SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier:

Trade name: COPPER SULPHATE PENTAHYDRATE – FEED GRADE
Chemical name : Copper II sulphate, pentahydrate with anticake
Proper shipping name: ENVIORENMENTALLY HAZARDOUS SUBSTANCE. SOLID. N.O.S
Chemical formula: $CuSO_4 * 5H_2O$
Nr UN: 3077
Nr CAS: 7758-99-8
Nr WE: 231-847-6
Nr indeksowy: 029-023-00-4
Nr rejestracji: 01-2119520566-40-XXXX

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identifies uses:	Feed / food use. Feed additive.
Uses advised against:	Not applicable

1.3 Details of the supplier of the material safety data sheet:

CHEM TRADE CENTER Sp. z o.o. Sp. K
ul. Łęczyńska 50A, 20-309 Lublin
Tel. +48 441 37 73
e-mail: info@ctcenter.pl
Person responsible for preparing the MSDS:
info@ctcenter.pl

1.4 Emergency telephone number

Fire Department (Poland): (+48) 998 – available 24/7
General European Emergency Number: 112 – available 24/7

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture:

H302	Acute Toxicity (Oral) Category 4
H318	Serious Eye Damage/Eye Irritation Category 1
H400	Hazardous to the Aquatic Environment Acute Hazard Category 1
H410	Hazardous to the Aquatic Environment Long-Term Hazard Category 1

2.2 Label elements:

GHS05

GHS08

GHS09

Signal Word: “DANGER”

Hazard statements (H):

H302	Harmful if swallowed
H318	Causes serious eye damage.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statements Prevention:

P264	Wash all exposed external body areas thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P280 Wear protective gloves, protective clothing, eye protection and face protection

Precautionary statements Response:
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTER/doctor/physician/first aider.
P391 Collect spillage.
P310+P312 IF SWALLOWED: Call a POISON CENTER/doctor/physician/first aider if you feel unwell.
P330 Rince mouth

Precautionary statement Storage
Not Applicable

Precautionary statement Disposal
P501 Dispose of contents/container to authorized hazardous or special waste collection point in accordance with any local regulation.

2.3 Other hazards:

Inhalation may produce health damage*.
Cumulative effects may result following exposure*.
Possible respiratory sensitizer*.
REACH - Art.57-59: The mixture does not contain Substances of Very High Concern (SVHC) at the SDS print date.

SECTION 3: Composition/information on ingredients

3.1 Substances

See 'Information on ingredients' in section 3.2

3.2 Mixtures:

Product contains anticaking: silicum dioxide, content of 1 – 2.5%

Product Name	COPPER SULPHATE PENTAHYDRATE
REACH Registration Number	01-2119520566-40-XXXX and 01-2119520566-40-XXXX
CAS-No.	7758-99-8
EU Index No.	029-023-00-4
EC No.	231-847-6

Weight %	Classified according to CLP Regulation,	SLC / M factor	Nanoform particle characteristics
98-100	Acute Toxicity (Oral) Category 4 Serious Eye Damage/Eye Irritation Category 1 Hazardous to the Aquatic Environment Acute Hazard Category 1 Hazardous to the Aquatic Environment Long-Term Hazard Category 1 H302, H318, H400, H410	M=10	Not available

Product Name	SILICIUM DIOXIDE REACH
Registration Number	01-2119379499-16-XXXX
EC No.	231-545-4

Weight %	Classified according to CLP Regulation,	SLC / M factor	Nanoform particle characteristics
97-100	The product is not a hazardous substance as defined by EU Regulation 1272/2008 and Directive: 67/548/EEC	Not available	Not available

SECTION 4: First Aid measures

4.1 Description of first aid measures:

Inhalation	If fumes or combustion products are inhaled remove from contaminated area. Lay patient down. Keep warm and rested. Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. 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 hospital, or doctor, without delay.
Eye contact	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 Information Centre or a doctor, or for at least 15 minutes. Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin contact	Immediately flush body and clothes with large amounts of water, using safety shower if available. Quickly remove all contaminated clothing, including footwear. Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre. Transport to hospital, or doctor.
Ingestion	For advice, contact a Poisons Information Centre or a doctor at once. Urgent hospital treatment is likely to be needed. **If swallowed do NOT induce vomiting.** If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. Observe the patient carefully. Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. Transport to hospital or doctor without delay

