SAFETY DATA SHEET
COPPER SULPHATE PENTAHYDRATE

According to Regulation (EU) No 453/2010

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name  COPPER SULPHATE PENTAHYDRATE
Product No. C26
REACH Registration number 01-2119520566-40
REACH Registration notes According to REACH Annex V, paragraph 6; the hydrates of a substance are covered by the registration of the anhydrous material.
CAS-No. 7758-99-8
EU Index No. 029-004-00-0
EC No. 231-847-6

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


Some grades of this substance are available for feed/food use; (E4) Feed additive.

1.3. Details of the supplier of the safety data sheet

Supplier Norkem Limited,
Norkem House, Bexton Lane,
Knutsford, Cheshire,
WA16 9FB. UK.
T: +44 (0)1565 755550
F: +44 (0)1565 755496
datasheet@norkem.com

1.4. Emergency telephone number

T: 01270 502891 (UK Transport emergencies only)

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (EC 1272/2008)
Physical and Chemical Hazards Not classified.
Human health Acute Tox. 4 - H302; Skin Irrit. 2 - H315; Eye Irrit. 2 - H319
Environment Aquatic Acute 1 - H400; Aquatic Chronic 1 - H410

Classification (67/548/EEC) Xn;R22. Xi;R36/38. N;R50/53.
The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

Environment
M factor = 10 according to the harmonised classification and labelling listed in Regulation (EC) No 1272/2008.

Physical and Chemical Hazards
As part of the REACH registration alternative classifications were proposed based on the data presented in section 11 and 12 of this SDS.

2.2. Label elements

EC No. 231-847-6
Label In Accordance With (EC) No. 1272/2008
**COPPER SULPHATE PENTAHYDRATE**

**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.
- P301+312 IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
- P302+352 IF ON SKIN: Wash with plenty of soap and water.
- P305+351+338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P501 Dispose of contents/container in accordance with regional regulations.

**Supplementary Precautionary Statements**
- P270 Do not eat, drink or smoke when using this product.
- P264 Wash contaminated skin thoroughly after handling.
- P330 Rinse mouth.
- P332+313 If skin irritation occurs: Get medical advice/attention.
- P337+313 If eye irritation persists: Get medical advice/attention.
- P362 Take off contaminated clothing and wash before reuse.
- P391 Collect spillage.
- P321 Specific treatment (see medical advice on this label).

2.3. Other hazards

Not Classified as PBT/vPvB by current EU criteria.

**SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**

**3.1. Substances**

<table>
<thead>
<tr>
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**Composition Comments**
Purity >90, <100% w/w

**SECTION 4: FIRST AID MEASURES**

4.1. Description of first aid measures

**General information**
Remove victim immediately from source of exposure. Provide fresh air, warmth and rest, preferably in comfortable upright sitting position.

**Inhalation**
Move the exposed person to fresh air at once. Get medical attention. When breathing is difficult, properly trained personnel may assist affected person by administering oxygen. Get medical attention if any discomfort continues.

**Ingestion**
NEVER MAKE AN UNCONSCIOUS PERSON VOMIT OR DRINK FLUIDS! Remove victim immediately from source of exposure. Drink a few glasses of water or milk. Get medical attention immediately!

**Skin contact**
Remove contaminated clothing. Wash the skin immediately with soap and water. Get medical attention promptly if symptoms occur after washing.
COPPER SULPHATE PENTAHYDRATE

Eye contact
Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention immediately. Continue to rinse.

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

Inhalation.
Metallic taste. Irritation of nose, throat and airway.

Ingestion

Skin contact
Mild dermatitis, allergic skin rash. Irritating and may cause redness and pain.

Eye contact
Causes serious eye damage. Burns can occur.

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

Unless extensive vomiting has occurred, empty the stomach by gastric lavage. Probable mucosal damage may contraindicate use of gastric lavage.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media
Extinguishing media
Use fire-extinguishing media appropriate for surrounding materials.

