



MSDS Sheet Supplied by:

**Material Name: Copper (II) sulfate pentahydrate****Section 1 – Chemical Product and Company Information****MSDS Name:** Copper (II) sulfate pentahydrate  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ .**Synonyms:** Blue Vitriol.**Company Identification:**M.C. Miller CO.  
11640 U.S. Hwy 1  
Sebastian, Florida 32958**For information, call:** 1-772-794-9448**Fax Number:** 1-772-589-9072**For CHEMTREC assistance, call:** 800-424-9300**For International CHEMTREC assistance, call:** 703-527-3887**Section 2 – Composition, Information on Ingredients**

CAS#	Chemical Name	%	EINECS/ELINCS
7758-99-8	Copper (II) Sulfate Pentahydrate	99.8	231-847-6

**Hazard Symbols:** XN      **Risk Phrases:** 22 36/38**Section 3 – Hazards Identification****Emergency Overview****Appearance:** blue crystals.**Warning!** Harmful if swallowed. Causes eye and skin irritation and possible burns. Causes digestive and respiratory tract irritation with possible burns. Hygroscopic (absorbs moisture from the air). Severe marine pollutant.**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:** Causes skin irritation and possible burns.**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:** 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. Adverse reproductive effects have been reported in animals. Laboratory experiments have resulted in mutagenic effects. Chronic copper poisoning in man is recognized in the form of Wilson's disease.

### **Section 4 – First Aid Measures**

**Eyes:** Immediately flush eyes with plenty of room temperature water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If symptoms persists, after 15 minutes of irrigation, get medical aid.

**Skin:** Get medical aid. Flush skin with plenty of 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.

**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.

### **Section 5 – Fire Fighting Measures**

**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.

**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:** Not available.

**Upper Flammable Limit (UFL):** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0; Reactivity: 1

Hazard Scale: 0=Minimal 1=Slight 2=Moderate 3=Serious 4=Severe

### **Section 6 – Accidental Release Measures**

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. U.S. regulations require reporting spills and releases to soil, water and air in excess of reportable quantities.

### **Section 7 – Handling and Storage**

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid breathing dust.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from moisture.

### **Section 8 – Exposure Controls, Personal Protection**

**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. Wash hands thoroughly after handling material.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Copper(II) sulfate pentahydrate	none listed	1 mg/m <sup>3</sup> TWA (as Cu, except Copper fume) (listed under Copper compounds, n.o.s.).	none listed

**OSHA Vacated PELs:** Copper (II) sulfate pentahydrate: No OSHA Vacated PELs are listed for this chemical.

**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 respirator use.

## **Section 9 – Physical and Chemical Properties**

**Physical State:** Solid Crystals  
**Appearance:** Blue  
**Odor:** Odorless  
**pH:** 3.7-4.2 (10% soln.)  
**Vapor Pressure:** 7.3 mm Hg @ 25 deg C  
**Vapor Density:** 8.6  
**Evaporation Rate:** Negligible.  
**Viscosity:** Not available.  
**Boiling Point:** 560 deg C (1040deg F) (decomposes)  
**Freezing/Melting Point:** 150 deg C (302 deg F)  
**Molecular Weight:** 249.68  
**Solubility (H2O):** Soluble. 31.6 g/100cc (@ 0 deg C)  
**Specific Gravity/Density:** 2.2840g/cm3  
**Molecular Formula:** CuO4.5H2O

## **Section 10 – Stability and Reactivity**

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

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

**Incompatibilities with Other Materials:** Aqueous solution of copper (2+) sulfate is an acid. Incompatible with strong bases, hydroxylamine, magnesium.

**Hazardous Decomposition Products:** Oxides of sulfur, copper Oxides.

**Hazardous Polymerization:** Has not been reported

## **Section 11 – Toxicological Information**

**RTECS#:**

**CAS#** 7758-99-8: GL8900000

**LD50/LC50:**

**CAS#** 7758-99-8:

Oral, mouse: LD<sub>50</sub> = 43 mg/kg;

Oral, rat: LD<sub>50</sub> = 300 mg/kg;

Skin, rat: LD<sub>50</sub> = >2 gm/kg;

**Carcinogenicity:**

CAS# 7758-99-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information available.

**Teratogenicity:** There are no reports of Teratogenicity in humans. Animal studies indicate that a deficiency or excess copper in the body can cause significant harm to developing embryos. The net absorption of copper is limited and toxic levels are unlikely from industrial exposure.

