

School Material Safety Data Sheet

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No. 130

COPPER SULFATE

February 1987

SECTION 1. INTRODUCTORY INFORMATION

MATERIAL NAME AND FORMULA: COPPER SULFATE; $\text{CuSO}_4 \cdot 5(\text{H}_2\text{O})$

SYNONYMS: Cupric Sulfate Pentahydrate, Copper (II) Sulfate, Bluestone, Blue Vitriol

CAS NUMBER: 7758-99-8, Pentahydrate; 7758-98-7, Copper (II) Sulfate

INGREDIENTS: $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ca 100% (36.1% H_2O)

DOT CLASSIFICATION: ORM-E

EPA CLASSIFICATION: Hazardous Substance

MANUFACTURERS: Always request Material Safety Data Sheets from your chemical supplier. These should indicate the manufacturer of the substance and include an emergency phone number to call. The Manufacturers section of this book contains a listing of some of the larger manufacturers and available emergency numbers.

DESCRIPTION: Cupric sulfate occurs as transparent blue triclinic crystals or crystalline granules or powder. Odorless. Nauseating metallic taste (toxic).

PRELIMINARY INFORMATION:

This material is toxic and should be handled with care. It is a nonflammable chemical reagent with a variety of applications in a chemistry lab.



SECTION 2. USE AND STORAGE INFORMATION

-- PRELIMINARY PLANNING CONSIDERATIONS --

- Safety glasses or goggles and protective clothing (rubberized apron, etc.) should be worn for all experiments.
- Be sure eyewash station and safety shower are in good working order and readily available.
- Always provide for safe disposal of all chemical waste generated in the lab. Check applicable regulations prior to use.

-- USAGE PRECAUTIONS AND PROCEDURES --

- For safety, contact lenses should not be worn in the laboratory; soft lenses may absorb and all lenses may concentrate irritants. Particles may adhere to contact lenses and cause corneal damage.
- READ THE LABEL and follow all precautions.
- Maintain good housekeeping practices to avoid unintentional mixing with incompatible materials.
- After working with this material, always wash hands and face before eating, drinking, or smoking.
- No smoking in storage or use area.
- Minimize skin contact with this material. Avoid creating airborne dust conditions.

-- ADDITIONAL INFORMATION --

- Copper sulfate (CuSO_4) in solution can react with magnesium metal to evolve hydrogen gas.
- Anhydrous copper sulfate (CuSO_4) will ignite hydroxylamine upon contact.
- It is stable in closed containers at room temperature under normal storage and handling conditions.
- Material does not polymerize.

-- PREFERRED STORAGE LOCATION AND METHODS --

- Storage area should be cool and well ventilated. Containers should be tightly closed.
- Do not store chemicals alphabetically by name; store by chemical family instead to keep compatibles together.
- All chemical containers should be protected from physical damage and kept out of direct sunlight.
- Purchase only amounts equivalent to one year's needs.
- Store with compatible materials on sturdy shelving.
- No smoking in storage or use area.

SECTION 3. SPILLS AND DISPOSAL PROCEDURES

IF MATERIAL IS SPILLED:

- Cleanup personnel should have protection against inhalation of dust or mist and eye or skin contact.
- Avoid creating airborne dust conditions.
- For liquid spills, cover material with an inert solid absorbent (vermiculite, dry sand, etc.) and scoop into an appropriate container for disposal in accordance with existing regulations.

DISPOSAL OF SMALL QUANTITIES:

- Treatment with lime to precipitate insoluble basic copper salts may be desirable. Bury scrap in approved landfill.

DISPOSAL OF LARGER AMOUNTS: Contact a licensed disposal company.

*** FOLLOW ALL APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS FOR ALL WASTE DISPOSAL ***

SECTION 4: HEALTH HAZARDS

Copper sulfate is not listed as a carcinogen by OSHA, IARC, or NTP.
Current OSHA PEL and ACGIH TLV: 8-hr. TWA: (1.0 mg/m³) as Cu (for copper dust and mist)

Human, Oral, TDLo: 272 mg/kg; Toxic effects as CuSO₄•5H₂O
Rat, Oral, LD₅₀: 300 mg/kg as CuSO₄

- Copper sulfate is toxic. Inhalation of dusts or solution mists of copper salts can cause ulceration of nasal septum, and nasopharyngeal congestion of the mucous membranes.
- Repeated or prolonged skin contact may cause irritation and eczema.
- Particulate or solution in the eyes may cause conjunctivitis, ulceration, or clouding of the cornea.
- Ingestion can cause severe gastrointestinal tract irritation, abdominal pain, salivation, nausea, and hemorrhagic gastritis. Its unpleasant taste and prompt emetic effect upon ingestion can reduce oral toxicity.
- Ingestion of 10 g (as copper sulfate, CuSO₄) has resulted in death.

SECTION 5: FIRST AID PROCEDURES**Eye contact:**

- Flush eyes promptly with plenty of running water for at least 15 minutes, including under the eyelids.
- Get prompt medical attention.*

Skin contact:

- Flush affected area with large amounts of water.
- Remove contaminated clothing and launder before reuse.
- Get medical attention if irritation persists.*

Inhalation:

- Remove victim to fresh air; restore and/or support breathing as necessary. Rinse victim's mouth with water.
- Get medical help for coughing or breathing difficulty.*

Ingestion:

- Get prompt medical attention.*
- Give several glasses of milk or water to drink. Induce vomiting—but only if victim is conscious and alert. Vomiting may occur spontaneously.
- Never give anything by mouth to a person who is unconscious or convulsing.

* Get medical help (in school, paramedic, or community) for further treatment, observation, and support after first aid.

SECTION 6: FIRE PROCEDURES AND DATA

- This material is nonflammable but will melt and flow above 230°F (110°C). Avoid using a direct water stream on molten material (causes splattering).
- Sealed containers may rupture on heating due to pressure of H₂O vapor being released from crystals.
- Extinguishing media: Use media appropriate to surrounding fire conditions.
- For major fires, or if large quantities of this material are involved, fire fighters should wear appropriate protective clothing and use respiratory protection. Self-contained breathing apparatus is recommended.
- Use of a direct water stream may scatter fire.
- A water spray may be used to cool fire-exposed containers and disperse vapors.

THERMAL DECOMPOSITION PRODUCTS: At temp. >752°F (>400°C), material decomposes to cupric oxide and sulfur oxide.

FLASH POINT AND METHOD(S) ... Nonflammable
AUTOIGNITION TEMPERATURE ... Nonflammable

FLAMMABILITY LIMITS IN AIR (vol. %):

SECTION 7: PHYSICAL DATA

SOLUBILITY IN WATER (@0°C) ... 31.6 g/100 g (@ 212°F [100°C]; 203.3 g/100 g)

pH OF AQUEOUS SOLUTION (0.2 molar) ... 4.0

SPECIFIC GRAVITY (H₂O=1) ... 2.284

MELTING POINT ... -4 H₂O @ 230°F (110°C)*

FORMULA WEIGHT ... 249.7

- * loses H₂O of hydration slowly efflorescing in air or rapidly upon heating: -2H₂O @ 86°F (30°C); -4H₂O @ 230°F (110°C); -5H₂O @ 302°F (150°C) to yield anhydrous CuSO₄

DATA SOURCES: Genium's Industrial MSDS #29 (5/84) and references 1-7, 10, 12, 25, 27, 31, 44, 47-49, 501, 502, 510, 518.
(see glossary for titles)

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Indust. Hygiene/Safety

Medical Review

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