



# Copper Sulfate Pentahydrate

Date Prepared: August 31, 2004



NFPA RATING

HEALTH	3	
FLAMMABILITY	0	
REACTIVITY	0	
PROTECTIVE EQUIPMENT		

HMS RATING

## MATERIAL SAFETY DATA SHEET

### SECTION I. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** Copper Sulfate Pentahydrate

**Synonyms:** Triangle Brand Copper Sulfate; Triangle Brand Copper Sulfate Crystal; Triangle Brand Copper Sulfate Instant Powder; Triangle Brand Copper Sulfate Pentahydrate; Triangle Brand Cupric Sulfate Pentahydrate Technical; Phelps Dodge Copper Sulfate; Phelps Dodge Refining Corporation Triangle Brand Copper Sulfate; Phelps Dodge El Paso Triangle Brand; Cupric Sulfate; Copper Sulfate; Copper Sulfate Pentahydrate; Blue Vitriol; Triangle Brand Cupric Sulphate Pentahydrate Technical; Triangle Brand Copper Sulphate Instant Powder; Triangle Brand Copper Sulphate Crystal

**Product Use:** Industrial manufacturing, animal feed, algicide, fungicide, herbicide, pesticide or as a fertilizer.

**Manufacturer/Vendor Information:** PHELPS DODGE REFINING CORP.  
P.O Box 20001  
El Paso, Texas 79998

**Chemtrec 24-Hour Emergency Phone:**  
In USA or Canada (800)424-9300  
**Other Information Phone:** (915)778-9881

### SECTION II. COMPOSITION AND INFORMATION ON INGREDIENTS

CAS No.	Chemical Name	Exposure Limits	% by wt.
7758-99-8	Copper sulfate pentahydrate (CuSO <sub>4</sub> •5H <sub>2</sub> O), (Cupric sulfate), (Blue Vitriol), (Bluestone)	ACGIH TLV TWA: 1.0 mg/m <sup>3</sup> (as copper dust/mist) OSHA PEL TWA: 1.0 mg/m <sup>3</sup> (as copper dust/mist)	99
	<i>Phelps Dodge Triangle Brand Copper Sulfate Copper Sulfate Pentahydrate (CAS 7758-99-8) Contains water of crystallization Metallic copper equivalent</i>		=99% =35.7% =25.2%

### SECTION III. HAZARDS IDENTIFICATION

**Emergency Overview:** Odorless, transparent blue crystals, granules or powder. Can cause irreversible eye damage and slight skin irritation. Harmful if swallowed. Avoid breathing mist or dust and contact with skin, eyes or clothing.

**Route(s) of Entry:** Inhalation, eye contact, skin contact and ingestion.

**Acute Exposure:** Can cause skin, eye and respiratory irritation.

**Chronic Exposure:** Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated eye contact may cause conjunctivitis. Prolonged excessive inhalation of mists containing copper sulfate may cause adverse effects on the liver and kidneys.

**Carcinogenicity (NTP) (IARC) (OSHA) (ACGIH):** Not listed

**Eye:** Corrosive and may result in irreversible eye damage.

**Skin Contact:** Can cause slight skin irritation. May cause localized discoloration of the skin. Product specific tests in accordance with USEPA standards do not indicate skin sensitization is likely to occur.

**Inhalation:** Can result in irritation of the upper respiratory tract and in excessive quantities may cause ulceration and perforation of the nasal septum.

**Ingestion:** Can result in digestive tract irritation, nausea, vomiting, diarrhea and abdominal pain.

### SECTION IV. FIRST AID MEASURES

**Eyes:** Immediately flush eyes with plenty of water. Hold eye open and rinse slowly and gently for at least 15-20 minutes. Contact physician for treatment advice.

**Skin:** Wash skin with soap and plenty of water. If irritation persists contact a physician.

**SECTION IV. FIRST AID MEASURES (Continued)**

**Ingestion:** Contact a poison control center or physician for treatment advice. Have person sip a glass of water if able to swallow. Do not give anything by mouth to an unconscious person. Do not induce vomiting unless told to do so by the poison control center or physician. If vomiting occurs spontaneously, avoid aspiration.

**Inhalation:** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention.

**SECTION V. FIRE FIGHTING MEASURES**

<b>Flash Pt:</b>	Not applicable
<b>Flammable Limits in Air-Lower:</b>	Not applicable
<b>Flammable Limits in Air – Upper:</b>	Not applicable
<b>Auto Ignition Temperature:</b>	Not applicable
<b>Fire Fighting Extinguishing Media:</b>	Does not burn or support combustion. Use extinguishing media appropriate for surrounding fire (CO <sub>2</sub> , dry chemical or water).
<b>Fire Fighting Equipment:</b>	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
<b>Fire Fighting Instructions:</b>	Evacuate area and fight fire from a safe distance.
<b>Fire and Explosion Hazards:</b>	Sealed containers may rupture when heated due to release of water from crystals.
<b>Hazardous Combustion Products:</b>	Not applicable
<b>Explosion Data - Mechanical Impact / Static Discharge:</b>	Not available
<b>Unusual Hazards:</b>	Material is acidic when dissolved in water, contact with magnesium metal may evolve hydrogen gas. Anhydrous cupric sulfate formed on water loss (white color). Anhydrous salt will ignite hydroxylamine, if present.

