

Ferrous Sulphate Heptahydrate Solution

Page 1 Issued: 28/03/2022 Revision No: 1

1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

| Product Identifier: | |
|---------------------------|---|
| Other names: | Iron Sulphate Solution, Iron Sulphate Heptahydrate Solution, Pickling Liquor. |
| Relevant Identified uses: | The pickling process in steel plants and tube plants is a surface treatment process of coils and tubes prior to coating of these articles. In order to generate a suitable surface on the belts/strips remaining iron oxides (and some other minor impurities) and the first surface layer of iron are removed in continuous pickling lines or tanks by treating the belt/strip/tube with sulphuric acid. The resulting liquid Ferrous Sulphate solution is produced. The iron salts are then crystallised and removed from solution. |
| Uses: | The uses of Ferrous Sulphate will be covered in the exposure scenario annex, which will accompany this document. |
| Company name: | Nexchem Ltd Unit 3 Barshaw Park Leycroft Road Leicester LE4 1ET Tel: 0116 2311130 24/7 Emergency Tel: 0800 246 1274 Email: <u>sales@nexchem.co.uk</u> |

2. HAZARDS IDENTIFICATION

Classification:

Hazard Classification:

CLP regulations (EC) 1272/2008

Name Ferrous Sulphate

Hazard Class Acute toxicity - Oral Skin irritation Serious damage/ Eye irritation

Hazard Category Acute Tox. 4 Skin Irrit. 2 Eye Damage 2

Hazard Statements

H302: Harmful if swallowedH315: Causes skin irritationH319: Causes serious eye irritation

Label according to CLP regulations (EC) 1272/2008:



GHS07: Exclamation mark

Signal word:

Warning.

Ferrous Sulphate Heptahydrate Solution

| Issued: 28/03/2022 | Page 2 |
|---------------------------|--|
| Hazard Statements: | H302: Harmful if swallowed. |
| | H315: Causes skin irritation. |
| | H319: Causes serious eye irritation. |
| Precautionary Statements: | P264: Wash hands and exposed skin thoroughly after handling. |
| | P280: Wear protective gloves/protective clothing/eye protection/face protection. |
| | P301 +P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. |
| | P302+P352: IF ON SKIN: Wash with plenty of soap and water. |
| | P305+P351 +P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove |
| | contact lenses, if present and easy to do. Continue rinsing. |
| Other hazards: | For aqueous solutions of Ferrous Sulphate, the classification Corrosive to Metals should be |
| | given as required under CLP. The corresponding hazard category is Met Corr 1 and Hazard |
| | statement is H290: May be corrosive to metals. |
| | Independent studies/tests carried out by Scientific Services Derby (A Division of SureScreen |
| | Diagnostics Lid) for Ferrous Sulphate solution at 20% and 30% concentrations were conducted |
| | between March and August 2011. Results concluded 'all samples were below the required |
| | corrosion rate of 6.25mm/year. Therefore, under the remit of ADR/CDG regulations for the |
| | Carriage of Dangerous Goods by Road outlined within the CLP regulations the above stated |
| | strengths of solution fall well below the required threshold according to a test specification |
| | quoted in OJEU UN recommendations on the Transport of Dangerous Goods, Manual of Test |
| | and Criteria, Table 2.16.1. |

3. COMPOSITION / INFORMATION ON INGREDIENTS

| Substance | CAS No. | Einecs No. | Registration No. | Classification | Range (%) by weight |
|------------------|-----------|------------|-----------------------|------------------|---------------------|
| Ferrous Sulphate | 7720-78-7 | 231-753-5 | 01-2119513203-57-XXXX | H302, H315, H319 | ≥30 |

The full text of the hazard statements mentioned in this section can be found in section 16. The classification of Corrosive to metals H290 only applies to aqueous solutions of high concentrations and therefore is not included above. See section 2.3 Other hazards.

4. FIRST AID MEASURES

| Description of first aid m | neasures: |
|----------------------------|---|
| Skin contact: | Wash off with water, if symptoms persist, call a physician. |
| Eye contact: | Rinse immediately with plenty of lukewarm water, also under the eyelids, for several minutes, |
| | consult a physician. |
| Inhalation: | Supply fresh air, rinse mouth and nose with water, if symptoms persist, call a physician. |
| Ingestion: | Call a physician immediately, do NOT induce vomiting, rinse mouth with water, drink 1 or 2 |
| | glasses of water or milk. Never give anything by mouth to an unconscious person. |

Most important symptoms and effects: Can be acutely toxic but it's main symptoms will be irritation to the eye.

