SAFETY DATA SHEET

COPPER SULPHATE PENTAHYDRATE

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CAS NUMBER: 7758-99-8
PROPER SHIPPING NAME: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID N.O.S
copper sulphate pentahydrate
UN NUMBER: 3077
ACID

PRODUCT USE: Used as an agricultural fungicide, bactericide, algicide, herbicide; feed and fertiliser additive; in the manufacture of other copper salts; mordant in textile dyeing; tanning leather. Also used in preserving hides; in preparation of azo dyes; in preserving wood; in electroplating solutions; as battery electrolyte; in laundry and metal-marking inks; in petroleum refining; as floatation 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.

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Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

Hazardous Substance according to the criteria of the New Zealand Hazardous Substances and New Organisms legislation and GHS 7th Edition. Dangerous Good.

HAZARD LABELLING
WARNING

See Section 14 for UN labelling.

HAZARD CLASSIFICATION AND STATEMENTS

GHS
Acute toxicity: Oral - Category 4
Skin irritation - Category 2

HSNO
6.1D (oral)
6.3A

Serious eye irritation - Category 2	6.4A
Skin sensitization – Category 1	6.5B
Specific Target Organ Toxicity (Repeated exposure) - Category 2	6.9B
Aquatic toxicity (Acute & Chronic) – Category 1	9.1A
Hazardous to terrestrial vertebrates	9.3C

Harmful if swallowed.
Causes skin irritation.
Causes serious eye irritation.
May cause an allergic skin reaction.
May cause damage to kidneys through prolonged or repeated exposure.
Very toxic to aquatic life with long lasting effects.
Harmful to terrestrial vertebrates.

PRECAUTIONARY STATEMENTS

PREVENTION
Keep out of reach of children.
Wash hands and exposed skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/protective clothing/eye protection/face protection.
Avoid breathing dusts or fumes.
Contaminated work clothing should not be allowed out of the workplace.
Avoid release into the environment.

RESPONSE
Get medical advice/attention if you feel unwell.
For specific treatment see section 4 of this SDS.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.
IF SWALLOWED: Rinse Mouth. Call a POISON CENTRE or doctor/physician if you feel unwell.
IF ON SKIN: Wash with plenty of soap and water.
If skin irritation or rash occurs: Get medical advice/attention.
Take off contaminated clothing and wash before re-use.
Collect spillage.

DISPOSAL
Dispose of contents and packaging in accordance with relevant legislation.
See Section 13 of this SDS Document for more information.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%	HAZARDOUS
Copper sulphate pentahydrate	7758-99-8	100	Yes

SYNONYMS: Copper sulfate, pentahydrate; Copper (II) sulphate, pentahydrate; Sulfuric acid, copper(2+) salt (1:1), pentahydrate; cupric sulfate.

Section 4 - FIRST AID MEASURES

PRIMARY ROUTES OF EXPOSURE
Inhalation of dust or mists from solutions, contact with skin and eyes.

MAIN SYMPTOMS CAUSED BY EXPOSURE
Irritation of the skin, eyes, respiratory tract and gastrointestinal tract. Ingestion can cause metallic taste, breathing difficulty, sweating, headache and vomiting.

SWALLOWED
Call the National Poisons Centre (0800 764766) or a doctor immediately for medical advice.
Rinse mouth with water.
Do not induce vomiting unless advised by the poison centre or doctor.
Do not give anything by mouth to an unconscious patient.
Transport patient to a doctor or hospital along with a copy of the SDS.

EYE
Check if contact lenses are present, and if safe to do so remove them.
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 Poisons Centre or a doctor, or for at least 15 minutes.
Transport to hospital or doctor without delay even if no symptoms persist.

SKIN
Flush skin and hair with running water for several minutes while removing contaminated clothing, including footwear. Wash skin and hair thoroughly with soap and water.
If symptoms such as redness, itching or rash develop, seek medical attention.

