

# COPPER (II) SULFATE

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## 1. Product Identification

**Synonyms:** Copper (II) Sulfate Pentahydrate (1:1:5); blue vitriol; Sulfuric acid copper (2+) salt (1:1), Pentahydrate

**CAS No.:** 7758-98-7 (Anhydrous) 7758-99-8 (Pentahydrate)

**Molecular Weight:** 249.68

**Chemical Formula:**  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

**Product Codes:** CHEM-015 and others.

## 2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Cupric Sulfate	7758-98-7	100%	Yes

## 3. Hazards Identification

### Emergency Overview

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

### SAF-T-DATA<sup>(tm)</sup> Ratings

Health Rating: 2 - Moderate (Poison)

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: Blue (Health)

### 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 fume, 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 capillary damage, headache, cold sweat, 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 gram quantities of copper sulfate.

**Skin Contact:**

May cause irritation and itching.

**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.

## 5. Fire Fighting Measures

**Fire:**

Not considered to be a fire hazard.

**Explosion:**

Not considered to be an explosion hazard. Sealed container may rupture during fire conditions from pressure water vapor release.

**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 110C (230F) material will melt. Avoid using a direct water stream on molten material as it may causes splattering.

## 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. Solutions are corrosive to mild steel. 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/m<sup>3</sup> (TWA) for copper dusts & mists as Cu

ACGIH Threshold Limit Value (TLV): 1 mg/m<sup>3</sup> (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 lowest. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, 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:**

Transparent blue triclinic crystals or crystalline granules or powder.

### **Odor:**

Odorless.

### **Solubility:**

31.6g/100cc H<sub>2</sub>O @ 0°C (32°F)

**Specific Gravity:**

2.28 @ 15.6°C/4°C

**pH:**

4.0 (0.2 M solution)

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

0

**Boiling Point:**>150°C (>302°F) Decomposes with loss of 5H<sub>2</sub>O**Melting Point:**110°C (230°F) Loses 4H<sub>2</sub>O @ this temperature.**Vapor Density (Air=1):**

No information found.

**Vapor Pressure (mm Hg):**

No information found.

**Evaporation Rate (BuAc=1):**

(water=1): slowly efflorescent.

## 10. Stability and Reactivity

**Stability:**

Stable under ordinary conditions of use and storage.

**Hazardous Decomposition Products:**

When heated to decomposition cupric oxide and sulfur oxide may form.

**Hazardous Polymerization:**

Will not occur.

**Incompatibilities:**

Substance will ignite hydroxylamine. Solutions are acidic and can react with magnesium to evolve flammable hydrogen gas. May react with acetylene to form dangerous acetylides.

**Conditions to Avoid:**

Incompatibles.

## 11. Toxicological Information

**Toxicological Data:**

Oral rat LD50: 300 mg/kg. Investigated as a tumorigen, mutagen.

## Cancer Lists

## NTP Carcinogen

Ingredient	Known	Anticipated	IARC Category
Cupric Sulfate (7758-98-7)	No	No	None

## 12. Ecological Information

**Environmental Fate:**

Data for anhydrous material unless otherwise noted. 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 biodegrade. 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:**

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 IC50/72-hour values for algae are less than 1 mg/l. Toxicity data for copper.

Cupric Sulfate:

96 Hr LC50 rainbow trout: 0.1 mg/L;

48 Hr LC50 bluegill: 0.6 mg/L;

96 Hr LC50 goldfish: 0.1 mg/L

48 Hr EC50 water flea: 0.024 mg/L

## **13. Disposal Considerations**

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

## **14. Transport Information**

This material is designated an "RQ" reportable quantity in shipments of 10 lbs (4.54 kg) or greater.

**Domestic (Land, D.O.T.)**

**Proper Shipping Name:** RQ, TOXIC SOLID, INORGANIC, N.O.S. (CUPRIC SULFATE)

**Hazard Class:** 6.1

**UN/NA:** UN3288

**Packing Group:** III

**Information reported for product/size:**

**International (Water, I.M.O.)**

**Proper Shipping Name:** TOXIC SOLID, INORGANIC, N.O.S. (CUPRIC SULFATE)

**Hazard Class:** 6.1

**UN/NA:** UN3288

**Packing Group:** III

**Information reported for product/size:**

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

**Proper Shipping Name:** TOXIC SOLID, INORGANIC, N.O.S. (CUPRIC SULFATE)

**Hazard Class:** 6.1

**UN/NA:** UN3288

**Packing Group:** III

**Information reported for product/size:**

## **15. Regulatory Information**

### **Chemical Inventory Status - Part 1**

Ingredient	TSCA	EC	Japan	Australia
Cupric Sulfate (7758-98-7)	Yes	Yes	Yes	Yes

### **Chemical Inventory Status - Part 2**

Ingredient	Canada			
	Korea	DSL	NDSL	Phil.
Cupric Sulfate (7758-98-7)	Yes	Yes	No	Yes

Federal, State & International Regulations - Part 1

Ingredient	SARA 302		SARA 313	
	RQ	TPQ	List	Chemical Catg.
Cupric Sulfate (7758-98-7)	No	No	No	Copper compound

Federal, State & International Regulations - Part 2

	RCRA		TSCA	
	CERCLA	261.33		8(d)
Cupric Sulfate (7758-98-7)	10	No		No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No  
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No  
Reactivity: No (Pure / Solid)

**Australian Hazchem Code:** None allocated.

**Poison Schedule:** S5

**WHMIS:**

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

## 16. Other Information

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

**Label Hazard Warning:**

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.

Avoid breathing dust.

Keep container closed.

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. 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 reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases, get medical attention.

**Product Use:**

Laboratory Reagent and Consumer Hobby.

**Revision Information:**

None

**Disclaimer:**

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