5.2. Special hazards arising from the substance or mixture
Specific hazards
When heated and in case of fire, toxic vapours/gases may be formed.

5.3. Advice for firefighters
Special Fire Fighting Procedures
Keep run-off water out of sewers and water sources. Dike for water control.

Protective equipment for fire-fighters
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures
For personal protection, see section 8. Avoid contact with skin and eyes. Avoid inhalation of dust.

6.2. Environmental precautions
Do not discharge into drains, water courses or onto the ground.

6.3. Methods and material for containment and cleaning up
Wear necessary protective equipment. Do not contaminate water sources or sewer. Remove spillage with vacuum cleaner. If not possible, collect spillage with shovel, broom or the like. Ensure that waste and contaminated materials are collected and removed from the work area as soon as possible in a suitably labelled container.

6.4. Reference to other sections
For waste disposal, see section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling
Avoid spilling, skin and eye contact. Use mechanical ventilation in case of handling which causes formation of dust. Avoid inhalation of dust.

7.2. Conditions for safe storage, including any incompatibilities
Store in tightly closed original container in a dry, cool and well-ventilated place.

7.3. Specific end use(s)
The identified uses for this product are detailed in Section 1.2. For further information see attached Exposure Scenario.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters
COPPER SULPHATE PENTAHYDRATE

DNEL
Oral  Long Term  Systemic Effects  0.041  mg/kg/day
Oral  Short Term  Systemic Effects  0.082  mg/kg/day
Inhalation.  Long Term  Local Effects  (**) = 0.01  mg/m³
Inhalation.  Long Term  Local Effects  (***) = 13.67  mg/kg/day
Dermal  Long Term  Local Effects  (****) = 13.67  mg/kg/day

(*) Dust.  (**) Fume.  (***) Powder.  (****) Liquid.

8.2. Exposure controls

Protective equipment

Engineering measures
Provide adequate general and local exhaust ventilation.

Respiratory equipment
No specific recommendation made, but respiratory protection must be used if the general level exceeds the recommended occupational exposure limit.

Hand protection
Use protective gloves.

Eye protection
Wear approved safety goggles.

Other Protection
Provide eyewash station. Provide eyewash station and safety shower.

Hygiene measures
DO NOT SMOKE IN WORK AREA! Wash hands at the end of each work shift and before eating, smoking and using the toilet. Promptly remove any clothing that becomes contaminated. Wash promptly with soap & water if skin becomes contaminated. Use appropriate skin cream to prevent drying of skin. When using do not eat, drink or smoke.

Skin protection
Wear appropriate clothing to prevent any possibility of skin contact.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance  Crystalline powder.
Colour  Blue.
Odour  Odourless.
Solubility  Soluble in water.

Initial boiling point and boiling range
Not applicable.

Melting point (°C)
Not applicable.

Relative density 2.286 g/cm³
Vapour density (air=1)
Not applicable - High melting point inorganic solid.

Vapour pressure
Not applicable - High melting point inorganic solid.

Evaporation rate
Not applicable - High melting point inorganic solid.

pH-Value, Conc. Solution
Not Applicable - Inorganic chemical.

pH-Value, Diluted Solution 4.0 @ 1%
Viscosity
Not applicable - High melting point inorganic solid.

Solubility Value (G/100G H₂O@20°C) 22g/100g
Decomposition temperature (°C) 110°C
Odour Threshold, Lower
Not applicable.
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Flash point
Not applicable.

Auto Ignition Temperature (°C)
Not applicable.

Flammability Limit - Lower(%) Not applicable.

Partition Coefficient
(N-Octanol/Water)
Scientifically unjustified.

Explosive properties
Not classified.
The product has no flammability, explosive or self-inflammability properties.

Oxidising properties
Does not meet the criteria for oxidising.

9.2. Other information
Not available.

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

10.2. Chemical stability
Stable under normal temperature conditions.

10.3. Possibility of hazardous reactions
The materials is acidic when dissolved in water and can react with magnesium to form hydrogen gas.

