

Copper Sulfate

1. General information

The information contained herein was obtained from sources believed to be reliable; Electrochemical Devices, Inc. (EDI) disclaims all liability for the content. This information applies to material in bulk form and may not be relevant to the small quantities of material used in our products. Copper sulfate is present in EDI reference electrodes with **CUG** in the second grouping of the model designation. The material is entirely contained within the electrode housing.

Synonyms: Blue Vitriol, Copper (II) sulfate pentahydrate, cupric sulfate, blue copper

CAS#: 7758-99-8

2. Hazard Overview

Appearance: blue. Air sensitive.

Warning! Harmful if swallowed. Causes digestive and respiratory tract irritation with possible burns. Causes eye and skin irritation and possible burns. Hygroscopic. Mutagen. Possible sensitizer.

Target Organs: Blood, kidneys, liver.

Potential Health Effects

Eye: Exposure to particulates or solution may cause conjunctivitis, ulceration, and corneal abnormalities. Causes eye irritation and possible burns.

Skin: May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Causes skin irritation and possible burns. May cause itching eczema.

Ingestion: Harmful if swallowed. May cause severe gastrointestinal tract irritation with nausea, vomiting and possible burns. Ingestion of large amounts of copper salts may cause bloody stools and vomit, low blood pressure, jaundice and coma. Ingestion of copper compounds may produce systemic toxic effects to the kidney and liver and central nervous excitation followed by depression.

Inhalation: May cause ulceration and perforation of the nasal septum if inhaled in excessive quantities. Causes respiratory tract irritation with possible burns.

Chronic: Prolonged or repeated eye contact may cause conjunctivitis. May cause liver and kidney damage. May cause anemia and other blood cell abnormalities. Individuals with Wilson's disease are unable to metabolize copper. Thus, copper accumulates in various tissues and may result in liver, kidney, and brain damage. Laboratory experiments have resulted in mutagenic effects. May cause allergic skin reaction in some individuals. Chronic copper poisoning in man is recognized in the form of Wilson's disease.

3. First Aid

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin: Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation: Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician: Individuals with Wilson's disease are more susceptible to chronic copper poisoning.

Antidote: The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel.

4. Fire Fighting

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Substance is noncombustible. This material in sufficient quantity and reduced particle size is capable of creating a dust explosion.

Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

5. Accidental Release

General Information: Use proper personal protective equipment as indicated in Section 7.

Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. Place under an inert atmosphere.

6. Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Do not ingest or inhale. Handle under an inert atmosphere. Store protected from air.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not expose to air. Store protected from moisture. Store under an inert atmosphere.

7. Exposure Control

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits:

ACGIH: none listed

NIOSH: none listed

OSHA - Final PELs: none listed

OSHA Vacated PELs: none listed

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR §1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

8. Physical and Chemical Characteristics

Physical State: Crystals

Appearance: Blue

Odor: Odorless

pH: Not available.

Vapor Pressure: 7.3 mm Hg @ 25 deg C

Vapor Density: Not available.

Evaporation Rate: Negligible.

Viscosity: Not available.

Boiling Point: 150 deg C (dec)

Freezing/Melting Point: 110 deg C (dec)

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

Decomposition Temperature: Not available.

NFPA Rating: (estimated) Health: 2; Flammability: 0; Reactivity: 0

Explosion Limits, Lower: Not available.

Upper: Not available.

Solubility: Soluble.

Specific Gravity/Density: 2.2840g/cm³

Molecular Formula: CuSO₄·5H₂O

Molecular Weight: 249.68

9. Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions. Air sensitive.

Conditions to Avoid: High temperatures, incompatible materials, dust generation, exposure to air, exposure to moist air or water.

Incompatibilities with Other Materials: Moisture, air, steel, finely powdered metals, hydroxylamine, magnesium, hydrazine, nitromethane.

Hazardous Decomposition Products: Oxides of sulfur, irritating and toxic fumes and gases, oxides of copper, copper fumes.

Hazardous Polymerization: Has not been reported

10. Toxicological Information

LD50/LC50: CAS# 7758-99-8:

Oral, rat: LD50 = 300 mg/kg;

Skin, rat: LD50 = >2 gm/kg;<BR.

Carcinogenicity: CAS# 7758-99-8: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

Epidemiology: No information available.

Teratogenicity: No information available.

Reproductive Effects: No information available.

Neurotoxicity: No information available.

Mutagenicity: DNA Inhibition: Human, Lymphocyte = 76 umol/L.;

Unscheduled DNA Synthesis: Rat, Liver = 31 umol/L.;

Cytogenetic Analysis: Rat, Ascites tumor = 300 mg/kg.;

Micronucleus Test: Intraperitoneal, mouse = 5 mg/kg.

11. Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 0.1-2.5 mg/L; 96 Hr; Unspecified Harlequin fish: LC50 = 0.1-2.5 mg/L; 96 Hr; Unspecified Goldfish: LC50 = 0.1-2.5 mg/L; 96 Hr; Unspecified flea Daphnia: EC50 = 0.24 mg/L; 48 Hr; Unspecified In soil, copper sulfate is partly washed down to lower levels, partly bound by soil components, and partly oxidatively transformed. Copper has a strong affinity for hydrous iron and manganese oxides, clays, carbonate minerals, and organic matter. Sorption to these materials ... suspended in the water column & in the bed sediments, results in relative enrichment of the solid phase and reduction in dissolved levels.

Environmental: 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 days in polluted, urban areas.

Physical: No evidence was found to indicate that there is any biotransformation process for copper compounds which would have a significant bearing on the fate of copper in aquatic environments.