MATERIAL SAFETY DATA SHEET

SUPPLIER: HARCROS CHEMICALS, INC
5200 Speaker Road
Kansas City, KS 66106-1095
SUPPLIERS TELEPHONE NUMBER: 913-321-3131
TRANSPORTATION EMERGENCY TELEPHONE NUMBER: 1-800-424-9300

MSDS No. 000413

CUPRIC SULFATE ANHYDROUS

1. PRODUCT NAMES: COPPER SULFATE, COPPER SULFATE FEED GRADE, COPPER SULFATE PLATING GRADE

Synonyms: Copper (II) sulfate (1:1); copper sulfate, monohydrate; sulfuric acid copper (2+) salt (1:1); blue copper CAS No.: 7758-98-7 Molecular Weight: 159.60 Chemical Formula: CuSO4 Product Codes:

2. Composition/Information on ingredients

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cupric Sulfate</td>
<td>7758-98-7</td>
<td>100%</td>
</tr>
</tbody>
</table>
3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED. AFFECTS THE LIVER AND KIDNEYS. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

S.A.F.E.T.Y. DATA Sheet (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES, LAB COAT, VENT HOOD, PROPER GLOVES
Storage Color Code: Green (General/Storage)

Potential Health Effects

Inhalation:
Causes irritation to respiratory tract, symptoms may include coughing, sore throat, and shortness of breath. May result in ulceration and perforation of respiratory tract. When heated, this compound may give off copper fumes, which can cause symptoms similar to the common cold, including chills and stuffiness of the head.

Ingestion:
May cause burning pain in the mouth, esophagus, and stomach. Hemorrhagic gastritis, nausea, vomiting, abdominal pain, metallic taste, and diarrhea may occur. If vomiting, does not occur immediately systemic copper poisoning may occur. Symptoms may include epigastric distress, cold sweats, weak pulse, kidney and liver damage, central nervous excitation followed by depression, jaundice, convulsions, blood effects, paralysis and coma. Death may occur from shock or renal failure. Fatalities have occurred as a result of ingesting grams quantities of copper sulfate.

Skin Contact:
May cause irritation, itching, redness. Contact with extensively burned skin may cause poisoning.

Eye Contact:
Dust may cause irritation. Contact may cause conjunctivitis, ulceration, or clouding of the cornea.

Chronic Exposure:
Prolonged or repeated skin exposure may cause dermatitis. Prolonged or repeated exposure to dusts of copper salts may cause discoloration of the skin or hair, blood and liver damage, ulceration and perforation of the nasal septum, runny nose, metallic taste, and atrophic changes and irritation of the mucous membranes.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, impaired liver, kidney, or pulmonary function, glucose 6-phosphate-dehydrogenase deficiency, or pre-existing Wilson's disease may be more susceptible to the effects of this material.

4. First Aid Measures

**Inhalation:**
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

**Ingestion:**
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician immediately.

**Skin Contact:**
In case of contact, wipe off excess material from skin then immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

**Eye Contact:**
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

6. Fire Fighting Measures

**Fire:**
Not considered to be a fire hazard.

**Explosion:**
Not considered to be an explosion hazard.

**Fire Extinguishing Media:**
Use any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire exposed containers cool.

**Special Information:**
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. When heated above 110°C (230°F), material will melt. Avoid using a direct water stream on molten material as it may cause spattering.
6. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
  1 mg/m³ (TWA) for copper dusts & mists as Cu
- ACGIH Threshold Limit Value (TLV):
  1 mg/m³ (TWA) for copper dusts & mists as Cu

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, Industrial Ventilation: A Manual of Recommended Practices, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lower. A full-face piece particulate respirator (NIOSH type P100 filters) may be worn...
up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respiratory supplier, whichever is lowest. If col particles (e.g., lubricants, cutting fluids, glycine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear protective gloves and clean body-covering clothing.

Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Grayish-white to greenish-white rhombic crystals.

Odor:
Odorless.

Solubility:
14.3% in water @ 20°C (32°F)

Specific Gravity:
3.60

pH:
No information found.

% Volatiles by volume @ 21°C (70°F):
0

Boiling Point:
650°C (1127°F)

Melting Point:
> 290°C (> 552°F) Slowly decomposes

Vapor Density (Air=1):
No information found.

Vapor Pressure (mm Hg):
No information found.

Evaporation Rate (Buck=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Hygroscopic.

Hazardous Decomposition Products:
Burning may produce sulfur oxides.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Substance will ignite hydrolytically. Solutions are acidic and can react with magnesium to evolve flammable hydrogen.
11. Toxicological Information

Toxicological Data:
Oral rat LD₅₀: 400 mg/kg. Investigated as a tumorigen, mutagen and reproductive effector.

Reproductive Toxicity:
This agent is not mutagenic and teratogenic effects on laboratory animals.

---MTE---
Carcinogen---

Ingredient

Cupric Sulfate (7758-98-7)

Listed
No
No
None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater. When released into water, this material is not expected to bioaccumulate. When released into water, this material is not expected to evaporate significantly. This material is expected to significantly bioaccumulate. This material has an experimentally determined bioconcentration factor (BCF) of greater than 100. Bioaccumulation data for copper.

Environmental Toxicity:
Toxicity data for copper. This material is expected to be very toxic to aquatic life. The LC₅₀/96-hour values for fish are less than 1 mg/L. The EC₅₀/96-hour values for algae are less than 1 mg/L.

Cupric Sulfate:
96 Hr LC₅₀ rainbow trout: 0.1 mg/L;
48 Hr LC₅₀ bluegill: 0.6 mg/L;
96 Hr LC₅₀ goldfish: 0.3 mg/L;
48 Hr EC₅₀ water flea: 0.024 mg/L.

13. Disposal Considerations
14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ ENVIRONMENTAL HAZARDOUS SUBSTANCE, SOLID, N.O.S. (CUPRIC SULFATE) Hazard Class: 9 UN/NNA: UN3677 Packing Group: III Information reported for product size: 100LB

International (Water, I.M.O.)

Proper Shipping Name: ENVIRONMENTAL HAZARDOUS SUBSTANCE, SOLID, N.O.S. (CUPRIC SULFATE) Hazard Class: 9 UN/NNA: UN3677 Packing Group: III Information reported for product size: 100LB

International (Air, I.C.A.O.)

Proper Shipping Name: ENVIRONMENTAL HAZARDOUS SUBSTANCE, SOLID, N.O.S. (CUPRIC SULFATE) Hazard Class: 9 UN/NNA: UN3677 Packing Group: III Information reported for product size: 100LB

16. Regulatory Information

---------------[Chemical Inventory Status - Part 1]-----------------------------

Ingredient: Cupric Sulfate (7758-98-7)

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-------------------[Chemical Inventory Status - Part 2]-----------------------------

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---------------[Federal, State & International Regulations - Part 1]---------------

Cupric Sulfate (7758-98-7)

<table>
<thead>
<tr>
<th>SARA 3C</th>
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<tr>
<td>RQ TPQ</td>
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<tr>
<td>Copper Compo.</td>
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</table>
16. Other Information

NFPA Ratings: Health: 2 Flammability: 0 Reactivity: 0

WARNING! HARMFUL IF SWALLOWED. AFFECTS THE LIVER AND KIDNEYS. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Keep container closed.
Avoid breathing dust.
Use only with adequate ventilation.

Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician immediately. In case of contact, wipe off excess material from skin then immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before re-use. Call a physician.

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Product Use:
Laboratory Reagent.

Revision Information:
MSDS Section(s) Changed since last revision of document include: 3.

Disclaimer:
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