10.4. Conditions to avoid
Avoid heat.

10.5. Incompatible materials
Materials To Avoid

10.6. Hazardous decomposition products
Sulphurous gases (SOx). Cupric oxide.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects
Toxicological information

Copper is an essential element and therefore, its concentration in the body is strictly and efficiently regulated by homeostatic mechanisms.

Inhalation: The “respirable” fraction is assumed to be 100% absorbed. Absorption of the “inhalable” fraction depends on particle size. The Multiple Path Model of Particle Deposition (MPPD) can quantify the particle dependent absorption.

Oral: An oral absorption of 25% has been adopted, based on studies in the rat.

Dermal: A dermal absorption of 0.3% has been adopted for soluble and insoluble copper substances in solution or suspension, based on in-vitro percutaneous tests with human skin. For dry exposure, a dermal absorption value of 0.03% applies.

Acute toxicity:
Acute Toxicity (Oral LD50)
~ 480 mg/kg Rat
Test method(s): OECD 401.
Harmful if swallowed.

Acute Toxicity (Dermal LD50)
> 2000 mg/kg Rat
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Not classified. Test method(s): OECD 402.
Based on available data the classification criteria are not met.

Acute Toxicity (Inhalation LC50)
Not determined.
Inhalation is not considered to be a likely route of exposure based on the physical properties of the substance.
Based on available data the classification criteria are not met.

Skin Corrosion/Irritation:
Dose
0.5 g 4 hr Rabbit
Erythema/eschar score
average < (1)
Oedema score
No oedema (0).
Test method(s): OECD 404. This OECD study concluded that there should be no classification - this result is less severe than the harmonized classification as a Category II skin irritant set out in Annex VI of Regulation 1272/2008.
Not irritating.

Serious eye damage/irritation:
A test carried out in 3 male rabbits resulted in severe ocular irritation that was not reversible within the duration of the test. Test guideline OECD 405.
Copper sulphate pentahydrate meets the criteria for causing serious eye damage. This is more severe than the harmonized classification as an eye irritant set out in Annex VI of Regulation EC 1272/2008.

Respiratory or skin sensitisation:
Skin sensitisation
Guinea pig maximization test (GPMT):
Test method(s): OECD 406.
Not Sensitising.

Germ cell mutagenicity:
Genotoxicity - In Vitro
Gene Mutation:
Test method(s): OECD 471.
Negative.
Genotoxicity - In Vivo
DNA damage and/or repair:
Test method(s): OECD 486. A mouse micronucleus test (EC method B.12) also gave negative results.
Negative.

Carcinogenicity:
Carcinogenicity
Based on a weight of evidence approach, it was concluded that copper compounds do not have carcinogenic potential. Test method(s):
Journal of the American Pharmaceutical Association, 43(12): 722-737,
Br. J. Cancer Sep; 23(3): 591-596,
Fd Cosmet. Toxicol. 11: 827-840.
Not Classified

Reproductive Toxicity:
Reproductive Toxicity - Fertility
Two-generation study: LOAEL 23.5 mg/kg Oral Rat F2a
The units are expressed in 'mg/µg' of: Copper. Not classified. Test method(s): OECD 416.
Reproductive Toxicity - Development
Teratogenicity: LOAEL 9 mg/kg Oral Rabbit
Not classified. Test method(s): OECD 414.

Specific target organ toxicity - single exposure:
STOT - Single exposure
Scientifically unjustified.
Already classified for Acute Oral Toxicity.

Specific target organ toxicity - repeated exposure:
STOT - Repeated exposure -
COPPER SULPHATE PENTAHYDRATE

A 90-day oral repeat dose study conducted with copper sulphate pentahydrate in rats and mice (test method equivalent to EU B.26) gave the following results:

Forestomach lesions:
NOAEL in the rat: 16.7 mg Cu/kg bw/day
NOAEL in male mice: 97 mg Cu/kg bw/day
NOAEL in female mice: 126 mg Cu/kg bw/day

Liver and kidney damage:
NOAEL in the rat: 16.7 mg Cu/kg bw/day
This study was used to calculate of an oral and systemic DNEL of 0.041 mg Cu/kg bw/day (including a Safety factor of 100 and an oral absorption of 25%).