4.2 Most important symptoms and effects, both acute and delayed:

See section 11

4.3 Indication of any immediate medical attention and special treatment needed:

for copper intoxication:
- Unless extensive vomiting has occurred empty the stomach by lavage with water, milk, sodium bicarbonate solution or a 0.1% solution of potassium ferrocyanide (the resulting copper ferrocyanide is insoluble).
- Administer egg white and other demulcents.
- Maintain electrolyte and fluid balances.
- Morphine or meperidine (Demerol) may be necessary for control of pain.
- If symptoms persist or intensify (especially circulatory collapse or cerebral disturbances, try BAL intramuscularly or penicillamine in accordance with the supplier's recommendations.
- Treat shock vigorously with blood transfusions and perhaps vasopressor amines.
- If intravascular hemolysis becomes evident protect the kidneys by maintaining a diuresis with mannitol and perhaps by alkalinizing the urine with sodium bicarbonate.
- It is unlikely that methylene blue would be effective against the occasional methemoglobinemia and it might exacerbate the subsequent hemolytic episode.
- Institute measures for impending renal and hepatic failure.
- [GOSSELIN, SMITH & HODGE: Commercial Toxicology of Commercial Products] A role for activated charcoals for emesis is, as yet, unproven.
- In severe poisoning CaNa2EDTA has been proposed.
- [ELLENHORN & BARCELOUX: Medical Toxicology]

SECTION 5: Firefighting measures

5.1 Extinguishing media:
Water spray or fog. Foam. Dry chemical powder. BCF (where regulations permit). Carbon dioxide.

5.2 Special hazards arising from the substance or mixture:
Fire incompatibility none known

5.3 Advice for fire-fighters:

Fire fighting	Alert Fire Brigade and tell them location and nature of hazard. Wear breathing apparatus plus protective gloves in the event of a fire. 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	Noncombustible. Not considered a significant fire risk, however containers may burn. Decomposition may produce toxic fumes of: sulfur oxides (SOx) metal oxides

SECTION 6: Accidental release measures.

6.1 Personal precautions, protective equipment and emergency procedures:
See Section 8

6.2 Environmental precautions:
See Section 12

6.3 Methods and material for containment and cleaning up:

Minor spills	Environmental hazard - contain spillage. Clean up all spills immediately. Avoid contact with skin and eyes. Wear impervious gloves and safety glasses. Use dry clean up procedures and avoid generating dust. Vacuum up (consider explosion-proof machines designed to be grounded during storage and use). Do NOT use air hoses for cleaning Place spilled material in clean, dry, sealable, labelled container.
Major spills	Environmental hazard - contain spillage. Moderate hazard. CAUTION: Advise personnel in area. Alert Emergency Services and tell them location and nature of hazard. Control personal contact by wearing protective clothing. Prevent, by any means available, spillage from entering drains or water courses. Recover product wherever possible. **IF DRY:** Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal. **IF WET:** Vacuum/shovel up and place in labelled containers for disposal. **ALWAYS:** Wash area down with large amounts of water and prevent runoff into drains. If contamination of drains or waterways occurs, advise Emergency Services.

SECTION 7. Handling and storage

7.1 Precautions for safe handling:

Safe handling	Avoid all personal contact, including inhalation. Wear protective clothing when risk of exposure occurs. Use in a well-ventilated area. Prevent concentration in hollows and sumps. **DO NOT enter confined spaces until atmosphere has been checked.** **DO NOT allow material to contact humans, exposed food or food utensils.** Avoid contact with incompatible materials. **When handling, DO NOT eat, drink or smoke**. Keep containers securely sealed when not in use. Avoid physical damage to containers. Always wash hands with soap and water after handling. Work clothes should be laundered separately. Launder contaminated clothing before re-use. Use good occupational work practice. Observe manufacturer's storage and handling recommendations contained within this SDS. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
Fire and explosion protection	See Section
Other information	Store in original containers. Keep containers securely sealed. Store in a cool, dry area protected from environmental extremes. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS. For major quantities: Consider storage in bunded areas - ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams}. Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.