Indication of any immediate medical attention and special treatment needed: Seek medical attention if symptoms persist.

Ferrous Sulphate Heptahydrate Solution

Issued: 28/03/2022

5. FIRE-FIGHTING MEASURES

| Extinguishing media: | Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Extinguishing media which shall not be used for safety reasons- None. | |
|--------------------------------|---|--|
| Special hazards arising from | the substance: Sulphur Dioxide and Trioxide may be released when heating above the decomposition temperature. | |
| Advice for fire-fighters: | In the event of fire, wear self-contained breathing apparatus. Fire-fighters must wear fire resistant personal protective equipment. | |
| 6. ACCIDENTAL RELEASE MEASURES | | |

6. ACCIDENTAL RELEASE MEASURES

| Personal precautions: | Refer to protective measures listed in section "Handling and Storage". Wear protective suit and boots, if aerosols or mist are formed, use half mask with combination filter B/P2. |
|----------------------------|---|
| Environmental precautions: | Cover the drains to prevent the product from entering the environment. If the product contaminates rivers and lakes or drains inform respective authorities. Restrict the spread of the spillage by using inert absorbent material (sand, gravel) solutions only. |
| Methods for cleaning up: | Remove larger spills using a vacuum truck. Dilute residues with water and neutralise with lime or limestone powder. Must be disposed of in accordance with local and national regulations. |

7. HANDLING AND STORAGE

| Handling: | The workplace and work methods shall be organised in such a way that direct contact with the product is prevented or minimised. Wear gloves in a suitable material such as PVC, Neoprene or Natural rubber. Please observe the instructions regarding permeability and breakthrough time, which are provided by the supplier of the gloves. Also consider the specific local conditions under which the product is used, such as the danger of cuts, abrasion and the contact time. Tightly fitting safety goggles must be worn. |
|---------------------|--|
| Storage: | Keep away from incompatible products. Avoid freezing. Avoid high temperatures. |
| Plastic material: | Plastic (PE, PP, PVC), Fiberglass-reinforced polyester, Epoxy-coated concrete, Titanium, Acidproof or rubber-coated steel. |
| Materials to avoid: | Non-acid-proof metals (such as aluminium, copper and iron), Bases, Unalloyed steel, Galvanised surfaces. |

Ferrous Sulphate Heptahydrate Solution

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters (Occupational Exposure Limits (OELs):

Current OELs (GESTIS International Limit Values Institut fuer Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung (IFA):

| Country in EU with OEL for the relevant substance | Iron Salt (as Fe) | | |
|---|-------------------|---------------------------|--|
| | 8hr TWA (mg/m³) | STEL (mg/m ³) | |
| Belgium | 1.0 | - | |
| Denmark | 1.0 | - | |
| Hungary | 6.0 (Resp) | - | |
| Spain | 1.0 | - | |
| United Kingdom | 1.0 | 2.0 | |

| TWA: | Time Weighted Average measured over an 8-hour period. |
|-------|---|
| STEL: | Short Term Exposure Limit Value- 15-minute duration. |
| Resp: | Respirable fraction of dust. |

Derived DNELs for consumer and worker from the studies available from the REACH dossier.

DNELs that have been derived for the registration dossier of this substance are not included here due to the current methodology used to derive such levels. Currently a program of updating the derivation of DNELs is being carried out by the lead registrant and consortium as part of a post registration update and this SDS will be updated as and when this program is completed.

Control Measures:

To protect eyes wear suitable safety glasses and or safety goggles. Wear appropriate work wear to protect skin from contact. Check the resistance to chemicals of the protective gloves with the supplier of the gloves. Use only gloves conform to 89/686/EEC. Wear duration at permanent contact: gloves made of nitrile rubber, thickness of the glove material: 0.38 mm, breakthrough time (maximal wear duration): > 480 min, At occasional contact (splashes): gloves made of nitrile rubber, thickness of the glove material: 0.38 mm Breakthrough time (maximal wear duration): > 480 min this will include work< overalls plus suitable gloves. If a dust is created then wear a suitable FFSP2 mask (EN149).

