SAFETY DATA SHEET

PRODUCT NAME: COPPER SULPHATE (Pentahydrate)

Issue Date: September 22

IDENTIFICATION

Product Name: Copper Sulphate (Pentahydrate)
Other Names: Blue stone, blue copperas, copper sulfate sulphate, cupric copper (II) sulphate pentahydrate
Product Code: ZCSULP
Uses: Used as an agricultural fungicide, bactericide, algaecide, herbicide; feed and fertilizer additive; in insecticide mixtures; in the manufacture of other copper salts; as mordant in textile dying; in tanning leather. Also used in preparation of azo dyes; in preserving wood; in electroplating solutions; as battery electrolyte; in laundry and metal-marking inks; in petroleum refining; as flotation agent; in mordant baths for intensifying photographic negatives; in pyrotechnic compositions; in water-resistant adhesives for wood; in metal colouring and tinting baths; as reagent toner in photography and photoengraving.
Supplier: HamChem Hamilton Chemicals Ltd, 75 Ruffell Rd, Hamilton
Phone: 07 974 7971 Web: www.hamchem.nz Email: info@hamchem.nz

- **In emergency dial 111, and then ask for Fire, Ambulance or Police as necessary.**
- **In case of poisoning phone National Poisons Centre – 0800 764 766**

HAZARD IDENTIFICATION

GHS Classifications
Acute Toxicity (Oral) – Category 4
Skin Irritation – Category 2
Eye Irritation – Category 2
Skin Sensitisation – Category 1
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Hazardous to Terrestrial Vertebrates – Category 3
Hazardous to the Aquatic Environment (Acute) – Category 1
Hazardous to the Aquatic Environment (Chronic) – Category 1

Signal Word: DANGER

Hazard Statements
H302 – Harmful if swallowed
H315 – Causes skin irritation
H319 – Causes serious eye irritation
H317 – May cause an allergic skin reaction
H372 – Causes damage to organs through prolonged or repeated exposure
H410 – Very toxic to aquatic life with long lasting effects
Harmful to terrestrial vertebrates

Prevention
P264 – Wash hands thoroughly after handling
P270 – Do not eat, drink or smoke when using this product
P280 – Wear protective gloves/clothing and eye/face protection.
P261 – Avoid breathing dust/fume/gas/mist/vapours/spray.
P272 – Contaminated clothing should not be allowed out of the workplace.
P273 – Avoid release to the environment.

Response
P301+P312 – IF SWALLOWED: Call a POISON CENTRE or Doctor if you feel unwell
P330 – Rinse mouth
P302+P352 – IF ON SKIN: Wash with plenty of water (and soap if available).
P333+P313 – If skin irritation or rash occurs: get medical advice/attention.
P362+P364 – Take off contaminated clothing and wash it before reuse.
P305+P351+P338 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.
P337+P313 – If eye irritation persists: get medical advice/attention.
P314 – Get medical advice/attention if you feel unwell.
P391 – Collect spillage

Disposal
P501 - Dispose of contents/container to approved waste facility in accordance with relevant legislation.

COMPOSITION & INFORMATION ON INGREDIENTS

Chemical Entity	CAS No.	Proportion (%)
Copper Sulphate, pentahydrate	7758-99-8	>98

FIRST AID MEASURES

If swallowed: REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY. For advice, contact National Poisons Centre or a Doctor. If the services of a medical centre or Doctor are readily available, the patient should be placed in their care and a copy of the SDS should be provided. Further action will be the responsibility of the medical specialist. If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the SDS.

If on skin (or hair): Flush skin and hair with running water (and soap if available). Seek medical attention in event of irritation or allergic reaction.

If inhaled: If fumes or combustion products are inhaled remove from contaminated area. Lay patient down, keep warm and rested. Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. Transport to a hospital, or Doctor.

If in eyes: Immediately hold eyelids apart and flush the eye continuously with running water. Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. Continue flushing until advised to stop by the National Poisons Centre or a Doctor, or for at least 15 minutes. Transport to hospital or Doctor without delay.

Note to Physician: For copper intoxication: Unless extensive vomiting has occurred empty the stomach lavage with water, milk, sodium bicarbonate solution or a 0.1% solution of potassium ferrocyanide (the resulting copper ferrocyanide is insoluble). Maintain electrolyte and fluid balances.

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FIRE FIGHTING MEASURES

Extinguishing media: Water fog (if unavailable, fine water spray), foam, dry agent (carbon dioxide, dry chemical powder)

Fire fighting: Alert Fire Brigade and tell them location and nature of hazard. Wear breathing apparatus plus protective gloves for fire only. Prevent, by any means available, spillage from entering drains or water courses. Use fire fighting procedures suitable for surrounding area. DO NOT approach containers suspected to be hot. Cool fire exposed containers with water spray from a protected location. If safe to do so, remove containers from path of fire. Equipment should be thoroughly decontaminated after use.