7.2 Conditions for safe storage, including any incompatibilities:

Suitable container	**DO NOT use aluminum or galvanized containers** Polyethylene or polypropylene container. Check all containers are clearly labelled and free from leaks.
Storage incompatibility	Inorganic derivative of Group 11 metal. Derivative of electropositive metal. WARNING: Avoid or control reaction with peroxides. All transition metal peroxides should be considered as potentially explosive. For example, transition metal complexes of alkyl hydroperoxides may decompose explosively. The pi-complexes formed between chromium (0), vanadium (0) and other transition metals (haloarene-metal complexes) and mono-or poly-fluorobenzene show extreme sensitivity to heat and are explosive. Avoid reaction with borohydrides or cyanoborohydrides Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride. These trifluorides are hypergolic oxidizers. They ignite on contact (without external source of heat or ignition) with recognized 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. Copper sulfate: reacts violently with strong bases, hydroxylamine. (with ignition), magnesium (producing hydrogen gas) in contact with potassium chlorate is potentially explosive solutions are acidic and can react with metals to evolve flammable hydrogen gas. - corrosive to some metals including steel. is incompatible with sulfuric acid, caustics, ammonia, aliphatic amines, alkanolamines, amides, alkylene oxides, epichlorohydrin, organic anhydrides, isocyanates, vinyl acetate dusts or mists may react with acetylene to form shock-sensitive copper acetylides Avoid strong bases.

SECTION 8. Exposure control/personal protection

8.1 Control parameters:

Ingredients	**DNELs** **Exposure pattern worker**	**PNECs** **Compartment**
Copper sulpahte pentahydrate	Dermal 137 mg/kg bw/day (Systemic, Chronic) Inhalation 1 mg/m3 (Systemic, Chronic) Inhalation 1 mg/m3 (Local, Chronic) Oral 0.041 mg/kg bw/day (Systemic, Chronic) Oral 0.082 mg/kg bw/day (Systemic, Acute)	7.8 µg/L (Water (Fresh)) 5.2 µg/L (Water - Intermittent release) 87 mg/kg sediment dw (Sediment (Fresh Water)) 676 mg/kg sediment dw (Sediment (Marine)) 65 mg/kg soil dw (Soil) 230 µg/L (STP)

Occupational exposure limits (OEL)
Ingredient data

Source	**Ingredient**	**Material name**	**TVA**	**STEL**	**Peak**	**Notes**
UK WELs	Copper sulphate pentahydrate	Copper and compounds: dust and mist (as Cu)	1 mg/m3	2 mg/m3	N/A	N/A

Emergency limits

Ingredient	**TEEL-1**	**TEEL-2**	**TEEL-3**
Copper sulphate pentahydrate	7.5 mg/m3	9.9 mg/m3	59 mg/m3

Ingredient	**Original IDHL**	**Revised IDHL**
Copper sulphate pentahydrate	Not available	Not available

8.2 Exposure controls:

8.2.1. Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use. Employers may need to use multiple types of controls to prevent employee overexposure. Local exhaust ventilation 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. Correct fit is essential to ensure adequate protection. An approved self-contained breathing apparatus (SCBA) may be required in some situations. Provide adequate ventilation in warehouse or closed storage area. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.	
	Type of contaminant	Air speed
	solvent, vapors, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min.)
	aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)

	direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
	grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)
	Within each range the appropriate value depends on: Lower end of range	Upper end of range
	Room air currents minimal or favorable to capture Contaminants of low toxicity or of nuisance value only Intermittent, low production. Large hood or large air mass in motion	Disturbing room air currents Contaminants of high toxicity High production, heavy use Small hood-local control only
	Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used	
8.2.2. Personal protection		
Eye and face protection	Chemical goggles. Full face shield may be required for supplementary but never for primary protection of eyes. Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]	
Skin protection	See hand protection below	
Hand and feet protection	NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact. Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed. The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application. The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of	