INHALED
Remove patient from contaminated area to fresh air, keep warm and at rest.
If symptoms such as shortness of breath, coughing, wheezing or burning in the mouth, throat or lungs develop call the National Poisons Centre or a doctor. Be prepared to transport the patient to hospital.

NOTES TO PHYSICIAN
Treat symptomatically based on individual reactions of patient and judgement of doctor.
NOTE: In an emergency dial 111, for advice contact the Poisons Centre (0800-764-766).

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA
Use extinguishing media suitable for surrounding area; water spray, dry chemical, or carbon dioxide.

FIRE FIGHTING
Alert Fire Brigade and tell them location and nature of hazard.
Clear fire area of all non-emergency personnel. Stay upwind. Eliminate ignition sources.
Wear breathing apparatus plus protective gloves.
Prevent spillage from entering drains or water courses.
Care should be taken to prevent this runoff from reaching drains and watercourses.
Use firefighting procedures suitable for surrounding area.
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
Not combustible/flammable.
Decomposition may release Sulphur oxides and metal oxides.

FIRE INCOMPATIBILITY
None known.

HAZARDS FROM COMBUSTION PRODUCTS
If heated above 600°C, SO_2 is released.

PERSONAL PROTECTIVE EQUIPMENT
Firefighters should wear a positive-pressure self-contained breathing apparatus (SCBA) and protective firefighting clothing (includes firefighting helmet, coat, trousers, boots and gloves). Limit exposure duration to 1 BA set30 mins.

HAZCHEM CODE
2Z

Section 6 - ACCIDENTAL RELEASE MEASURES

Only fully trained personnel should be involved in handling chemicals.
Personal Protective Equipment advice is contained in Section 8 of the SDS.

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 including respiratory protection.
Evacuate all unnecessary personnel.
Increase ventilation. Avoid generating dust.
Stop leak if safe to do so.
If necessary, wet down with water and dike for later disposal.
Do NOT let product reach drains or waterways. If product does enter a waterway advise your local waste authority.
Collect in a suitable labelled chemical waste container and seal for disposal.
Wash spill area with plenty of water after removal of contaminant.
Decontamination run-off should be prevented from entering drains and watercourses.

EMERGENCY RESPONSE PLANNING GUIDELINES (AIHA 2016)
No ERPGs have been set for this substance by the American Industrial Hygiene Association.

PROTECTIVE ACTION CRITERIA (PAC) - SCAPA, 2016

Chemical (CAS Number)	PAC-1	PAC-2	PAC-3	Units
Copper (II) sulfate pentahydrate (7758-99-8)	12	32	190	mg/m^3

PAC-1: Mild, transient health effects.
PAC-2: Irreversible or other serious health effects that could impair the ability to take protective action.
PAC-3: Life-threatening health effects.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
Operators should be trained in procedures for safe use of this material.
Use good occupational work practice. When handling, DO NOT eat, drink or smoke.
Avoid generating and breathing dust. Avoid contact with skin and eyes.
Use personal protective equipment to control exposure.
Avoid contact with incompatible materials.
Avoid sources of heat.
Avoid physical damage to containers. Keep containers securely sealed when not in use.
Handle and open container with care. Use in a well-ventilated area.
Always wash hands with soap and water after handling or if accidental exposure occurs. Work clothes should be laundered separately.
Ensure an eye bath and safety shower are available and ready for use.

Observe good personal hygiene practices.
Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE PACKAGING
Original packaging. Polyethylene or polypropylene bag.
DO NOT use aluminium, steel or galvanised containers.
Check all containers are clearly labelled and free from leaks.
The UN Packaging specification number as well as the UN packaging Logo is to be printed on the bags.

STORAGE INCOMPATIBILITY
Avoid strong bases, galvanised metals, aluminium and nylon.
Avoid storage with powdered metals, magnesium, alkalis and hydroxylamine.