[This product does not meet the criteria for classification.]
Not classified.

Aspiration hazard:

Viscosity
No data available.

Inhalation
Prolonged inhalation of high concentrations may damage respiratory system.

Ingestion
May irritate and cause stomach pain, vomiting and diarrhoea.

Skin contact
Acts as a defatting agent on skin. May cause cracking of skin, and eczema. Prolonged or repeated exposure may cause severe irritation.

Eye contact
Causes serious eye damage.

Health Warnings
The product causes irritation of mucous membranes and may cause abdominal discomfort if swallowed.

Target Organs
Skin  Eyes  Respiratory system, lungs

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

Acute aquatic toxicity- test results and environmental classification:

Acute toxicity of copper ions was assessed using 451 L(E)C50 values from studies on soluble copper compounds. The lowest species-specific geometric mean reference value of 25.0 µg Cu/L was an L(E)C50 obtained for Daphnia magna at pH 5.5 - 6.5.

This substance is already classified as very toxic to aquatic organisms.

Copper is an essential nutrient regulated by homeostatic mechanisms and does not bioaccumulate. Bio-available copper ions are rapidly removed from the water column.

This substance is not classified on the basis of chronic aquatic toxicity.

Chronic freshwater toxicity- test results and PNEC derivation:

Chronic toxicity of copper ions from soluble copper compounds was assessed using 139 NOEC/EC10 values from 27 species representing different trophic levels (fish, invertebrates and algae). Species-specific NOECs were normalised using Biotic Ligand Models and used to derive Species Sensitivity Distributions (SSD) and a lowest HC5 (the median fifth percentile of the SSD) of 7.8 µg dissolved Cu/L. This value is considered to be protective of 90% of EU surface waters and represents a reasonable worst case. Applying an assessment factor of 1, a default chronic freshwater PNEC of 7.8 µg dissolved Cu/L is assigned to assess local risks.
COPPER SULPHATE PENTAHYDRATE

CHRONIC MARINE WATERS TOXICITY- test results and PNEC derivation:

Chronic toxicity of copper ions from soluble copper compounds was assessed using 51 NOEC/EC10 values from 24 species representing different trophic levels (fish, invertebrates and algae). Species-specific NOECs were calculated after normalizing to dissolved organic carbon (DOC) and were used to derive SSDs and HC5 values. Normalisation at a typical DOC for coastal waters of 2 mg/l resulted in an HC5 of 5.2 µg dissolved Cu/L. Applying an assessment factor of 1, a default chronic marine PNEC of 5.2 µg dissolved Cu/L is assigned to assess local risks.

CHRONIC FRESHWATER SEDIMENT TOXICITY- test results and PNEC derivation:

Toxicity of copper ions from soluble copper compounds was assessed using 62 NOEC values from 6 benthic species. The NOECs were related to DOC and Acid Volatile Sulphide (AVS) and were used to derive SSDs and HC5 values. An HC5 of 1741 mg Cu/kg OC, corresponding to 87 mg Cu/kg dry weight, was calculated for a low AVS sediment with a default OC of 5%. Applying an assessment factor of 1, a default chronic freshwater sediment PNEC of 87 mg Cu/kg dry weight is assigned to assess local risks.

CHRONIC TERRESTRIAL TOXICITY- test results and PNEC derivation:

Toxicity of copper ions from soluble copper compounds was assessed using 252 NOEC/EC10 values from 28 different species representing different trophic levels (decomposers, primary producers, primary consumers). NOEC values were adjusted to account for differences between lab-spiked soils and field-contaminated soils by the addition of a leaching ageing factor of 2. The adjusted values were then normalized to a range of EU soils using regression bioavailability models and used to derive SSDs and a lowest HC5 value of 65.5 mg Cu/kg dry weight. Applying an assessment factor of 1, a default chronic soil PNEC of 65.5 mg Cu/kg dry weight is assigned.