**Reproductive Effects:** See actual entry in RTECS for complete information.

**Mutagenicity:** See actual entry in RTECS for complete information.

**Neurotoxicity:** Has not been Identified

## **Section 12 – Ecological Information**

**Ecotoxicity:** Fish: Rainbow trout: LC50 = 0.1-2.5 mg/L; 96 Hr; Unspecified Fish: Bluegill/Sunfish: LC50 = 0.6 mg/L; 48 Hr; 15 mg/L CaCO3Fish: Bluegill/Sunfish: LC50 = 8.0 mg/L; 48 Hr; 68 mg/L CaCO3Fish: Bluegill/Sunfish: LC50 = 10.0 mg/L; 48 Hr; 100 mg/L CaCO3Fish: Bluegill/Sunfish: LC50 = 45.0 mg/L; 48 Hr; 132 mg/L CaCO3 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.

**Other:** Has fungicidal properties.

## **Section 13 – Disposal Considerations**

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40

CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

## **Section 14 – Transport Information**

	US DOT	Canada TDG
<b>Shipping Name:</b>	Environmentally Hazardous Solid, n.o.s. Copper Sulfate Pentahydrate	Environmentally Hazardous Solid, n.o.s. Copper Sulfate Pentahydrate
<b>Hazard Class:</b>	9	9
<b>UN Number:</b>	UN3077	UN3077
<b>Packing Group:</b>	III	III

## **Section 15 – Regulatory Information**

### **US Federal Regulations**

#### **TSCA**

CAS# 7758-99-8 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3 (u) (2)).

#### **Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

#### **Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

#### **Section 12b**

None of the chemicals are listed under TSCA Section 12b.

#### **TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

#### **SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

#### **SARA Codes**

CAS # 7758-99-8: immediate, delayed.

#### **Section 313**

This material contains Copper(II) sulfate pentahydrate (listed as Copper compounds, n.o.s.), 100%, (CAS# 7758-99-8) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

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#### **Clean Air Act:**

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depleters.

This material does not contain any Class 2 Ozone depleters.

#### **Clean Water Act:**

None of the chemicals in this product are listed as Priority Pollutants under the CWA. CAS# 7758-99-8 is listed as a Toxic Pollutant under the Clean Water Act.

#### **OSHA:**

None of the chemicals in this product are considered highly hazardous by OSHA.

#### **STATE**

CAS# 7758-99-8 can be found on the following state right to know lists: California, (listed as Copper compounds, n.o.s.), New Jersey, (listed as Copper compounds, n.o.s.), Pennsylvania, (listed as Copper compounds, n.o.s.).

#### **California Proposition 65**

Copper Sulfate Pentahydrate is not on the California Proposition 65 chemical lists.

### **European/International Regulations**

#### **European Labeling in Accordance with EC Directives**

##### **Hazard Symbols:**

XN N

##### **Risk Phrases:**

R 22 Harmful if swallowed.

R 36/38 Irritating to eyes and skin.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Safety Phrases:**

- S 22 Do not breathe dust.
- S 60 This material and its container must be disposed of as hazardous waste.
- S 61 Avoid release to the environment. Refer to special instructions / safety data sheets.

**WGK (Water Danger/Protection)****Canada - WHMIS**

This product has a WHMIS classification of D1B, D2B.  
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**

CAS# 7758-99-8 (listed as Copper compounds, n.o.s.) is listed on the Canadian Ingredient Disclosure List.

## **Section 16 – Additional Information**

**MSDS Creation Date:** 11/14/2001

**Revision #3 Date:** 07/11/2012

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# MATERIAL SAFETY DATA SHEET

## Section 1 – Chemical Product and Company Information

**MSDS Name:** Copper (II) Sulfate, Anti-Freeze Solution,

**Synonyms:** Anti-Freeze Solution

**Company Identification:** M. C. Miller Co., Inc.  
11640 U.S. Hwy 1  
Sebastian, Florida 32958

Telephone: 1-772-794-9448  
Fax: 1-772-589-9172  
E-mail: [sales@mcmiller.com](mailto:sales@mcmiller.com)

**Emergency Numbers:** M. C. Miller Co. 1-772-794-9448  
Chemtrec – 800-424-9300 (US)

Chemtrec – 703-527-3887 (International)