**SECTION VI. ACCIDENTAL RELEASE MEASURES**

**Accidental Release Measures:** Use clean-up methods that avoid dust generation (vacuum, wet). Wear a NIOSH approved respirator if dust will be generated in clean-up. Use protective clothing if skin contact is likely. If material is diluted in a water solution, and a spill occurs in a confined area, introduce lime or soda ash to form insoluble copper salts and dispose of by approved method. Prevent accidental entry of solution into streams and other water bodies. Shovel any spills into plastic bags and seal with tape. Copper sulfate solution may deteriorate concrete.

**SECTION VII. HANDLING AND STORAGE**

**Signal Word:** Danger.

**Handling Information:** Avoid breathing dust or solution mist. Sweep up crystals or powder, vacuum is preferred. Eye wash stations should be available in work areas. Users should wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

**Storage Information:** Store in closed containers in a cool, dry, well-ventilated area away from heat sources and reducing agents. Store copper sulfate in stainless steel, fiberglass, polypropylene, PVC's or plastic equipment. Keep away from galvanized pipe and nylon equipment. If container or bag is damaged, place the container or bag in a plastic bag. Use good housekeeping practices to prevent dust accumulation.

**SECTION VIII. EXPOSURE CONTROLS / PERSONAL PROTECTION**

**Engineering Controls:** Use adequate general or local ventilation to keep airborne concentrations below the exposure limits.

**Eye Protection:** Use protective goggles or a face-shield.

**Skin Protection:** Use protective clothing to prevent repeated or prolonged skin contact. Applicators and other handlers must wear long-sleeved shirt and long pants, waterproof gloves, shoes plus socks, and protective eyewear. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with product's concentrate. Do not reuse them. Keep and wash PPE separately from other laundry.

**SECTION VIII. EXPOSURE CONTROLS / PERSONAL PROTECTION (Continued)**

**Respiratory Protection:** A respiratory protection program that meets OSHA 29 CFR 1910.134 requirements must be followed whenever workplace conditions warrant respirator use. For concentrations up to 10 times the exposure limit, use NIOSH approved half- or full-face, air-purifying respirator. For higher concentrations, consult a professional industrial hygienist.

**SECTION IX. PHYSICAL AND CHEMICAL PROPERTIES**

<b>Appearance:</b>	Transparent blue crystals, granules or powder.
<b>Melting Point:</b>	Not available
<b>Boiling Point:</b>	-5H <sub>2</sub> O @ 150 °C (760 mmHg)
<b>Decomposition Temperature:</b>	Decomposition above 110 °C with -4 H <sub>2</sub> O
<b>Density/Specific Gravity:</b>	2.284 @ 15.6 °C
<b>Odor/Odor Threshold:</b>	Not available
<b>Evaporation rate:</b>	Not applicable
<b>pH:</b>	Not available
<b>Coefficient of water/oil distribution:</b>	Not available
<b>Vapor Pressure:</b>	Not applicable
<b>Vapor Density:</b>	Not applicable
<b>Solubility in Water:</b>	83.1 g/100 cc water @ 30 °C
<b>Molecular Weight:</b>	249.68

**SECTION X. STABILITY AND REACTIVITY**

**Stability:** Stable.

**Incompatibility:** Acetylene gas, aluminum powder, hydroxylamine, magnesium, moist air. Contact with magnesium metal can generate dangerous levels of hydrogen gas.

**Conditions under which product is chemically unstable:** Not applicable

**Hazardous decomposition products:** At temperatures >600 °C material decomposes to cupric oxide and sulfur dioxide.

**Conditions of reactivity:** Not applicable

**Hazardous Polymerization:** Will not occur.

**SECTION XI. TOXICOLOGICAL INFORMATION****Toxicology Tests: (Triangle Brand Copper Sulfate Crystal)**

<b>Test : 1</b>	<b>Test : 3</b>
<b>LD/LC : LD<sub>50</sub></b>	<b>LD/LC : LC<sub>50</sub></b>
<b>Test Type : Acute</b>	<b>Test Type : Acute, 4 hr</b>
<b>Test Route : Dermal</b>	<b>Test Route : Inhalation</b>
<b>Test Species : Rabbit</b>	<b>Test Species : Rats</b>
<b>Results Amounts : &gt;5050 mg/kg</b>	<b>Results Amounts : &gt;2.95 mg/L</b>

**Test : 2**  
**LD/LC : LD<sub>50</sub>**  
**Test Type : Acute**  
**Test Route : Oral**  
**Test Species : Rat**  
**Results Amounts : 352 mg/kg\***  
 \*Results based on toxicity evaluation of this product.