STORAGE REQUIREMENTS
Store in original packaging.
Keep containers securely sealed.
No smoking, naked lights or ignition sources.
Product begins to degrade at temperatures over 30°C.
Store in a cool, dry, well-ventilated area, out of direct sunlight.
Store away from incompatible materials and foodstuffs.
Protect containers against physical damage and check regularly for leaks.

Section 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	Measurement	Limit
New Zealand WES 2023	Copper and its inorganic compounds, as Cu	time weighted average (TWA)	0.01 mg/m^3

ENGINEERING CONTROLS

VENTILATION SYSTEM
A system of local and/or general exhaust 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. Refer to the 'Local exhaust ventilation' guide found on the WorkSafe New Zealand website.

PERSONAL PROTECTION EQUIPMENT (PPE)

PERSONAL RESPIRATORS
An approved dust mask e.g. a *P1* respirator, is recommended when using this product in dusty conditions. For more information see Australian/New Zealand Standard, AS/NZS 1715 and AS/NZS 16900.2.
If in doubt, seek expert occupational hygiene advice.

SKIN PROTECTION
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Refer to AS/NZS 2161 Occupational Protective Gloves. Dispose of contaminated gloves after use. Ensure there is ready access to an emergency shower.

EYE PROTECTION
Use approved chemical safety goggles and a full-face shield where splashing is possible. Refer to Personal eye protection Part 1: Eye and face protectors for occupational applications, Australian/New Zealand Standard: AS/NZS 1337. Maintain eye wash facilities in work area.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
Blue crystals or crystalline powder.

PHYSICAL PROPERTIES
Loses water of hydration by effloresecing slowly in air above 30°C, or rapidly on heating; loses two H_2O above 30.6°C, two more at ~110°C and the fifth H_2O around 250°C.

PROPERTY	VALUE
State:	Solid
Odour:	Odourless
Molecular Weight:	249.68
Melting Range (°C):	Not available
Boiling Range (°C):	150
Solubility in water (g/L, 20°C):	~320
pH (5% solution):	~4
Relative Density (g/cm^3, 20°C):	2.284
Volatile Component (%vol):	Not available
Relative Vapor Density(air=1):	Not available
Vapour Pressure (kPa):	Not available
Autoignition Temp (°C):	Not applicable
Flash Point (°C):	Not applicable
Lower Explosive Limit (%):	Not applicable
Upper Explosive Limit (%):	Not applicable
Decomposition Temp (°C):	>560
Viscosity:	Not applicable
Evaporation Rate:	Not applicable

Section 10 - CHEMICAL STABILITY AND 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, and temperature extremes. Keep containers dry and tightly closed to avoid moisture absorption and contamination.

INCOMPATIBLE MATERIALS
Incompatible with strong bases, oxidizing agents, powdered metals (e.g. aluminium powder), iron, magnesium, alkalis, hydroxylamine and acetylene gas.
In solution it is mildly corrosive to steel and reacts with magnesium to produce hydrogen gas (H_2).
When exposed to air it will oxidise and turn whitish.

HAZARDOUS DECOMPOSITION PRODUCTS
Decomposition above 600°C produces toxic fumes of sulphur oxides (SOx) and metal oxides.

HAZARDOUS REACTIONS
Metals and their oxides or salts can react violently with chlorine trifluoride. Chlorine trifluoride is a hypergolic oxidiser.
Copper dust or mist may react with acetylene to form shock-sensitive copper acetylides. Reacts violently with hydroxylamine.
Hazardous polymerization will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

ACUTE HEALTH EFFECTS

SWALLOWED
Ingestion can cause irritation of the gastrointestinal tract, including a burning sensation and abdominal pain. Nausea, dizziness, diarrhoea and vomiting may follow.
Animal experiments indicate that ingestion of less than 150 grams of copper sulphate pentahydrate may cause serious illness or fatality.

EYE
Causes pain, redness and blurred vision. If left untreated, there may be permanent eye damage.
May cause transient discomfort characterised by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. Copper salts, in contact with the eye, may produce inflammation of the conjunctiva, ulceration and cloudiness of the cornea.