**Chemical Family:** Mixture

**Product Use:** Anti-freeze solution for copper sulfate electrodes

## Section 2 – Composition, Information on Ingredients

CAS#	Chemical Name	%	EINECS/ELINCS
56-81-5	Glycerin	25-75	200-289-5
7758-99-8	Copper Sulfate Pentahydrate	5-25	231-847-6
7732-18-5	Water	10-25	233-139-2

## Section 3 – Hazards Identification

### Emergency Overview

**CERCLA RATINGS (SCALE 0-3):** Health=3, Fire=1, Reactivity=0, Persistence=3

**NFPA RATINGS (SCALE 0-4):** Health=3, Fire=1, Reactivity=0

Odorless, Light Blue Liquid. Harmful if swallowed. Cause severe burns to mucous membranes. Causes eye irritation, possibly severe. Causes respiratory tract and skin irritation. Do not get into eyes, on skin, or on clothing. Avoid breathing vapor or mist. Keep container tightly closed. Wash thoroughly after handling. Use only with adequate ventilation. Handle with caution.

### Potential Health Effects

- **Eye:** Short Term Effects: May cause irritation, possibly severe. Additional effects may include tearing and eye damage. Long Term Effects: Same effects as from short-term exposure
- **Skin:** Short Term Effects: May cause irritation. Additional effects may include burns, itching and blood disorders. Long Term Effects: Same effects as from short-term exposure.
- **Ingestion:** Short Term Effects: May cause burns. Additional effects may include sore throat, metallic taste, fever, yellowing of the skin and eyes, digestive disorders, bloody vomit, blood in the urine, blood in the stool, inability to urinate, low blood pressure, headache, dizziness, twitching, bluish skin color, blood disorders, kidney damage, paralysis, convulsions, shock and coma. Long Term Effects: Same effects as from short-term exposure.
- **Inhalation:** Short Term Effects: May cause irritation. Additional effects may include burns, metallic taste, chills, digestive disorders, chest pain, and difficulty breathing. Long Term Effects: In addition to effects from short term exposure, perforation of the nose, fever, and anemia may occur.

**Carcinogen Status:** OSHA: N

NTP: N

IARC: N

## Section 4 – First Aid Measures

- **Eyes:** Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower lids, until no evidence of chemical remains (at least 15-20 minutes). Get medical attention.

- **Skin:** Remove contaminated clothing and shoes immediately. Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention.
- **Ingestion:** Treat symptomatically and supportively. Induce vomiting. Get medical attention immediately.
- **Inhalation:** Remove from exposure area to fresh air immediately. Perform artificial respiration if necessary. Keep person warm and at rest. Treat symptomatically and supportively. Get medical attention immediately.

## **Section 5 – Fire Fighting Measures**

- **Fire and Explosion Hazard:** Slight fire hazard when exposed to heat or flame.
- **Extinguishing Media:** Dry chemical, carbon dioxide, water spray or regular foam (1993 Emergency Response Guidebook, RSPA P 5800.6). For larger fires, use water spray, fog, or regular foam (1993 Emergency Response Guidebook, RSPA P 5800.6).
- **Firefighting:** Move the container from fire area if you can do so without risk. Do not scatter spilled material with high-pressure water streams. Dike fire-control water for later disposal (1993 Emergency Response Guidebook, RSPA P 5800.6, Guide Page 31). Use agents suitable for type of surrounding fire. Avoid breathing hazardous vapors, keep upwind. Flash Point, Lower Flammable Limit, and Auto Ignition: No Data Available.
- **Hazardous Combustion Products:** Thermal decomposition may release toxic and/or hazardous gases.

## **Section 6 – Accidental Release Measures**

- **Occupational Spill:** Stop the leak if you can without risk. For small spills, take up with sand or other absorbent material and place into clean, dry containers for later disposal. Keep unnecessary people away. Isolate hazard area and deny entry.
- **Reportable Quantity (RQ):** The Superfund Amendments and Reauthorization Act (SARA) Section 304 requires that a release equal to or greater than the reportable quantity established for that substance be immediately reported to the local emergency planning committee and the state emergency response commission (40 CFR 355.40). If the release of this substance is reportable under CERCLA Section 103, the National Response Center must be notified immediately at (800) 424-8802 or (202) 426-2675 in the metropolitan Washington D.C. area (40 CFR 302.6).