**Primary Eye Irritation:** Corrosive, irreversible eye damage

**Primary Skin Irritation:** Slightly irritating.

**Skin Sensitization:** Product-specific tests in accordance with USEPA standards did not indicate that this product would cause skin sensitization.

**Respiratory Tract Sensitization:** Not available.

**Carcinogenicity:** Not listed as a carcinogen by NTP, IARC, OSHA, or ACGIH.

**SECTION XI. TOXICOLOGICAL INFORMATION (Continued)**

**Mutagenicity:** A study performed with copper sulphate on mice showed mutagenicity in a chromosomal aberration test; however, the route of exposure (*i.e.*, intraperitoneal) is not likely to be applicable to workplace use of this product.

**Reproductive Toxicity:** No reproductive effects were shown in a feeding test performed with copper sulphate on rats and mice.

**Teratogenicity:** Embryotoxicity was not seen at non-maternally toxic doses of copper sulphate in the relevant studies reviewed.

**Toxicologically Synergistic Materials:** Not available.

**Other Chronic Effects:** Long term inhalation of copper sulfate containing mists (*i.e.*, Bordeaux mixture) may cause adverse effects to the liver and kidneys. A sub-chronic test performed on rats and mice showed that at high exposure levels in feed (>4000 ppm) cupric sulfate is toxic to the liver and kidneys.

**Additional Information:** Inhalation of dust and mists of copper salts can result in irritation of nasal mucous membranes, sometimes of the pharynx and, on occasion ulceration with perforation of the nasal septum. Exposure to copper dust causes discoloration of the skin.

**Note to Physician:** Probable mucosal damage may contraindicate the use of gastric lavage. Measures against circulatory shock, respiratory depression and convulsions may be needed. Wilson's disease or G6PD deficiency (individual who absorbs, retains and stores copper) can be aggravated by excessive exposure. Symptoms may include nausea, vomiting, epigastric pain, diarrhea, dizziness, jaundice, and general debility.

**SECTION XII. ECOLOGICAL INFORMATION**

**Subacute dietary LC<sub>50</sub>:** >10,000 ppm (quail and duck).

**96 hr acute toxicity LC<sub>50</sub>:** 0.65 ppm (bluegill), 0.056 ppm (trout), 16 ppm (pink shrimp)

**48 hr EC<sub>50</sub>:** 54 ppb (eastern oysters)

**48 hr LC<sub>50</sub>:** 17 ppm (pink shrimp), 600 ppb (daphnia)

**24 hr LC<sub>50</sub>:** 6.9 ppm (blue crab), 600 ppb (daphnia)

**Bioaccumulation:** Not available

**Biodegradability:** Not applicable

**SECTION XIII. DISPOSAL INFORMATION**

**Waste Disposal Method:** Waste must be disposed of in accordance with federal, state/provincial and local environmental control regulations. Improper disposal is a violation of law. Do not reuse empty container. If allowed by federal, state/provincial and local authorities, dispose of container in a sanitary landfill or by incineration.

**SECTION XIV. TRANSPORT INFORMATION**

<u>Proper Shipping Name:</u>	<u>Technical Name (If N.O.S.):</u>	<u>Hazard Class:</u>	<u>ID:</u>	<u>PG:</u>
DOT: <i>Environmentally Hazardous Substance, Solid, n.o.s., (Cupric Sulfate)*</i> Reportable Quantity (RQ) = 10 pounds (4.54 kg).		9	UN3077	III

\*Applicable when product is shipped in packaging of 10 pounds or greater.

**SECTION XV. REGULATORY INFORMATION****US Federal**

**Federal Drinking Water Standards:** (*Copper*) EPA 1300µg/L (action level), 1000 µg/L

**Clean Water Act:** This product contains compounds identified in 40 CFR 116.4.

**TSCA:** Listed

**EPCRA, SARA Title III, Section 313 (40 CFR 372) Chemicals subject to reporting requirements (see Section II for**

**CAS number and percentage in mixture):** Section 312 and/or 313 reporting may be required for this product, depending of the amount used and/or stored on site.

**CERCLA Hazardous Substances:** RQ is not assigned to the broad class of copper compounds.

**DOT:** RQ 10 pounds (4.54 kg), See Section XIV TRANSPORT INFORMATION

**NSF/ANSI Standard 60:** "The finished drinking water should be monitored to ensure that the levels of copper do not exceed 1.3 mg/L"

**Canada**

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 the *Controlled Products Regulations*.

**SECTION XVI. OTHER INFORMATION**

<b>Prepared By:</b>	Phelps Dodge Corporation Department of Occupational Health and Safety One North Central Avenue Phoenix, AZ 85004 Telephone number (602.366.8100)
<b>Reason for Revision:</b>	Updated section names. Revised Section XV – added NSF/ANSI Standard 60 statement.

**Disclaimer:** This information is based on available scientific evidence known to the Phelps Dodge Corporation. The information contained in the MSDS is being disclosed as required pursuant to applicable law. However, Phelps Dodge does not guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. This information is furnished without warranty, expressed or implicit.