	a nonperfumed moisturiser is recommended. Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: · frequency and duration of contact, · chemical resistance of glove material, · glove thickness and · dexterity Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent). · When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. · When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. · Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use. · Contaminated gloves should be replaced. As defined in ASTM F-739-96 in any application, gloves are rated as: · Excellent when breakthrough time > 480 min · Good when breakthrough time > 20 min · Fair when breakthrough time < 20 min · Poor when glove material degrades For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended. It should be emphasized that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times. Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers technical data should always be taken into account to ensure selection of the most appropriate glove for the task. Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example: · Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of. · Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present. polychloroprene. nitrile rubber. butyl rubber. Fluoro caoutchouc. polyvinyl chloride. Gloves should be examined for wear and/ or degradation constantly
Body protection	See other protection below
Other protection	Overalls. P.V.C apron. Barrier cream. Skin cleansing cream. Eye wash unit.

Respiratory protection

Type -P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Required minimum protection factor	**Half-face respirator**	**Full-face respirator**	**Powered air respirator**
up to 10 x ES	P1 Air line *	- -	PAPR-P1 -
up to 50 x ES	Air line **	P2	PAPR-P2
up to 100 x ES	-	P3	-
		Air line *	-

100+ x ES	-	Air line * *	PAPR-P3

* - Negative pressure demand ** - Continuous flow

A(All classes) = Organic vapors, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

· Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.

· The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).

· Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory protection. These may be government mandated or vendor recommended.

· Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program. · Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)

· Use approved positive flow mask if significant quantities of dust become airborne.

· Try to avoid creating dust conditions.

Class P2 particulate filters are used for protection against mechanically and thermally generated particulates or both.

P2 is a respiratory filter rating under various international standards, Filters at least 94% of airborne particles

Suitable for:

· Relatively small particles generated by mechanical processes eg. grinding, cutting, sanding, drilling, sawing.

· Sub-micron thermally generated particles e.g. welding fumes, fertilizer and bushfire smoke.

· Biologically active airborne particles under specified infection control applications e.g. viruses, bacteria, COVID-19, SARS frequency and

8.3 Environmental exposure controls

See Section 12

SECTION 9. Physical and chemical properties

9.1 Information on basic physical and chemical properties:

Appearance	Microcrystals		
Physical state	Solid	**Relative density**	2.286
Particle size	0.05 to 0.75 mm	**Partition coefficient noctanol / water**	N/A
pH as supplied	N/A	**Decomposition temperature**	110 °C
pH in solution	4	**Auto-ignition temperature**	N/A
Water solubility	22.3 g in 100 ml at 25°C	**Molecular weight**	159.6 g/mol
Nanoform particle characteristics	N/A	**Viscosity**	N/A

Nanoform solubility	N/A	**Taste**	N/A
Melting & freezing point	N/A	**Explosive properties**	N/A
Boiling point & range	N/A	**Oxidizing properties**	N/A
Flashpoin	N/A	**Odor**	No odor
Flammability	Not flammable	**Odor threshold**	N/A
Upper explosive limit	N/A	**Surface tension**	N/A
Lower explosive limit	N/A	**Volatile component**	N/A
Evaporation rate	N/A	**VOC**	N/A
Vapor density	N/A	**Gas component**	N/A
Vapor pressure	N/A	**Gas group**	N/A

9.2 Other information:
N/A

SECTION 10. Stability and reactivity

10.1 Reactivity: See section 7.2

10.2 Chemical stability:
Unstable in the presence of incompatible materials.
Product is considered stable.
Hazardous polymerization will not occur.