9. PHYSICAL AND CHEMICAL PROPERTIES

| Property | Value used |
|---|--|
| Appearance at 20°C/ 1013 hPa | Light green-blue liquid that turns brown after exposure to light and air |
| Form and Odour | Light green with a slight acidic odour (threshold n/a) |
| рН | 1.9 (30% solution) |
| Melting point | Not applicable as solution |
| Boiling point | >300°C as Heptahydrate |
| Relative density | 1.150 at 20°C of solution |
| Vapour pressure | Not applicable |
| Surface tension | Not applicable |
| Water solubility | >100 g/l at 20°C |
| Partition coefficient (Kow ⁴) | Not applicable, inorganic |

Ferrous Sulphate Heptahydrate Solution

Issued: 28/03/2022

| Flash point | Not classified |
|-------------------------------|-----------------------------|
| Flammability | Not classified |
| Explosive properties | Not classified |
| Oxidising properties | Known to be reducing agents |
| Granulometry | Not applicable |
| Stability in organic solvents | Stable in organic solvents |
| Dissociation constant | Not applicable |
| Viscosity | Not determined |

Only properties that apply to the substance will be included in the table above.

10. STABILITY AND REACTIVITY

| Reactivity: | Product can be reactive under the correct conditions (oxidising agents). | |
|--|---|--|
| Chemical stability: | Loses water progressively from 56°C to 300°C. Aqueous solutions are oxidised slowly by air when hot, the rate of oxidation is increased by the addition of alkali or exposure to light. | |
| Possibility of hazardous reaction | s: Rapid oxidation will occur if product comes into contact with oxidising agents. | |
| Conditions to avoid: | Avoid contact with oxidising agents. Thermal decomposition at 400°C, | |
| Incompatible materials: | Oxidising agents. | |
| Hazardous decomposition products: If heated to above 600°C the product may give off acidic fumes of SO3 Sulphur Trioxide | | |

and SO2 Sulphur Dioxide.

11. TOXICOLOGICAL INFORMATION

| Acute toxicity: | The overall pattern of oral toxicity for iron salts is that they are harmful if swallowed. The |
|------------------|---|
| | human oral lethal dose is approximately 1000 mg/kg and 500-2000 mg/kg in rats. Toxic effects |
| | may, however, be produced by much lower doses especially when administered systemically. |
| | There is limited evidence that inhaled soluble iron salts are tolerated by rats plus limited |
| | evidence that inhaled soluble iron salts do not impair lung function and the dermal lethal dose |
| | would be greater than 2000 mg/kg. The dermal limit dose of Ferrous Chloride in rats is greater |
| | than 2,000 mg/kg (>881 mg Fe/kg) and thus should be used to compare against Ferrous |
| | Sulphate. This suggests little potential for systemic toxicity in humans after dermal contact. |
| Dose descriptor: | Oral – LD50s 300-2000 mg/kg bw |
| | Dermal – LD50s >2000 mg/kg bw |
| | Inhalation - No data |

Ferrous Sulphate Heptahydrate Solution

| Issued: 28/03/2022 | Page 6 |
|---------------------------------|---|
| Skin corrosion/irritation: | Ferrous Sulphate is skin irritant based on (2:1 animal majority) in rabbit test and is an eye irritant. Read across from Ferrous Sulphate and Ferric Chloride, indicates that solutions have the same or a lower classification than the solid and that classification based on pH would be overly cautious. On this basis an irritant classification, Skin Irritation Cat 2. H315: Causes skin irritation should be applied to solutions based on rules for mixtures. This classification therefore applies to this solution as the concentration .:: 10%. Ferrous Sulphate should not be seen as corrosive just as an irritant. |
| Eye damage/irritation: | Results are available for a GLP-compliant guideline study (Johnson, 2003), which showed that a 25% solution of Ferrous Sulphate Heptahydrate caused no more than mild redness and chemosis after instillation into the rabbit eye. The predicted classification based on reading across of several iron salts would be a classification between no classification and causes serious eye damage however due to the lack of test data and low pH a precautionary approach has be taken with classification as Eye Damage Cat 2. |
| Respiratory/Skin sensitisation: | Ferrous Sulphate Heptahydrate has been tested in a guideline, GLP, Local Lymph Node Assay (Stitzinger, 2010: reliability 1). In this test Ferrous Sulphate gave a clear negative result and is therefore not considered a skin sensitiser. Results of a reliable LLNA test were clearly negative for Ferrous Sulphate Heptahydrate. There are a few case studies in which human subjects showed signs of sensitisation to iron; however overall, these data are poor and do not provide convincing evidence of a positive reaction in humans. There is also poor evidence in animal studies of sensitisation as a result of exposure to iron. The widespread exposure of iron and its role in biological processes, together with the extensive use of dietary supplements suggest that sensitisation is not a concern. Within the REACH registration process a technical grade was registered attracting a skin sensitizer hazard due to a high level of Nickel impurities. The Nickel impurity for this grade is less than 30mg/kg so this does not apply. |
| Germ cell mutagenicity: | With regard to their mutagenic properties, iron salts have been extensively tested in microbial and mammalian systems in vitro, and in mammalian and insect tests in vivo. There are inconsistencies in the in vitro findings, with a small number of studies returning positive results. This has been attributed to DNA damage following reduction of Fe(III) to Fe(II) with free radical or superoxide formation and subsequent redox recycling. This contrasts with the consistently negative results obtained in vivo where, presumably, more efficient control mechanisms exist that protect the body from iron-induced oxidative damage. It is concluded that iron salts are not genotoxic. |
| Carcinogenicity: | Due to its potential pro-oxidant effects, there has been extensive research into possible links between iron and cancer development. These include many clinical investigations into the effects of oral (dietary) iron salts in humans and links to cancer. Although iron has been implicated in the development of cancers at various sites because of its role as a pro-oxidant, the UK Scientific Advisory Committee on Nutrition concluded that there is not enough evidence to reach conclusions for any specific links (EVM, 2003). |