## **Section 7 – Handling and Storage**

- **Handling:** Observe all federal, state, and local regulations when storing this substance. Store away from incompatible substances.

## **Section 8 – Exposure Controls, Personal Protection**

- **Exposure Limits:** Glycerin (Mist): 5mg/m<sup>3</sup> OSHA TWA (respiratory fraction); 10mg/m<sup>3</sup> OSHA TWA (total mist); 10mg/m<sup>3</sup> ACGIH TWA. *Note: OSHA revoked the final rule limits of January 19, 1989 in response to the 11<sup>th</sup> Circuit Court of Appeals decision (AFL-CIO v. OSHA) effective June 30, 1993. See 29 CFR 1910.1000 (58 FR 35338).*
- **Copper Dust and Mist (AS CU):** 1mg/m<sup>3</sup> OSHA TWA 1mg/m<sup>3</sup> ACGIH TWA 1mg/m<sup>3</sup> NIOSH recommended TWA 1mg/m<sup>3</sup> DFG MAK TWA (total dust) 2mg/m<sup>3</sup> DFG MAK 30 minute peak, average value, 4 times/shift. Measurement method: Particulate filter; acid; atomic absorption spectrometry; (NIOSH Vol. III #7029).
- **Cupric Sulfate:** 10 pounds CERCLA Section 103 Reportable Quantity Subject to SARA Section 313 Annual Toxic Chemical Release Reporting.
- **Ventilation:** Provide local exhaust ventilation system to meet published exposure limits.
- **Personal Protective Equipment**
  - **Eyes:** The use of chemical splash goggles is recommended. Emergency Eye Wash: Where there is any possibility that an employee's eye(s) may be exposed to this substance, the employer should provide an eye wash fountain within the immediate work area for emergency use.
  - **Gloves:** Employee must wear appropriate protective gloves to prevent contact with this substance.
  - **Clothing:** Employee must wear appropriate protective (impervious) clothing and equipment to prevent repeated or prolonged skin contact with this substance.
  - **Respirators:** Based on the components present and/or information in physical data, health effects or toxicity sections, no respirator would be required under normal conditions of use. However, air contamination monitoring should be carried out to assure that the employees are not exposed to harmful concentrations of any of the above-mentioned components. If respiratory protection is required, it must be based on the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA).
  - **For Firefighting and Other Immediately Dangerous to Life or Health Conditions:** Any self-contained respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supply-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-



pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

## **Section 9 – Physical and Chemical Properties**

<b>Odor:</b>	Odorless	<b>Odor Threshold:</b>	No Data Available
<b>Appearance:</b>	Light Blue Liquid	<b>Volatility:</b>	0%
<b>pH:</b>	5.0	<b>Vapor Pressure:</b>	No Data Available
<b>Vapor Density:</b>	No Data Available	<b>Evaporation Rate:</b>	No Data Available
<b>Boiling Point:</b>	212°F (100°C)	<b>Freezing Point:</b>	No Data Available
<b>Specific Gravity:</b>	1.0	<b>Water Solubility:</b>	miscible

## **Section 10 – Stability and Reactivity**

- **Reactivity:** Stable under normal temperatures and pressures.
- **Conditions to Avoid:** May burn, but does not ignite readily. Avoid contact with strong oxidizers, excessive heat, sparks, or open flame.
- **Incompatibilities:**
  - **Glycerin:**
    - **Acetic Anhydride:** Violent reaction catalyzed by phosphorus oxychloride
    - **Acids (Strong):** Incompatible
    - **Bases (Strong):** Incompatible
    - **Calcium Hypochlorite:** May ignite spontaneously on mixing
    - **Chlorine (Liquid):** Explosive reaction
    - **Chromium (III) Oxide:** Explosive reaction
    - **Chromium Trioxide:** Violent reaction
    - **Hydrofluoric Acid, Nitric Acid:** Unstable mixture
    - **Hydrogen Peroxide:** Explosive hazard
    - **Lead Oxide, Perchloric Acid:** Explosive hazard
    - **Nitric Acid, Sulfuric Acid:** Explosive hazard
    - **Oxidizers (Strong):** Explosive reaction
    - **Potassium Chlorate:** Explosive reaction
    - **Potassium Permanganate:** Explosive reaction on contact
    - **Potassium Peroxide:** Fire and explosion hazard
    - **Sodium Hydride:** Intense exothermic reaction
    - **Silver Perchlorate:** Formation of shock-sensitive solvated salt
    - **Sodium Peroxide:** Fire and explosion hazard
  - **Cupric Sulfate (Copper Sulfate):**
    - **Hydroxylamine:** May ignite
    - **Magnesium:** Produces hydrogen
    - **Metals:** Corrosive
    - **Oxidizers (Strong):** Incompatible
    - **Reducing Agents:** Reacts vigorously
    - **Sodium Hypobromite:** Solutions of sodium hypobromite are decomposed by powerful catalytic action of cupric ions
  - **Copper Salts:**
    - **Acetylene:** May form explosive acetylides
    - **Hydrazine:** Decomposes
    - **Nitromethane:** Forms explosive mixtures
  - **Hazardous Decomposition:** Thermal decomposition may release toxic and/or hazardous gases
  - **Polymerization:** Hazardous polymerization has not been reported to occur under normal temperature and pressures