10.3 Possibility of hazardous reactions: See section 7.2

10.4 Conditions to avoid: See section 7.2

10.5 Incompatible materials: See section 7.2

10.6 Hazardous decomposition products: See section 5.3

SECTION 11. Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Inhaled	The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Levels above 10 micrograms per cubic meter of suspended inorganic sulfates in the air may cause an excess risk of asthmatic attacks in susceptible people. Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled. If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures. Copper poisoning following exposure to copper dusts and fume may result in headache, cold sweat and weak pulse. Capillary, kidney, liver and brain damage are the longer term manifestations of such poisoning. Inhalation of freshly formed metal oxide particles sized below 1.5 microns and generally between 0.02 to 0.05 microns may result in "metal fume fever". Symptoms may be delayed for up to 12 hours and begin with the sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Mild to severe headache, nausea, occasional vomiting, fever or chills, exaggerated mental activity, profuse sweating, diarrhea, excessive urination and prostration may also occur. Tolerance to the fumes develops rapidly but is quickly lost. All symptoms usually subside within 24-36 hours following removal from exposure.

	Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
Ingestion	**Toxic effects** may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual. The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion. Sulfates are not well absorbed orally but can cause diarrhea. A metallic taste, nausea, vomiting and burning feeling in the upper stomach region occur after ingestion of copper and its derivatives. The vomitus is usually green/blue and discolors contaminated skin.
Skin contact	The material can produce chemical burns following direct contact with the skin. Exposure to copper, by skin, has come from its use in pigments, ointments, ornaments, jewelry, 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. Open cuts, abraded or irritated skin should not be exposed to this material Entry into the bloodstream, though, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected. This material can cause inflammation of the skin on contact in some persons.
Eye	The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating. If applied to the eyes, this material causes severe eye damage. Copper salts, in contact with the eye, may produce inflammation of the conjunctiva, or even ulceration and cloudiness of the cornea
Chronic	Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems. Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population. Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed. This material can cause serious damage if one is exposed to it for long periods. It can be assumed that it contains a substance which can produce severe defects. Ample evidence from experiments exists that there is a suspicion this material directly reduces fertility. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure. For copper and its compounds (typically copper chloride): Acute toxicity: There are no reliable acute oral toxicity results available. Animal testing shows that skin in exposure to copper may lead to hardness of the skin, scar formation, exudation and reddish changes. Inflammation, irritation and injury of the skin were noted. Repeat dose toxicity: Animal testing shows that very high levels of copper monochloride may cause anaemia. Genetic toxicity: Copper monochloride does not appear to cause mutations in vivo, although chromosomal aberrations were seen at very high concentrations in vitro. Cancer-causing potential: There was insufficient information to evaluate the cancer-causing activity of copper monochloride.

TOXICITY	**IRRITATION**
dermal (rat) LD50: >2000 mg/kg	N/A
Oral (Mouse) LD50; 43 mg/kg	
Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a nonallergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity	

on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production.
The following information refers to contact allergens as a group and may not be specific to this product.
Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitization potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitizing substance which is widely distributed can be a more important allergen than one with stronger sensitizing potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.
Copper sulfate is corrosive. Side effects are diverse and multi-systemic, and include severe gastrointestinal symptoms and signs, metallic taste in the mouth, burning pain in the chest, headache, sweating, shock and damage to brain, liver and kidneys. It has been reported as a cause of human suicide. On exposure, it can cause dose dependent damage to the skin and eye, also, eczema and allergic reactions. Long term effects can lead to anemia and degenerative changes and are more likely in individuals with Wilson's disease, a condition which causes excessive absorption and storage of copper. It has adverse effects on reproduction and fertility as well as cancer and embryo toxic effects. Although it is excreted in the faeces, there is residual accumulation the liver, brain, heart, kidney and muscles.

SECTION 12. Ecological information

12.1 Toxicity:

End point	Test duration	Species	Value	Source
EC50(ECx)	96h	Crustacea	0.001 mg/l	ECETOC Aquatic Hazard Assessment Data
EC50	72h	Algae or other aquatic plants	0.8 mg/l	ECETOC Aquatic Hazard Assessment Data
EC50	48h	Crustacea	0.003 mg/l	ECETOC Aquatic Hazard Assessment Data
LC50	96h	Fish	0.073 mg/l	US EPA, Ecotox database Aquatic Toxicity Data E