Page 6

Ferrous Sulphate Heptahydrate Solution

 Reproductive toxicity:
 Results from recent guideline oral screening studies performed on Ferrous Chloride and Ferrous Sulphate gave NOAELs for reproductive and developmental effects of ≥500 mg/kg body weigh/day or ≥1000 mg/kg body weigh/day (no adverse effects were observed), respectively. These findings are considered to be relevant to Ferric as well as Ferrous salts, as oxidation of Ferrous to Ferric occurs in the low pH of stomach before ingested iron is absorbed into the body. In humans, iron supplementation of about 5.8 to 11.7 mg/kg bw/day (for a 60kg individual) is routinely prescribed throughout pregnancy with no adverse effects on pregnancy outcome. Evidence of adverse effects on male testes has only been observed at acutely toxic, overload doses, at which some of the experimental animals died.

Dose descriptor: Oral – LD50s ≥1000 mg/kg bw day Dermal - No data Inhalation - No data

 Repeated dose toxicity:
 No human data is available for Ferrous Sulphate and repeated dose toxicity and even though effects are shown in some animal studies the overall conclusion is that no classification should be assigned for all endpoints oral, inhalation and dermal. NOAEL 49 days ~ 1 00mg/kg Ferrous Sulphate Heptahydrate, result= no effect.

Aspiration hazard:

Toxicity:

No data, not an aspiration hazard.

12. ECOLOGICAL INFORMATION

In general toxic effects will not be seen by the presence of Ferrous Sulphate in the environment. However Ferrous Sulphate may present a toxic hazard to environmental species under specific conditions. For example, it is possible that Ferrous iron salts could have toxic effects in circumstances where the following conditions apply and persist: pH is low (<5), iron concentration is high (of the order of the apparent E(L)C50 values), oxygen content is very low, background concentrations of Ferrous iron are low. Such conditions would need to result in dissolved iron concentrations in the order of 1 to 1 0 mg/l and would not be expected to arise from the industrial production and use patterns for this product.

Persistence and degradability: An in-depth analysis of the oxidation and precipitation of iron was carried out by CEFIC as part of the recent European Chemicals Bureau classification process of Ferrous Sulphate (ECB, 2004b). A review of the scientific literature on the oxidation of Ferrous Sulphate reveals the following: Ferrous Sulphate reacts with water to form Ferrous Hydroxide (Fe(OH)2), moderately insoluble. Any precipitate would in turn undergo further oxidation to form Ferric Hydroxide (Fe(OHh) which is highly insoluble. Formation of Ferric Hydroxide at pH levels above 5.0 limits the presence of iron in aqueous systems.

For inorganic metal salts the concept of biodegradation is not applicable in general (OECD, 2001). Removal of iron from solution via precipitation and abiotic processes is dominant. Iron is abundant in the environment from natural mineral sources and iron transformations and the whole iron cycle in the environment is a combination of abiotic and biological processes.