Fire/explosion hazard: Non-combustible. Not considered a significant fire risk, however containers may burn. Decomposition may produce toxic fumes of: sulfur oxides (SOx), metal oxides.

Fire incompatibility: None known.

Personal Protective Equipment: Breathing apparatus. Gas tight chemical resistant suit. Limit exposure duration to 1 BA set30 mins.

ACCIDENTAL RELEASE MEASURES

Minor spills: Environmental hazard - contain spillage. Clean up all spills immediately. Avoid contact with skin and eyes. Control personal contact by using protective equipment. Use dry clean up procedures and avoid generating dust. Place in a suitable labelled container for waste disposal.

Major spills: Personnel involved in the clean-up should wear full protective clothing. Evacuate all unnecessary personnel. Eliminate sources of ignition. Increase ventilation. Avoid generating dust. If necessary, wet down with water and dike for later disposal. Stop leak if safe to do so. Do NOT let product reach drains or waterways. If product does enter a waterway, advise EPA or your local waste authority. Collect in a labelled chemical waste container and seal for disposal. Wash spill area with plenty of water after removal of contaminant.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)
- The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing life-threatening health effects is:
Copper Sulphate Pentahydrate: 40 mg/m³
- Irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:
Copper Sulphate Pentahydrate: 6 mg/m³
- Other than mild, transient adverse effects without perceiving a clearly defined odor is:
Copper Sulphate Pentahydrate: 2.5 mg/m³
-The threshold concentration below which most people experience no appreciable risk of health effects:
Copper Sulphate Pentahydrate: 2.5 mg/m³

HANDLING & STORAGE

Procedure for handling: Use good occupational work practice. Wear protective clothing where risk of exposure occurs. Avoid generating and breathing dust. Avoid contact with skin and eyes. Avoid contact with incompatible materials. When handling, do NOT eat, drink or smoke. Keep containers securely sealed when not in use. Always wash hands with soap and water after handling. Work clothes should be laundered separately. Launder contaminated clothing before re-use. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Suitable container: Original packaging. Do NOT use aluminium or galvanized containers. Use polyethylene or polypropylene containers. Check all containers are clearly labelled and free from leaks.

Storage Incompatibility: Avoid strong bases. Metals and their oxides or salts may react violently with chlorine trifluoride. Chlorine trifluoride is a hypergolic oxidiser. It ignites on contact (without external source of heat or ignition) with recognised fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition. The state of subdivision may affect the results. Avoid storage with powdered metals, magnesium, alkalis and hydroxylamine. Copper dust or mist may react with acetylene to form shock-sensitive copper acetylides. Reacts violently with hydroxylamine. The solution reacts with magnesium to produce hydrogen (H2).

Storage requirements: Store in original containers. Keep containers securely sealed. Store away from incompatible materials and foodstuff containers. No smoking, naked lights or ignition sources. Store in a cool, dry, well-ventilated area.

EXPOSURE CONTROLS & PERSONAL PROTECTION

Exposure standards: New Zealand Workplace Exposure Standards (WES 2013) – Copper fume TWA 0.2mg/m³, Dust & Mists as Cu TWA 1mg/m³

Personal Protection Equipment (PPE): The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Engineering controls: Local exhaust ventilation is usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances.

Personal Respirators (NIOSH Approved): For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. 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-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen deficient atmospheres. For more information see AS/NZS 1715 and AS/NZS 1716

Ventilation System: A system of local and/or general exhaust ventilation is recommended to keep employee exposures as low as possible. 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.

Skin Protection: Wear impervious protective clothing, including boots, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Refer to AS/NZS 2161 Occupation Protective Gloves – Selection, Use and Maintenance. Dispose of contaminated gloves after use.

Eye Protection: Use approved chemical safety goggles and/or a full-face shield where splashing is possible. Refer to AS/NZS 1337 Eye and Face Protectors for Occupational Applications for more information. Maintain eye wash station in work area.

PHYSICAL & CHEMICAL PROPERTIES

Appearance: Blue, odourless, crystals or powder; soluble in water. Unpleasant metallic taste.

Property	Value
Molecular Weight	249.7
Melting Range (°C)	110°C
Solubility in Water (g/L)	Miscible
pH (1% solution)	4 @ 0.2 Molar
Volatile Component (%vol)	None
Relative Vapour Density (Air=1)	Not available

Lower Explosive Limit (%)	Not applicable
Autoignition Temperature (°C)	Not applicable
State	Divided solid
Boiling Range (°C)	Not applicable
Specific Gravity (water=1)	2.29 @ 15°C
pH (as supplied)	Not applicable
Evaporation Rate	Not applicable
Flash Point (°C)	Not applicable
Upper Explosive Limit (%)	Not applicable
Decomposition Temperature (°C)	Not available
Viscosity	Not available

STABILITY & REACTIVITY

Chemical Stability: Product is stable under normal conditions of use, storage and temperature.

