SAFETY DATA SHEET (SDS)
COPPER SULPHATE PENTAHYDRATE

Issue Date: 01.11.2013
Status modified by Cuprichem Limited

Section 1
IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Product Name: Copper sulphate pentahydrate
Product Use: In agriculture as a soil additive, pesticide; feed additive; germicide; leather and textile mordant; pigment; electropolating and electro refining of copper; medicine; wood and pulp preservative; engraving and lithography; in mining ore treatment; steel and rubber processing.
Other Names: Copper (II) sulfate pentahydrate, Copper sulfate pentahydrate, Cupric sulphate pentahydrate
Company Name: CUPRICHEM LIMITED
Address: 20 Harcourt Street
           W1H 4HG, London, UK
Emergency Telephone: +44 207 193 4945 (working hours) / +90 532 334 91 22 (24 hours)
Fax: +44 207 691 7857
REACH REGISTRATION NUMBER : 01-2119520566-40-0016

Section 2
HAZARDS IDENTIFICATION

This material is hazardous; HAZARDOUS SUBSTANCE.
Classified as Dangerous Goods for Transport by Sea, Air, Road and Rail; DANGEROUS GOODS.

Hazard Class: Harmful if swallowed. Causes skin irritation. Causes serious eye irritation. Very toxic to aquatic life. Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.
Poisons Schedule: S6 Poison.
M Factor 10

Section 3
COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Components</th>
<th>EC Number</th>
<th>CAS Number</th>
<th>Proportion</th>
<th>Hazard Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper Sulphate pentahydrate</td>
<td>231-847-6</td>
<td>7758-99-8</td>
<td>100%</td>
<td>H302, H315, H319</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H400, H401</td>
</tr>
</tbody>
</table>
FIRST AID MEASURES

Skin contact:
Take off contaminated clothes and wash with soap and plenty of water all the contaminated parts of the body. In case of irritation seek medical advice.

Eye contact:
Wash immediately with plenty of water for at least 15 minutes. Seek medical advice.

Ingestion:
If swallowed seek immediately medical advice. Show this safety data sheet or the label.

Inhalation:
If possible reduce exposure using fresh air. Remove from exposure take the person to a well aerated place and keep calm. Seek medical advice.

FIRE FIGHTING MEASURES

Suitable extinguishing media:
Product is not flammable. Use extinguishing media appropriate for surrounding fire (micronized water, CO2, foam). Collect the contaminated water to avoid reaching of sewers or water courses. Special hazards arising from the substance: Avoid breathing fumes that could be toxic (presence of sulphur oxides SOx).

Special protective equipment for fire-fighters:
Fire-fighters should wear proper protective equipment and self-contained (positive pressure if available) breathing apparatus with full face piece.

ACCIDENTAL RELEASE MEASURES

Personal precautions:
Protect adequately all the body parts. The air passages must be protected (suitable filter mask) if the material is in microcrystals form (higher probability that the product forms dust). Keep away unauthorized people, children and animals.

Environmental precautions:
Use sand or soil to contain the loss of product. Avoid the possibility that significant quantities of product can enter water courses or sewer; if this should happen advise immediately the local competent authority.

Methods for cleaning up:
Cover the product with sand or soil and carefully clean up all the product. Put it into another clean and dry container, close and remove it from the area. Do not clean contaminated area with water.
HANDLING AND STORAGE

Precautions for safe handling:
Avoid dust formation. Do not breathe dust. Handle in a well ventilated area or wear adequate respiratory protection (anti-dust mask). Avoid contact with skin and eyes wearing working clothes, gloves and protective glasses. Do not eat, smoke or drink during use. After use keep the packaging well closed.

Conditions for safe storage, including any incompatibilities:
Keep in sealed containers away from humidity and sunlight. Store the product in a well ventilated warehouse away from flammable product. Keep out of the reach of children, animal and unauthorized people. Keep away from food, drink and feeding stuff.

EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits:
No value assigned for this specific material. However, Exposure Standard(s) for constituent(s):
Copper dusts & mists (as Cu): 8hr TWA = 1 mg/m³
TWA - The time-weighted average airborne concentration over an eight-hour working day, for a five-day working week over an entire working life.
These Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

Engineering controls:
Natural ventilation should be adequate under normal use conditions.

Personal Protective Equipment:
Avoid contact with eyes and skin. Do not inhale dust. After use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water. After each day's use wash contaminated clothing. Wear rubber gloves while handling the product.

PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Blue crystals</td>
</tr>
<tr>
<td>Molecular formula</td>
<td>CuSO₄.5H₂O</td>
</tr>
<tr>
<td>Melting Point</td>
<td>Decomposes at 650°C</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>2.2840 g/cm³</td>
</tr>
<tr>
<td>Flash Point</td>
<td>Not applicable (does not burn)</td>
</tr>
<tr>
<td>Flamm. Limit LEL</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flamm. Limit UEL</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>Very soluble</td>
</tr>
<tr>
<td>Vapour Pressure</td>
<td>7.3 mmHg at 25°C</td>
</tr>
<tr>
<td>pH Value</td>
<td>4.0 (0.2 M @ 4°C)</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>249.69</td>
</tr>
<tr>
<td>Dehydration</td>
<td>The pentahydrate loses two water molecules of hydration at 30°C, 2 more at 110°C and becomes anhydrous by 250°C.</td>
</tr>
</tbody>
</table>
STABILITY AND REACTIVITY

Chemical stability: Stable under normal conditions of use.
Conditions to avoid: Avoid dust generation. Avoid contact with foodstuffs.
Incompatible materials: Incompatible with finely powdered metals, steel, nitromethane, hydrazine, hydroxyl amine and magnesium.
Hazardous decomposition products: Oxides of copper. Oxides of sulfur.
Hazardous reactions: Contact with magnesium metal can generate flammable hydrogen gas. Will ignite hydroxyl amine. Can corrode most ferrous based metals.

TOXICOLOGICAL INFORMATION

No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Symptoms or effects that may arise if the product is mishandled and overexposure occurs are:

Ingestion: Swallowing can result in nausea, vomiting, diarrhea, and gastrointestinal irritation.
Eye contact: An eye irritant.
Skin contact: Contact with skin will result in irritation.
Inhalation: Breathing in dust may result in respiratory irritation.
Long Term Effects: No information available for the product.

Toxicological Data:
Oral (rat) LD50 : 300 mg/kg
Skin (rat) LD50 : > 2 gm/kg

ECOLOGICAL INFORMATION

Ecotoxicity:
Avoid contaminating waterways. Unspecified in soil, copper sulfate is partly washed down to lower levels, partly bound by soil components, and partly oxidatively transformed. Copper has a strong affinity for hydrous iron and manganese oxides, clays, carbonate minerals, and organic matter. Sorption to these materials ... suspended in the water column & in the bed sediments, results in relative enrichment of the solid phase and reduction in dissolved levels.

Aquatic toxicity:
Very toxic to aquatic organisms. May cause long term adverse effects in the aquatic environment.
EC50 algae, 5 days (Selenastrum capricornutum): 0.0031 mg/L (1)
48hr EC50 (Daphnia magna): 0.18mg/L (1)
96hr LC50 (rainbow trout): 0.032mg/L (1)

Environmental:
Copper is accumulated by plants and animals, but it does not appear to biomagnify from plants to animals. This lack of biomagnification appears common with heavy metals. In air, copper aerosols (in general) have a residence time of 2 to 10 days in an unpolluted atmosphere and 0.1 to > 4 days in polluted, urban areas.
Physical:
No evidence was found to indicate that there is any biotransformation process for copper compounds which would have a significant bearing on the fate of copper in aquatic environments.

Section 13
DISPOSAL CONSIDERATIONS

Disposal methods:
Refer to local government authority for disposal recommendations.

Section 14
TRANSPORT INFORMATION

ROAD AND RAIL TRANSPORT
Classified as Dangerous Goods for Transport by Road and Rail; DANGEROUS GOODS.

- **Proper Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
- **UN Number:** 3077
- **DG/ADR Class:** 9
- **Packing Group:** III

MARINE TRANSPORT
Classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea; DANGEROUS GOODS. This material is classified as a Marine Pollutant (P) according to the International Maritime Dangerous Goods Code.

- **Proper Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
- **UN Number:** 3077
- **DG/ADR Class:** 9
- **Packing Group:** III
- **IMDG EMS Fire:** F-A
- **IMDG EMS Spill:** S-F

AIR TRANSPORT
Classified as Dangerous Goods by the criteria of the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air; DANGEROUS GOODS.

- **Proper Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
- **UN Number:** 3077
- **DG/ADR Class:** 9
- **Packing Group:** III
REGULATORY INFORMATION

CLASSIFICATION ACCORDING TO CLP / GHS
Signal word: WARNING

Hazard statements:
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statements:
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P501 Dispose of contents/container to ... Dispose of waste and residues in accordance with local authority requirements.

CLASSIFICATION ACCORDING TO DSD / DPD
Signal word: DANGER

Xn harmful N dangerous for the environment

R-phrases:
R22 harmful if swallowed
R36/38 irritating to eyes and skin
R50/53 very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

S-phrases:
S22 Do not breathe dust
S26 Avoid contact with skin and eyes. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S60 This material and its container must be disposed of as hazardous waste
S61 Avoid release to the environment. refer to special instructions/safety data sheets
OTHER INFORMATION

Other hazard statements:
H400 Very toxic to aquatic life.

Other precautionary statements:
P264 Wash... thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P301+P312 IF SWALLOWED: Call a POISON CENTRE or doctor/physician if you feel unwell.
P330 Rinse mouth.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313 If eye irritation persists: Get medical advice/attention.
P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P321 Specific treatment (see... on this label).
P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P391 Collect spillage.

Under REACH Material Safety Data Sheets (MSDS) are referred to as Safety Data Sheets (SDS).

This MSDS summaries our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this SDS and consider the information in the context of how the product will be handled and used in the workplace including its use in conjunction with other products. If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact Cuprichem Limited. Our responsibility for products sold is subject to our standard terms and conditions, a copy of which is sent to our customers and is also available on request.

END OF SAFETY DATA SHEET