## **Section 11 – Toxicological Information**

- **Glycerin:**
  - **Irritation Data:** 500 mg/24 hours skin-rabbit mild; 126 mg eye-rabbit mild; 500 mg//24 hours eye-rabbit mild
  - **Toxicity Data:** 1428 mg/kg oral-human TDLo; 12600 mg/kg oral-rat LD50; 4090 mg/kg oral-mouse LD50; 27 gm/kg oral-rabbit LD50; 7750 mg/kg oral-guinea pig LD50; 100 mg/kg subcutaneous-rat LD50; 91 mg/kg subcutaneous-mouse LD50; 5566 mg/kg intravenous-rat LD50; 4250 mg/kg intravenous-mouse LD50; 53 gm/kg intravenous-rabbit LD50; 4420 mg/kg Intraperitoneal-rat LD50; 8700 mg/kg Intraperitoneal-mouse LD50; mutagenic data (RTECS); reproductive effects data (RTECS)
  - **Carcinogen Status:** None

- **Acute Toxicity Level:** Slightly toxic by ingestion
  - **Target Effects:** Poisoning may affect the kidneys and central nervous system
- **Cupric Sulfate (Copper Sulfate):**
  - **Toxicity Data:** 50 mg/kg oral-human TDLo; 857 mg/kg oral-man LDLo; 150 mg/kg oral-child LDLo; 300 mg/kg oral-rat LD50; 3 gm/kg/8 weeks continuous oral-mouse LDLo; 2 gm/kg/3 weeks continuous oral-mouse LDLo; 43 mg/kg subcutaneous-rat LD50; 500 ug/kg subcutaneous-mouse LDLo; 10 mg/kg intravenous-rabbit LD50; 50 gm/kg intravenous-mouse LDLo; 2 mg/kg intravenous-guinea pig LDLo; 18 mg/kg intraperitoneal-mouse LD50; 520 mg/kg unreported-rat LD50; mutagenic data (RTECS); reproductive effects data (RTECS); tumorigenic data (RTECS)
  - **Monohydrate:** No data available
  - **Pentahydrate:** 1088 mg/kg oral-human TDLo; 272 mg/kg oral-human LDLo; 300 mg/kg oral-rat LD50; 60 mg/kg oral-dog LDLo; 5 gm/kg oral-animal LDLo; 62 gm/kg subcutaneous-guinea pig LDLo; 18700 ug/kg intraperitoneal-rat LD50; 33 mg/kg intraperitoneal-mouse LD50; 7500 ug/kg intraperitoneal-mammal LD50; 221 mg/kg unreported-man LDLo; mutagenic data (RTECS)
  - **Carcinogen Status:** None
  - **Local Affects:** Corrosive-eyes and ingestion; inhalation and skin
  - **Acute Toxicity Level:** Toxic by ingestion
  - **Target Effects:** Poisoning may affect the liver, kidneys, and blood
  - **At Increase Risk from Exposure:** Persons with pre-existing respiratory, liver, kidney, skin, or Wilson's disease, or hematopoietic disorders (based on general information on copper salts)
  - **Additional Data:** May be excreted in breast milk
- **Health Effects:**
  - **Inhalation:**
    - **Glycerin:**
      - **Acute Exposure:** Due to its low vapor pressure, glycerin is not considered likely to be an inhalation hazard at normal room temperatures. Vapor or mist in sufficient concentrations may interfere with respiratory function. At elevated temperatures, the fume may cause irritation and dehydration of the mucous membranes. Symptoms may include coughing and difficulty breathing.
      - **Chronic Exposure:** No Data Available
    - **Cupric Sulfate (Copper Sulfate):**
      - **Irritant:** See information on copper salts. In addition to the effects described in copper salts, copper sulfate may cause sore throat, coughing, shortness of breath, and can be corrosive to mucous membranes. Chronic exposure can also cause sloughing of nasal mucosa. Workers exposed over the years to bordeaux mixture, containing copper sulfate as the principle toxic agent, have developed copper containing nodules and greenish tumors in the liver and lungs.
    - **Copper Salts:**
      - **Acute Exposure:** Mists of copper salts may cause irritation of the upper respiratory tract or an illness similar to the common cold with chills and stuffiness of the head. Chest pain, dyspnea, a metallic taste, and gastrointestinal disturbances may occur.