Conditions to Avoid: Avoid excessive heat, direct sunlight, static discharges, moisture, temperature extremes.

Incompatible Materials: Incompatible with strong bases. Metals and their oxides or salts may react violently with chlorine trifluoride. Chlorine trifluoride is a hypergolic oxidizer. Avoid storage with powdered metals, magnesium, alkalis and hydroxylamine. Copper dust or mist may react with acetylides. Reacts violently with hydroxylamine. The solution reacts with magnesium to produce hydrogen (H2).

Hazardous Decomposition: Decomposition may produce toxic fumes of Sulphur oxides (SOx), metal oxides.

Hazardous Polymerisation: Will not occur.

TOXICOLOGICAL INFORMATION

Toxicity data: Oral (human) LDLo: 1088mg/kg. Oral (human) TDLo: 272mg/kg. Oral (rat) LD50: 300mg/kg. Dermal (rat) LD50:>2000mg/kg

Acute Health Effects

Swallowed: Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual. Sulfates are not well absorbed orally, but can cause diarrhea.

Eye: May cause transient discomfort characterised by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals. Copper salts, in contact with the eye, may produce inflammation of the conjunctiva, or even ulceration and cloudiness of the cornea.

Skin: Skin contact is not thought to produce harmful health effects (as classified under EC Directives using animal models). Systemic harm, however, has been identified following exposure of animals by at least one other route and the material may still produce health damage following entry through wounds, lesions or abrasions. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting. Exposure to copper, by skin, has come from its use in pigments, ointments, ornaments, jewellery, dental amalgams and IUDs (intra-uterine devices), and in killing fungi and algae. Although copper is used in the treatment of water in swimming pools and reservoirs, there are no reports of toxicity from these applications.

Inhaled: Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual. Inhalation of dusts, or fumes, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.

Chronic health effects: Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure. Copper has fairly low toxicity. Some rare hereditary conditions (Wilson disease or hepatolenticular degeneration) can lead to accumulation of copper on exposure, causing irreversible damage to a variety of organs (liver, kidney, CNS, bone, vision) and lead to death. There may be anaemia and cirrhosis of the liver.

ECOLOGICAL INFORMATION

Ecotoxicity:
Oncorhynchus mykiss, Rainbow trout, Donaldson trout 96hr LC50 0.032mg/l
Daphnia magna, Water flea, 48hr EC50 0.18mg/l
Selenastrum capricorntum, 5 day EC50, 0.0031 mg/l
Rat, LD50, 960 mg/kg

DISPOSAL CONSIDERATIONS

Product: The product may be treated so that it is no longer hazardous by a means other than dilution. This includes incineration at approved site or burial in a landfill in such a manner that it will not cause a fire or explosion or will not lead to any adverse health effects to any person. Treatment in a biological wastewater treatment system with prior approval and arrangement is also permissible providing that the substance is rendered non-hazardous and does not pose any adverse effects to human health or the environment. Alternatively consult an approved Waste Management company for disposal options.

Packaging: Packaging should be rendered incapable of containing any material. Bury at an authorized landfill. Alternatively consult an approved Waste Management company for disposal options. Containers may be recycled if they have been treated to remove residual traces of this substance or if any residual traces have been treated to render them non-hazardous. Observe all label safeguards until containers are cleaned and destroyed. Where possible retain label warnings and SDS and observe all notices pertaining to the product.

TRANSPORT INFORMATION

UN Number:	3077
Proper Shipping name:	Environmentally hazardous substance, solid, N.O.S
Dangerous Goods Class:	9 - Miscellaneous
Subsidiary Risk:	Nil
Packing group:	III
Hazchem Code:	2Z

REGULATORY INFORMATION

HSNO Classifications: 6.1D, 6.3A, 6.4A, 6.5B, 6.9B, 9.3C, 9.1A
EPA Approval #: HSR002503 – Additives, Process Chemicals & Raw Materials (Subsidiary Hazard) Group Standard 2020

OTHER INFORMATION

Key to abbreviations:

EC50	Effective concentration – It is the concentration that has an effect on 50% of the test group of an organism, estimated by graphical or computational means. EC50 is often using for reporting effects other than fatality.
LD50	Is the dose which kills half of the test animals by ingestion.
LDLo	Is the lowest dose of a material in reported to have caused death in animals or humans. The exposure may be acute or chronic. This is also called the lowest dose causing death, lowest detected lethal concentration, and lethal dose low.**End of SDS.**

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