SKIN
Dermal contact can cause skin irritation, redness, pain, and a rash in susceptible individuals.

INHALED
May cause cough and respiratory tract irritation. Pain, redness and difficulty breathing can result.

CHRONIC HEALTH EFFECTS
Repeated or prolonged oral exposure can cause effects on the blood, kidneys and liver. This may result in haemolytic anaemia, kidney impairment and liver impairment.

TOXICITY AND IRRITATION DATA

TOXICITY
Acute Oral Toxicity, Rat, LD_{50}: >472.5 mg/kg [Manufacturer's SDS]
Acute Dermal Toxicity, Rabbit, LD_{50}: >8000mg/kg [Manufacturer's SDS]
Acute Inhalation Toxicity, Rat, LC_{50}: >2.95 mg/L [Manufacturer's SDS]

IRRITATION/ CORROSION
Skin: Irritating to the skin [NZ EPA CCID]
Eyes: Irritating to the eyes [NZ EPA CCID]

Carcinogenic effects: Not classified or listed by IARC, NTP, OSHA, EU and ACGIH.
Mutagenic effects: Not available.
Reproductive or developmental effects: Not available.
Aspiration hazard: Not classified.
Specific target organ toxicity: Known to cause damage to the kidneys after prolonged or repeated oral exposure. NOAEL of 1000ppm for males and 500ppm for females. [NTP, 1993]
Sensitisation (respiratory/contact): Contact sensitiser. Prolonged or repeated exposure to copper salts can cause irritation, producing itching and redness of the skin. Some may become sensitized to copper sulphate and develop allergic contact dermatitis. [NZ EPA CCID]

Section 12 - ECOLOGICAL INFORMATION

ECOTOXICITY
Very toxic in the aquatic environment with long lasting effects, and harmful to terrestrial vertebrates.
Acute Oral Toxicity, Rat, LD_{50}: >472.5 mg/kg [Manufacturer's SDS]

ECOTOXICITY DATA
Fish, (*Oncorhynchus mykiss*), 96h LC_{50}: 0.032 mg/L [NZ EPA CCID]
Crustacean, (*Daphnia magna*), 48h EC_{50}: 0.18 mg/L [NZ EPA CCID]
Algae (*Selenastrum* capricornutum), 5-day EC_{50}: 0.0031 mg/L [NZ EPA CCID]

Persistence and Degradability: Persistent in the environment.
Mobility: Freely soluble in water.
Bioaccumulation: Not expected to bioaccumulate.
BOD and COD: No data available.
Products of Biodegradation: No data available.
DO NOT discharge into sewer or waterways.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal of Hazardous Substances is subject to the Resource Management Act and Council By-Laws in addition to HSNO requirements. Do not dispose with household rubbish.

PRODUCT
Recycle wherever possible. Special hazard may exist - specialist advice may be required.
The product may be treated so that it is no longer hazardous by a means other than dilution. This includes incineration at an approved site or burial in a landfill in such a manner that it will not lead to any adverse health effects to any person or exceed any TEL (tolerable exposure limit) set by the Authority for this substance.
Consult a Waste Management Company or authorized landfill for disposal options.

PACKAGING
Recycle wherever possible. Special hazard may exist - specialist advice may be required.
Packaging should be rendered incapable of containing any material.
Puncture containers to prevent re-use and bury at an authorised landfill.
Empty containers may be decontaminated. The residual contents of the package must be diluted to below the thresholds for the respective hazard and the diluted residue is 1% or less of the volume of the package.
Consult an approved Waste Management company for disposal options or dispose of at an approved waste disposal facility.
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.