      - **Chronic Exposure:** Repeated or prolonged exposure to dusts or mists of copper salts may cause irritation of the upper respiratory tract, rhinitis, sneezing, coughing, fever, metallic taste, and digestive disorders. Ulceration and perforation of the nasal septum has been reported on occasion. Congestion and atrophic changes in nasal mucosa have been reported from long-term exposure. Mild anemia, possibly hemolytic, has been observed in workers exposed to copper in the air. Greenish discoloration of the skin, hair, and teeth has occurred. In animals, inhalation of copper salts has caused injury to the lungs and liver with hemochromatosis.
  - **Skin Contact:**
    - **Glycerin:**
      - **Acute Exposure:** Application of concentrated glycerin may cause effects ranging from mild irritation to dehydration of the skin with subsequent irritation and redness. Allergic reactions are rare, but may occur in sensitive individuals.
      - **Chronic Exposure:** Repeated or prolonged exposure to concentrated solutions may result in dermatitis.
    - **Cupric Sulfate (Copper Sulfate):**
      - **Irritant:** See information on copper salts. In addition to the effects described in copper salts, copper sulfate may cause redness, pain, and itching papulovesicular and eczematoid lesions. Strong solutions of copper sulfate can be corrosive. Rarely, sensitization may occur. Hemolytic anemia has been observed when the crystals were applied to burned skin.
    - **Copper Salts:**
      - **Acute Exposure:** Direct contact with copper salts may cause irritation, erythema, and dermatitis, and some have been reported to cause an itching eczema; continued contact may cause some degree of necrosis. Absorption through

burned or eczematous skin has occurred with some salts. Systemic effects may be possible.

- **Chronic Exposure:** Repeated and prolonged contact with some copper salts has resulted in irritation, necrosis, and greenish skin color discoloration. Allergic dermatitis, although rare, has been reported.

○ **Eye Contact:**

▪ **Glycerin:**

- **Acute Exposure:** Application the the human eye may cause a strong stinging and burning sensation, with reflex tearing and dilation of the conjunctival vessels, but no injury. Instillation into the anterior chamber resulted in an inflammation reaction and edema of the cornea with wrinkling of the posterior surface and damage of endothelial cells.
- **Chronic Exposure:** Not Available.

▪ **Cupric Sulfate (Copper Sulfate):**

- **Corrosive.** See information on copper salts. In addition to the effects described in copper salts, copper sulfate may cause skin irritation, redness, pain, and blurred vision. Copper sulfate solutions can be corrosive to the eye. Repeated application of copper sulfate to the eye has caused temporary inflammation and a purulent reaction with discoloration of the cornea. If a partial of copper sulfate is left in the conjunctival sac, it can cause local inflammation and necrosis, corneal opacity and symblepharon.

▪ **Copper Salts:**

- **Acute Exposure:** Some copper salts have been reported to cause conjunctivitis, corneal ulcerations and turbidity, and possibly palpebral edema. Copper particles embedded in the eye may result in a pronounced foreign-body response with characteristic discoloration of ocular tissue.
- **Chronic Exposure:** Prolonged or repeated exposure to copper salts may cause irritation and conjunctivitis.

