

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper sulphate</td>
<td>7758-98-7</td>
<td>TWA</td>
<td>1 mg/m3</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
</tr>
</tbody>
</table>

Personal protective equipment

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand 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.

Immersion protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested: Dermatril® (Aldrich Z677272, Size M)

Splash protection
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 30 min
Material tested: Dermatril® (Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 873000, 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 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.

Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and 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.
Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
- Form: powder
- Colour: light grey

Safety data
- pH: no data available
- Melting point/freezing point: Melting point/range: 200 °C (392 °F) - dec.
- Boiling point: no data available
- Flash point: not applicable
- Ignition temperature: no data available
- Autoignition temperature: no data available
- Lower explosion limit: no data available
- Upper explosion limit: no data available
- Vapour pressure: 9.7 hPa (7.3 mmHg) at 25 °C (77 °F)
- Density: 3.603 g/mL at 25 °C (77 °F)
- Water solubility: no data available
- Partition coefficient: n-octanol/water: no data available
- Relative vapour density: no data available
- Odour: no data available
- Odour Threshold: no data available
- Evaporation rate: no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
no data available

Materials to avoid
Powdered metals, hydroxylamine, Magnesium, Strong reducing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Sulphur oxides, Borane/boron oxides, Copper oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity
- Oral LD50
  LD50 Oral - rat - 482 mg/kg
**Inhalation LC50**
no data available

**Dermal LD50**
no data available

**Other information on acute toxicity**
LD50 Intraperitoneal - rat - 20 mg/kg
LD50 Subcutaneous - rat - 43 mg/kg
LD50 Intravenous - rat - 48.9 mg/kg

**Skin corrosion/irritation**
no data available

**Serious eye damage/eye irritation**
no data available

**Respiratory or skin sensitization**
Prolonged or repeated exposure may cause allergic reactions in certain sensitive individuals.

**Germ cell mutagenicity**
Genotoxicity in vitro - rat - Liver
DNA damage
Genotoxicity in vivo - mouse - Intraperitoneal
DNA damage

**Carcinogenicity**
Carcinogenicity - Chicken - Parenteral
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Endocrine: Tumors.

**IARC:**
No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**ACGIH:**
No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

**NTP:**
No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

**OSHA:**
No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**
Reproductive toxicity - mouse - Intravenous
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

no data available

**Teratogenicity**
Developmental Toxicity - mouse - Intravenous
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Central nervous system. Specific Developmental Abnormalities: Cardiovascular (circulatory) system.

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**
no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**
no data available

**Aspiration hazard**
no data available

**Potential health effects**
- **Inhalation**
  May be harmful if inhaled. Causes respiratory tract irritation.
- **Ingestion**
  Toxic if swallowed.
Skin: May be harmful if absorbed through skin. Causes skin irritation.
Eyes: Causes eye irritation.

Signs and Symptoms of Exposure
Symptoms of systemic copper poisoning may include: capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, central nervous system excitation followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure. Chronic copper poisoning is typified by hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has lead to hemolytic anemia and accelerates arteriosclerosis. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: GL8800000

12. ECOLOGICAL INFORMATION
Toxicity
Toxicity to fish: mortality LC50 - other fish - 1 - 2.5 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates: Immobilization EC50 - Daphnia magna (Water flea) - 0.024 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS
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: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Copper sulphate)
Reportable Quantity (RQ): 10 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Copper sulphate)
Marine pollutant: Marine pollutant
IATA
UN number: 3077   Class: 9   Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Copper sulphate)

15. REGULATORY INFORMATION

OSHA Hazards
Target Organ Effect, Toxic by ingestion, Irritant

SARA 302 Components
SARA 302: 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:

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

Massachusetts Right To Know Components

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Pennsylvania Right To Know Components

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New Jersey Right To Know Components

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California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
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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.