Section 14 - TRANSPORT INFORMATION

UN Number:	3077
Proper Shipping Name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
Technical name:	copper sulphate pentahydrate
DG Class:	9
Subrisk:	n/a
Packing Group:	III
Label required:	ENVIRONMENTALLY HAZARDOUS, MISCELLANEOUS
Hazchem code:	2Z
Marine Pollutant:	Yes
EMS Number:	F-A, S-F

Section 15 - REGULATORY INFORMATION

REGULATIONS
Classified as hazardous according to the criteria of the New Zealand Hazardous Substances and New Organisms Act.
This product has been assigned to the following Group Standards by Interchem Agencies Limited:

Additives, Process Chemicals and Raw Materials (Subsidiary Hazard) Group Standard 2020.
EPA Approval number: HSR002503.
Active Ingredients for Use in the Manufacture of Agricultural Compounds Group Standard 2020.
EPA Approval number: HSR100756.

Certified handler, tracking and location compliance certification regulations do not apply.

For full HSNO controls and Health and Safety at Work regulations for this substance refer to the New Zealand EPA's Approved Hazardous Substances with Controls website.

Copper sulphate pentahydrate (CAS: 7758-99-8) is found on the following inventory lists:
NZIoC, AIIC, TSCA, EINECS, DSL.

Section 16 - OTHER INFORMATION

NEW ZEALAND POISON CENTRE 0800 POISON (0800 764 766)
NZ EMERGENCY SERVICES: 111

Interpretation and Abbreviations
ACGIH – American Conference of Governmental Industrial Hygienists.
ACVM – Agricultural Chemicals and Veterinary Medicines.
AIIC – Australian Inventory of Industrial Chemicals.
AOX – Absorbable organic halogens.
BOD – Biochemical Oxygen Demand.
Ceiling – A concentration that should not be exceeded at any time during the working day.
China IECSC – Inventory of Existing Chemical Substances Produced or Imported in China.
COD – Chemical Oxygen Demand.
DSL – Canadian Domestic Substances List.
EINECS – European Inventory of Existing Commercial Chemical Substances.
ENCS – Japanese Existing and New Chemical substances.
ERPG – Emergency Response Planning Guidelines.
GHS – Globally Harmonized System of Classification and Labelling of Chemicals.
IARC – International Agency for Research on Cancer.
ISHL – Japanese Industrial Safety and Health Law List of Chemicals.
Koc – soil organic carbon-water partition coefficient
Kow - octanol/water partition coefficient
LOEL – Lowest Observed Effect Level.
LD_{LO} – Lethal Dose Low (the lowest dosage per unit of bodyweight of a substance known to have resulted in fatality in a particular animal species).
NOAA – National Oceanic and Atmospheric Administration.
NOEC – No Observed Effect Concentration.
NTP – National Toxicology Program.
NZ CCID – New Zealand Chemical Classification and Information Database.
NZIoC – New Zealand Inventory of Chemicals.
OECD HPV – The Organisation for Economic Co-operation and Development High Production Volume Chemicals.
PEL – Permissible exposure limit.
PPE – Personal Protective Equipment.
SCAPA – Subcommittee on Consequence Assessment and Protective Actions.
STEL – Short term exposure limit.
TOC – Total Organic Carbon.
TSCA – US Toxic Substances Control Act Existing Chemicals.
TWA - The time-weighted average airborne concentration over an eight-hour working day, for a five-day working week over an entire working life.
VOC – Volatile Organic Compounds.

Sources of key data used to compile the datasheet:
Manufacturer's SDS

NZ EPA CCID
GESTIS
NTP Toxicity Report 29

Date of first issue: Prior to 2008
Date of Preparation/Review: 2025.01.06
Amendments: 5 yearly review of all sections. Updated NZ Workplace Exposure Standard, assigned to Group Standard.

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For the avoidance of doubt, this safety data sheet has been prepared for the purpose of providing safety information, not to give specific usage or regulatory advice. Nothing contained herein can or should be construed as advice on the suitability of the product for a particular purpose. It is the user's sole responsibility to determine whether the product meets the user's specific requirements and is fit for those purposes.

End of SDS