○ **Ingestion:**

▪ **Glycerin:**

- **Acute Exposure:** Ingestion of 100ml resulted in headache, nausea, and vomiting. Other symptoms may include digestive tract irritation, insomnia, dizziness, diarrhea, and fever. Large doses may cause hemolysis, hemoglobinuria, hyperglycemia, glycosuria, renal failure, convulsions, and paralysis. Glycerin acts as an osmotic diuretic and as such may lower intraocular pressure and cause hypovolemia. In rodents, it may also cause restlessness, mild cyanosis, drop in blood pressure, increased rate and magnitude of respiration, followed by debility, diuresis, tremors, decreased respiration, collapse, clonic convulsions and coma. Reproductive effects have been reported in animals.
- **Chronic Exposure:** Ingestion of 30 ml for 50 days by human volunteers resulted in increased thirst and a feeling of warmth.

▪ **Cupric Sulfate (Copper Sulfate):**

- **Toxic/Corrosive:** See information on copper salts. In addition to the effects described in copper salts, copper sulfate, if not removed immediately can be corrosive. Copper sulfate can also cause sore throat gastroenteric pain, blue discoloration of gums and tongue, prostration, loss of consciousness, and convulsions. Other reported effects include: hematemesis, melena, hematuria, an increase in white blood cells, sulphaemoglobinaemia, and septicemia. A study using mice exposed to copper sulfate in their drinking water resulted in dose dependent impairment of the immune response.

▪ **Copper Salts:**

- **Acute Exposure:** May cause immediate metallic taste, salivation, nausea, epigastric burning, violent vomiting which may be bluish-green, and diarrhea with bloody stools, colic, ulceration, and hemorrhagictritis. If sufficient vomiting does not occur, some copper salts may cause systemic poisoning with severe headache. Cold sweat weak pulse, hypotension, and other symptoms of shock. Jaundice may appear in a few days due to liver injury and/or hemolytic crisis; anemia may also develop. Oliguria, anuria, and other signs of renal injury may occur. Diffuse myalgias, rhabdomyolysis, methemoglobinemia, metabolic acidosis, and pancreatitis have also been reported. In fatal cases, death may be preceded by convulsions, paralysis, and coma. Early death is usually associated with shock; later it is likely caused by hepatorenal failure.
- **Chronic Exposure:** Repeated ingestion of copper salts has produced hemolytic anemia, hemochromatosis, impaired immune response, liver, kidney, lung, and spleen damage and death in animals.

**Section 12 – Ecological Information**

- **Environmental Impact Rating (0-4):** No Data Available
- **Acute Aquatic Toxicity:** No Data Available
- **Degradability:** No Data Available
- **Log Bioconcentration Factor (BCF):** No Data Available
- **Log Octanol/water Partition Coefficient:** No Data Available

**Section 13 – Disposal Considerations**

Observe all federal, state, and local regulations when disposing of this substance.

**Section 14 – Transport Information**

	US DOT	IATI	RID/ADR	IMO	Canada TDG
Shipping Name:	Environmentally Hazardous Substance, Liquid n.o.s. <b>Technical Shipping Name:</b> Copper Sulphate	Environmentally Hazardous Substance Liquid, n.o.s	Environmentally Hazardous Substance Liquid, n.o.s	Environmentally Hazardous Substance Liquid, n.o.s	CUPRIC SULFATE Liquid
Hazard Class:	9	9	9	9	9.2
UN Number:	3082	3082	3082	3082	3082
Packing Group:	III	III	III	III	II
Packing Group:	WHMIS CLASSIFICATION D2B – OTHER REGULATORY REQUIREMENT none	--	--	--	REGULATED LIMIT 5 KG

**Section 15 – Regulatory Information**

- **TSCA Status:** Yes
- **CERCLA Section 103:** Yes
  - **Cupric Sulfate 10 pounds RQ**
- **SARA Section 302 (40 CFR 355.30):** No
- **SARA Section 304 (40 CFR 355.40):** No
- **SARA Section 313 (40 CFR 372.65):** Yes
  - Copper Dust and Mist (AS CU)
  - Cupric Sulfate
- **OSHA Process Safety (29 CFR 1910.119):** No
- **California Proposition 65:** No

- **SARA Hazard Categories, SARA Sections 311/312 (40 CFR 370.21)**
- **Acute Hazard:** Yes
- **Chronic Hazard:** Yes
- **Fire Hazard:** No
- **Reactivity Hazard:** No
- **Sudden Release Hazard:** No

### **Section 16 – Additional Information**

The information contained within this document is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, expressed or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if M.C. Miller Co. Inc. has been advised of the possibility of such damages.