TOXICITY TO SEWAGE TREATMENT PLANT (STP) MICRO-ORGANISMS

The toxicity of copper ions from soluble copper compounds was assessed using NOEC and EC50 values from high quality studies with STP bacteria and protozoa. The statistically-derived NOEC was 0.23 mg Cu/L in the STP. Applying an assessment factor of 1, a PNEC of 0.23 mg Cu/L is assigned for Sewage Treatment Plant.

12.2. Persistence and degradability

Degradability

The copper ions resulting from the degradation of this product cannot be degraded.

The fate of copper ions in the water column was modelled using the Ticket Unit World Model. Removal was also assessed using data from one mesocosm and three field studies. "Rapid" removal was demonstrated, defined as 70% removal within 28 days. Literature data confirm the strong binding of copper ions to sediment, with the formation of stable Cu-S complexes. Re-mobilisation of copper ions to the water column is therefore not expected. Copper does not meet the criteria as “persistent”.

12.3. Bioaccumulative potential

Bioaccumulative potential

The “bioaccumulative” criteria are not applicable to essential metals.

Partition coefficient

Scientifically unjustified.

Not Applicable - Inorganic chemical.

12.4. Mobility in soil

Mobility:

Copper ions bind strongly to soil. The median water-soil partitioning coefficient (Kp) is 2120 L/kg.

12.5. Results of PBT and vPvB assessment

Not Classified as PBT/vPvB by current EU criteria. Not Applicable - Inorganic chemical.

12.6. Other adverse effects

None known. Copper sulphate pentahydrate does not contribute to ozone depletion, ozone formation, global warming or acidification.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Dispose of waste and residues in accordance with local authority requirements. Residues and empty containers should be taken care of as hazardous waste according to local and national provisions.

SECTION 14: TRANSPORT INFORMATION

14.1. UN number

UN No. (ADR/RID/ADN) 3077
COPPER SULPHATE PENTAHYDRATE

UN No. (IMDG) 3077
UN No. (ICAO) 3077

14.2. UN proper shipping name
Proper Shipping Name UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Copper Sulphate) 9, III, (E)
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

14.3. Transport hazard class(es)
ADR/RID/ADN Class 9
ADR/RID/ADN Class Class 9: Miscellaneous dangerous substances and articles.
ADR Label No. 9
IMDG Class 9
ICAO Class/Division 9
Transport Labels

14.4. Packing group
ADR/RID/ADN Packing group III
IMDG Packing group III
ICAO Packing group III

14.5. Environmental hazards
Environmentally Hazardous Substance/Marine Pollutant

14.6. Special precautions for user
EMS F-A, S-F
Emergency Action Code 2Z
Hazard No. (ADR) 90
Tunnel Restriction Code (E)

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

SECTION 15: REGULATORY INFORMATION

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

EU Legislation
COPPER SULPHATE PENTAHYDRATE

15.2. Chemical Safety Assessment

A chemical safety assessment has been carried out.

SECTION 16: OTHER INFORMATION

General information
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 reprocessors 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 products supplied in returnable packaging is clearly marked to this effect.

Revision Date 17/06/2011
Revision 1
Safety Data Sheet Status For further information see attached Exposure Scenario.

Risk Phrases in Full
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.

Hazard Statements in Full
H319 Causes serious eye irritation.
H315 Causes skin irritation.
H302 Harmful if swallowed.
H410 Very toxic to aquatic life with long lasting effects.
H400 Very toxic to aquatic life.

Disclaimer
This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is, to the best of the company's knowledge and belief, accurate and reliable as of the date indicated. However, no warranty guarantee or representation is made to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability of such information for his own particular use.