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high-water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.
Wastes resulting from use of the product must be disposed of on site or at approved waste sites.
For Copper Sulfate:
Terrestrial Fate: Soil - If released to soil, copper sulfate may leach to groundwater and may partially oxidize or bind to humic materials, clay or hydrous oxides of iron and manganese. Since copper is an element, it will persist indefinitely. Copper is bound or adsorbed, to organic materials, and to clay and mineral surfaces. The degree of adsorption to soils depends on the acidity or alkalinity of the soil. Copper sulfate is one of the more mobile metals in soil; however, its leaching potential is low in all but sandy soils. When applied with irrigation water, copper sulfate does not accumulate in the surrounding soils; however, some 60% is deposited in the sediments at the bottom of the irrigation ditch, where it becomes adsorbed to clay, mineral, and organic particles. Copper compounds also settle out of solution. Plants – Copper sulfate is toxic to plants and kills by photosynthesis disruption. Bluegreen algae have been shown to become increasingly resistant to the algaecide after 26 years of use.
Aquatic Fate: In water, copper sulfate will bind to carbonates as well as humic materials, clay and hydrous oxides of iron and manganese. As an element, copper can persist indefinitely.
Ecotoxicity: Copper is accumulated by plants and animals, but, it does not appear to bio magnify from plants to animals. Copper sulphate is practically non-toxic to birds and poses less of a threat to birds than to other animals. Copper sulfate is highly toxic to fish and Daphnia magna water fleas. Even at recommended rates of application, this material may be poisonous to trout and other fish,

especially in soft or acid waters. Its toxicity to fish generally decreases as water hardness increases. Fish eggs are more resistant than young fish fry to the toxic effects of copper sulfate. Copper sulfate is toxic to aquatic invertebrates, such as crab, shrimp, and oysters. Higher concentrations of the material caused some behavioral changes, such as secretion of mucous, and discharge of eggs and embryos. Bees are endangered by Bordeaux mixtures of copper (II) sulfate and hydrated lime. Copper sulfate may be poisonous to sheep and chickens at normal application rates. Most animal life in soil, including large earthworms, have been eliminated by the extensive use of copper containing fungicides in orchards.

For copper:

Atmospheric Fate - Copper is unlikely to accumulate in the atmosphere due to a short residence time for airborne copper aerosols. Airborne coppers, however, may be transported over large distances. Air Quality Standards: no data available.

Aquatic Fate: Toxicity of copper is affected by pH and hardness of water. Total copper is rarely useful as a predictor of toxicity. In natural sea water, more than 98% of copper is organically bound and in river waters a high percentage is often organically bound, but the actual percentage depends on the river water and its pH.

Ecotoxicity: Copper accumulates significantly in the food chain. The toxic effect of copper in the aquatic biota depends on the bioavailability of copper in water which, in turn, depends on its physico-chemical form (i.e. speciation). Bioavailability is decreased by complexation and adsorption of copper by natural organic matter, iron and manganese hydrated oxides, and chelating agents excreted by algae and other aquatic organisms. Copper exhibits significant toxicity in some aquatic organisms. Some algal species are very sensitive to copper. Silicate, iron, manganese and EDTA may reduce bioavailability.

For copper: Ecotoxicity - Significant effects are expected on various species of microalgae, some species of macroalgae, and a range of invertebrates, including crustaceans, gastropods and sea urchins. Copper is moderately toxic to crab and their larvae and is highly toxic to gastropods (mollusks, including oysters, mussels and clams). In fish, the acute lethal concentration of copper depends both on test species and exposure conditions. Waters with high concentrations of copper can have significant effects on diatoms and sensitive invertebrates, notably cladocerans (water fleas). Most taxonomic groups of macroalgae and invertebrates will be severely affected.

For Inorganic Sulfate:

Environmental Fate - Sulfates can produce a laxative effect at concentrations of 1000 - 1200 mg/liter, but no increase in diarrhea, dehydration or weight loss. The presence of sulfate in drinking-water can also result in a noticeable taste. Sulfate may also contribute to the corrosion of distribution systems. No health-based guideline value for sulfate in drinking water is proposed. Atmospheric Fate: Sulfates are removed from the air by both dry and wet deposition processes. Wet deposition processes including rain-out (a process that occurs within the clouds) and washout (removal by precipitation below the clouds) which contribute to the removal of sulfate from the atmosphere.