Ferrous Sulphate Heptahydrate Solution

| Issued: 28/03/2022 | | Page 8 |
|--|--|---|
| | In summary, in the environment, a number of important steps follow from any releases effect, Ferrous and Ferric ions can be treated together because the Ferrous ion is rapid transformed to Ferric ion under the conditions found at typical points of release. Ferric released into (or generated in) water will rapidly precipitate as highly insoluble oxides a Hydroxides. These stable compounds are exactly the forms in which iron is found natu the earth's crust. | . In dly ions and oxo- rally in |
| Bio accumulative potential: | Biologically, iron is an essential trace element for organisms including micro-organisms and animals. Iron plays an important role in biological processes, and iron homeostasis under strict control. | s, plants s is |
| Mobility in Soil: | Soil is the primary reservoir of naturally occurring iron. It has its own surface geochemic cycle. Iron can be mobilised from soil or sediment to surface waters as colloidal Ferric Hydroxide, fine suspended particulates and inbound to clay sill. Factors like pH, CO2 concentration, redox conditions, availability of organic and inorganic complexing agent soil type contribute to reactions of iron in soil. | cal s and |
| Results of PBT and vPvB asse | essment: The criteria for persistence, bioaccumulation potential and toxicity are not met. The substance is not PBT or vPvB. | he |
| PNEC water: | Any concentration of iron in water that can be considered as stable can only be due to complexing effects of natural constituents in the water, bearing in mind that the amoun water will already be at saturation. This concentration will vary with location. It is not re possible to consider that any addition to the aquatic compartment can be stable, and the no PNEC can be set for water. | the t in alistically nerefore |
| PNEC sediment: PNEC soil: PNEC oral (secondary poisoni | 49.5 g Fe/kg dwt, Indicative only, in the absence of intrinsic toxicity. 55.0 g/kg dwt, Indicative only, in the absence of intrinsic toxicity ing): Widespread use of iron salts as human and veterinary dietary supplements, strongly that effects resulting from long-term exposure at realistic environmental concentrations unlikely to occur. | suggest s are very |
| | | |

13. DISPOSAL CONSIDERATIONS

This product is classified as hazardous waste and as such is covered by local waste legislation. Do not discharge directly into watercourse or any other controlled watercourse. Waste disposal according to EC-regulations 2006/12/EC and 91/689/EEC in the corresponding versions, covering waste and dangerous waste.

14. TRANSPORT INFORMATION

Not classified as hazardous for transport.

Ferrous Sulphate Heptahydrate Solution

Issued: 28/03/2022

15. REGULATORY INFORMATION

| Safety, health and environmental regulations: Observe in addition the national legislative regulations. UK - Requirements in | | |
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| | relation to drinking water treatment chemicals are set out in Regulation 31 of the Water Supply | |
| | (Water Quality) Regulations 2000, as amended (UK only). There are specification limits on | |
| | quality in relation to Ferrous Sulphate under the Drinking Water Inspectorate in the UK. | |
| Chemical Safety Assessment: | A chemical safety assessment has been carried out for this substance and full details of this | |
| | can be found in the formal Chemical Safety Report (CSR) document held by each registrant. | |
| | Details, which were seen to add value, have been included in the relevant sections of this SOS. | |
| | Also see the Annex of this SOS for the relevant exposure scenarios written for Ferrous | |
| | Sulphate. | |
| Note: The regulatory information given above only indicates the principal regulations specifically | | |
| | Applicable to the product described in the safety data sheet. The user's attention is drawn to | |
| | the possible existence of additional provisions which complete these regulations. Refer to all | |
| | applicable national, international and local regulations or provisions. | |

16. OTHER INFORMATION

Hazard and Precautionary Statements according to CLP Regulations (EC)1272/2008):

| Hazard statements: | H290: May be corrosive to metals (only applies to aqueous solutions). |
|---------------------------|--|
| | H302: Harmful if swallowed. |
| | H315: Causes skin irritation. |
| | H319: Causes serious eye irritation. |
| Precautionary statements: | P264: Wash hands and exposed skin thoroughly after handling. |
| | P280: Wear protective gloves/protective clothing/eye protection/face protection. |
| | P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. |
| | P302+P352: IF ON SKIN: Wash with plenty of soap and water. |
| | P305+P351 +P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove |
| | contact lenses, if present and easy to do. Continue rinsing. |
| Legal disclaimer: | The information contained in this SDS does not constitute a risk assessment, and should not |
| | replace the user's own assessment of risks as required by other health and safety legislation. |
| | This advice is given by Nexchem Ltd who accept no legal liability for it except otherwise |
| | provided by law. The information contained herein is based on the present state of our |
| | knowledge and is intended to describe our products from the point of view of safety |
| | requirements. It should not therefore be construed as guaranteeing specific properties. |