

**COPPER SULFATE PENTAHYDRATE
(Copper Sulphate Crystals)
MATERIAL SAFETY DATA SHEET**

Date: 11/06/2008

1. PRODUCT & COMPANY IDENTIFICATION

Product Name: Copper Sulfate Pentahydrate (Copper Sulphate Crystals)
TSCA: TSCA 8(b) inventory: No products were found
Synonym: Blue vitriol; Copper (II) Sulfate Pentahydrate
Chemical Name: Cupric Sulfate Pentahydrate
Chemical Formula: $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

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2. COMPOSITION AND INFORMATION ON INGREDIENTS

Composition:
Name: Copper sulfate pentahydrate
CAS #: 7758-99-8
% by Weight: 100

Toxicological Data on Ingredients:
Copper sulfate pentahydrate:
ORAL (LD50): Acute: 300 mg/kg [Rat].
DERMAL (LD50): Acute: > 2000 mg/kg [Rat].

3. HAZARDS IDENTIFICATION

Potential Acute Health Effects:

- Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

- Carcinogenic Effects: Not available.
- Mutagenic Effects: Mutagenic for mammalian somatic cells.
- Teratogenic Effects: Not available.
- Developmental Toxicity: Not available.

The substance may be toxic to kidneys, liver. Repeated or prolonged exposure to the substance can produce target organs damage.

4. FIRST AID MEASURES

- **Eye Contact:** Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.
- **Skin Contact:** In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

- **Serious Skin Contact:** Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.
- **Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
- **Serious Inhalation:** Not available.
- **Ingestion:** Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.
- **Serious Ingestion:** Not available.

5. FIRE AND EXPLOSION DATA

- **Flammability of the Product:** Non-flammable.
- **Auto-Ignition Temperature:** Not applicable.
- **Flash Points:** Not applicable.
- **Flammable Limits:** Not applicable.
- **Products of Combustion:** Not available.
- **Fire Hazards in Presence of Various Substances:** Not applicable.
- **Explosion Hazards in Presence of Various Substances:**
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
- **Fire Fighting Media and Instructions:** Not applicable.

Special Remarks on Fire Hazards: When heated to decomposition it emits toxic fumes. Solutions are acidic and can react with magnesium to evolve flammable hydrogen gas.

Special Remarks on Explosion Hazards: Nitromethanes and copper salts spontaneously form explosive materials.

6. ACCIDENTAL RELEASE MEASURES

- **Small Spill:** Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.
- **Large Spill:** Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

7. HANDLING AND STORAGE

- **Precautions:** Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as metals, alkalis.
- **Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

- **Engineering Controls:** Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
- **Personal Protection:** Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Use gloves.
- **Personal Protection in Case of a Large Spill:** Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

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- **Exposure Limits:**
TWA: 1 (mg/m³) from ACGIH (TLV) Inhalation
TWA: 0.1 (mg/m³) from OSHA (PEL) Inhalation
TWA: 1 (mg/m³) from NIOSH Inhalation
Consult local authorities for acceptable exposure limits.

9. PHYSICAL AND CHEMICAL PROPERTIES

- **Physical state and appearance:** Solid. (Crystalline granules solid. Powdered solid.)
- **Odour:** Odourless.
- **Taste:** Nauseous metallic.
- **Molecular Weight:** 249.69 g/mole
- **Colour:** Blue. (Light.)
- **pH (1% soln/water):** Not available.
- **Boiling Point:** 150°C (302°F)
- **Melting Point:** 110°C (230°F)
- **Critical Temperature:** Not available.
- **Specific Gravity:** 2.28 @ 15.6 deg. C (Water = 1)
- **Vapour Pressure:** Not applicable.
- **Vapour Density:** Not available.
- **Volatility:** Not available.
- **Odour Threshold:** Not available.
- **Water/Oil Dist. Coeff.:** Not available.
- **Ionicity (in Water):** Not available.
- **Dispersion Properties:** See solubility in water, methanol.
- **Solubility:**
Easily soluble in hot water.
Soluble in cold water, methanol.
Solubility in water: 31.6 g/100 ml @ 0 deg. C.; 203.3 g/100 ml @ 100 deg. C
Solubility in methanol: 15.6 g/100 ml @ 18 deg. C.
Insoluble in ethanol.
It readily forms alkaline complexes at sufficiently high concentrations of amines or alkali cyanides.
Practically insoluble in most organic solvents.

10. STABILITY AND REACTIVITY DATA

- **Stability:** The product is stable.
- **Instability Temperature:** Not available.
- **Conditions of Instability:** Excess heat (high temperatures), incompatible materials, exposure to air
- **Incompatibility with various substances:** Reactive with metals, alkalis.
- **Corrosivity:** Highly corrosive in presence of steel.
- **Special Remarks on Reactivity:** Air Sensitive. Slowly efflorescent in air. Solutions of hyprobromite are decomposed by powerful catalytic action of cupric ions, even as impurities. Incompatible with finely powdered metals.
- **Special Remarks on Corrosivity:** Corrosive to finely powdered metals. Very corrosive to plain steel.
- **Polymerization:** Will not occur.