Terrestrial Fate: Soil - In soil, the inorganic sulfates can adsorb to soil particles or leach into surface water and groundwater. Plants - Sodium sulfate is not very toxic to terrestrial plants; however, sulfates can be taken up by plants and be incorporated into the parenchyma of the plant. Some plants (e.g., corn and Kochia Scoparia) are capable of accumulating sulfate to concentrations that are potentially toxic to ruminants. Jack pine are the most sensitive plant species.

Aquatic Fate: Sulfate in water can also be reduced by sulfate bacteria (Thiobacilli) which use them as a source of energy. In anaerobic environments sulfate is biologically reduced to (hydrogen) sulfide by sulfate reducing bacteria or incorporated into living organisms as source of sulfur. Sodium sulfate is not reactive in aqueous solution at room temperature. Sodium sulfate will completely dissolve, ionize and distribute across the entire planetary "aquasphere". Some sulfates may eventually be deposited with the majority of sulfates participating in the sulfur cycle in which natural and industrial sodium sulfates are not distinguishable. Ecotoxicity: Significant bioconcentration or bioaccumulation is not expected. Algae are the most sensitive to sodium sulfate and toxicity occurs in bacteria from 2500mg/L. Sulfates are not acutely toxic to fish or invertebrates. Daphnia magna water fleas and fathead minnow appear to be the least sensitive species. Activated sludge showed a very low sensitivity to sodium sulfate. Overall, it can be concluded that sodium sulfate has no acute adverse effect on aquatic and sediment dwelling organisms. No data were found for long term toxicity.

For Copper: Typical foliar levels of copper are: Uncontaminated soils (0.3-250 mg/kg) ; Contaminated soils (150-450 mg/kg) ; Mining/smelting soils (6.1-25 mg/kg80 mg/kg300 mg/kg). Terrestrial Fate: Plants - Generally, vegetation reflects soil copper levels in its foliage. This is dependent upon the bioavailability of copper and the physiological requirements of species concerned. Crops are often more sensitive to copper than the native flora. Soil: In soil, copper levels are raised by application of fertilizer, fungicides, from deposition of highway dusts and from urban, mining and industrial sources. Chronic and or acute effects on sensitive species occur as a result of human activities such as copper fertilizer addition and addition of sludge. When soil levels exceed 150 mg Cu/kg, native and agricultural species show chronic effects. Soils in the range 500-1000 mg Cu/kg act in a strongly selective fashion allowing the survival of only copper-tolerant species and strains. At 2000 Cu mg/kg, most species cannot survive. By 3500 mg Cu/kg, areas are largely devoid of vegetation cover. The organic content of the soil appears to be a key factor affecting the bioavailability of copper. On normal forest soils, non-rooted plants such as mosses and lichens show higher copper concentrations. The fruiting bodies and mycorrhizal sheaths of soil fungi associated with higher plants in forests often accumulate copper to much higher levels than plants at the same site.

DO NOT discharge into sewer or waterways.

12.2. Persistence and degradability:

Water & Soil	HIGH
Air	HIGH

12.3. Bioaccumulative potential:

Bioaccumulation	LOW (LogKOW = -2.2002)

12.4. Mobility in soil:

Mobility	LOW (KOC=6.124)

SECTION 13: Disposal considerations

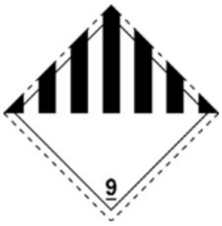
13.1 Waste treatment methods:

Product / Packaging disposal	Containers may still present a chemical hazard/ danger when empty. Return to supplier for reuse/ recycling if possible. Otherwise: If container cannot be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorized landfill. Where possible retain label warnings and SDS and observe all notices pertaining to the product. **DO NOT allow wash water from cleaning or process equipment to enter drains.** It may be necessary to collect all wash water for treatment before disposal. In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. Where in doubt contact the responsible authority. Recycle wherever possible or consult manufacturer for recycling options. Consult State Land Waste Management Authority for disposal. Bury residue in an authorized landfill. Recycle containers if possible or dispose of in an authorized landfill.
Waste treatment options	N/A
Sewage disposal options	N/A

SECTION 14: Transport information

For all transport

Labels required



HAZCHEM	2Z
14.1. UN number	3077
14.2. Proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
14.3. Packing group	III

Sea transport (IMDG-Code / GGVSee)

14.4. Transport hazard class	IMDG Class 9 IMDG Subrisk Not applicable
14.5. Environmental hazard	Marine pollutant
14.6. Special precautions for user	EMS Number F-A, S-F Special provisions 274 335 966 967 969 Limited quantities 5 kg

Land transport (ADR-RID)

14.4. Transport hazard class	Class 9 Subrisk Not applicable
14.5. Environmental hazard	Environmentally hazardous
14.6. Special precautions for user	Hazard identification (Kemmler) 90 Classification code M7 Hazard label 9 Special provisions 274 335 375 601 Limited quantity 5 kg Tunnel restriction code 3 (-)

Air transport (ICAO-IATA / DGR)

14.4. Transport hazard class	IICAO/IATA Class 9 ICAO/IATA Sub risk Not applicable ERG Code 9L
14.5. Environmental hazard	Environmentally hazardous
14.6. Special precautions for user	Special provisions A97 A158 A179 A197 A215 Cargo only packing instructions 956 Cargo only maximum qty / pack 400 kg Passenger and cargo packing instructions 956 Passenger and cargo maximum qty / pack 400 kg Passenger and Cargo limited quantity Packing Instructions Y956 Passenger and Cargo limited maximum qty / pack 30 kg G

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

This safety data sheet is in compliance with the following EU legislation and its adaptations - as far as applicable - : Directives 98/24/EC, - 92/85/EEC, - 94/33/EC, - 2008/98/EC, - 2010/75/EU; Commission Regulation (EU) 2020/878; Regulation (EC) No 1272/2008 as updated through ATPs.

15.2. Chemical safety assessment

For further information please look at the Chemical Safety Assessment and Exposure Scenarios prepared by your Supply Chain if available

SECTION 16: Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources using available literature references.
The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whetherthe reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios.

Scale of use, frequency of use and current or available engineering controls must be considered.
The following information is provided to conform with article 13 of the EC Directive on Packaging and Packaging Waste 94/62/EC:-
Wherever possible we use returnable packaging and pallets. Details of these are on our sales contracts. - For any non-returnable packaging the cost of disposal is at your expense, but we do have a list of reprocesses available.- In most cases, but not all, we are able to supply products in returnable packaging but the additional cost of this will be for the customer's expense. Please ask for details with your specific requirements. - Any product supplied in returnable packaging is clearly marked to this effect.
For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:
EN 166 Personal eye-protection
EN 340 Protective clothing
EN 374 Protective gloves against chemicals and micro-organisms
EN 13832 Footwear protecting against chemicals

Definitions and abbreviations

PC-TWA: Permissible Concentration-Time Weighted Average PC-STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit 。
IDLH: Immediately Dangerous to Life or Health Concentrations
ES: Exposure Standard,OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value, LOD: Limit Of Detection
OTV: Odour Threshold Value,BCF: BioConcentration Factors
BEI: Biological Exposure Index
AIIC: Australian Inventory of Industrial Chemicals
DSL: Domestic Substances List, NDSL: Non-Domestic Substances List
IECSC: Inventory of Existing Chemical Substance in China
EINECS: European INventory of Existing Commercial chemical Substances
ELINCS: European List of Notified Chemical Substances
NLP: No-Longer Polymers
ENCS: Existing and New Chemical Substances Inventory
KECI: Korea Existing Chemicals Inventory
NZIoC: New Zealand Inventory of Chemicals
PICCS: Philippine Inventory of Chemicals and Chemical Substances
TSCA: Toxic Substances Control Act
TCSI: Taiwan Chemical Substance Inventory
INSQ: Inventario Nacional de Sustancias Químicas
NCI: National Chemical Inventory
FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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