11. TOXICOLOGICAL INFORMATION

- **Routes of Entry:** Inhalation. Ingestion.
- **Toxicity to Animals:** Acute oral toxicity (LD50): 300 mg/kg [Rat.] Acute dermal toxicity (LD50): >2000 mg/kg [Rat].
- **Chronic Effects on Humans:** MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
- **May cause damage to the following organs:** kidneys, liver.

- **Other Toxic Effects on Humans:** Hazardous in case of skin contact (irritant), of ingestion, of inhalation.
- **Special Remarks on Toxicity to Animals:** Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 1088 mg/kg
- **Special Remarks on Chronic Effects on Humans:** May affect genetic material based on animal data
- **Special Remarks on other Toxic Effects on Humans:**

- **Acute Potential Health Effects:**
 - Skin:** Causes skin irritation. May cause skin burns. It may cause and itching allergic eczema.
 - Eyes:** Causes eye irritation. May cause eye burns. It may cause conjunctivitis, corneal discoloration, ulceration and turbidity of the cornea.
 - Inhalation:** Causes respiratory tract (nose, throat, lung) irritation with coughing and wheezing. May cause ulceration and perforation of the nasal septum if inhaled in excessive quantities. Burning copper sulfate may result in irritating and poisonous gases which may irritate the respiratory tract and lungs, and may cause fume metal fever which is characterized by flu-like symptoms such as fever, chills, muscle aches.
 - Ingestion:** Harmful if swallowed. May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea, metallic taste, burning sensation in the stomach or epigastrium, abdominal pain, and possible gastrointestinal tract bleeding. May affect metabolism (metabolic acidosis), liver (liver damage, jaundice), blood (Methemoglobin, hemolytic anemia), urinary system (kidney damage, hematuria, hemoglobinuria, albuminuria), behavior/nervous systems (somnolence, tremor, psychosis, muscle weakness, coma), cardiovascular system (lowering of blood pressure, dysthrythmia). Oral mucosa, vomitus, stools, and saliva may be stained blue or green following ingestion. Aspiration pneumonia may develop following emesis and CNS depression.
- **Chronic Potential Health Effects:**
 - Skin: Repeated or prolonged skin contact may cause thickening of the skin.

12. ECOLOGICAL INFORMATION

- **Ecotoxicity:** Ecotoxicity in water (LC50): 0.1 ppm 48 hours [Goldfish]. 0.1 mg/l 96 hours [Rainbow Trout]. 2.5 mg/l 96 hours [Rainbow Trout].
- **BOD5 and COD:** Not available.
- **Products of Biodegradation:** Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.
- **Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.
- **Special Remarks on the Products of Biodegradation:** If released to soil, copper sulfate may leach to groundwater, be partly oxidized, or bind to humic materials, clay, or hydrous of iron and manganese. In water, it will bind to carbonates as well as humic materials, clay and hydrous oxides of iron and manganese. Copper is accumulated by plants and animals, but it does not appear to biomagnify from plants to animals. This lack of biomagnification appears common with heavy metals. In air, copper aerosols (in general) have a residence time of 2 to 10 days in an unpolluted atmosphere and 0.1 to >4 in a polluted, urban areas.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Copper dusts or mist or copper compounds may be disposed of in Group III sealed containers in a secure sanitary landfill. Copper containing soluble wastes can be concentrated through the use of ion exchange, reverse osmosis, or evaporators to the point where copper can be electrolytically removed and sent to a reclaiming firm. If recovery is not feasible, the copper can be precipitated through the use of caustics and the sludge deposited in a chemical waste landfill. Be sure to consult with authorities (waste regulators). Waste must be disposed of in accordance with local environmental control regulations.

14. TRANSPORT INFORMATION

DOT Classification: CLASS 9: Miscellaneous hazardous material.

Identification: Environmentally hazardous substance, n.o.s. (Cupric Sulfate) UNNA: 3077 PG: III

Special Provisions for Transport: additional markings "Marine Pollutant" - required for bulk shipments. The words "Marine Pollutant" must be entered on the shipping paper in association with the basic DOT description for bulk shipments.

15. OTHER REGULATORY INFORMATION

DSCL (EEC):

- R22- Harmful if swallowed.
- R36/38- Irritating to eyes and skin.
- R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- S22- Do not breathe dust.
- S60- This material and its container must be disposed of as hazardous waste.
- S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

- Health Hazard: 2
- Fire Hazard: 0
- Reactivity: 0
- Personal Protection: E
- National Fire Protection Association (U.S.A.):
- Health: 2
- Flammability: 0
- Reactivity: 0
- Specific hazard:

Protective Equipment: Use gloves, lab coat, dust respirator & splash goggles. Be sure to use an approved/certified respirator or equivalent.

16. OTHER INFORMATION

Last Updated: 11/06/2008

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