FERROUS SULPHATE MONOHYDRATE
Safety Data Sheet- MSDS

Update version -IV-

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifiers

Product name : **Ferrous Sulphate Monohydrate**

CAS-No. : 17375-41-6

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

Identified uses : Fertilizer, Feed Additive, Laboratory chemicals, Industrial & for Professional Use only.

OTHER NAMES - In manufacture of iron compounds, in electroplating baths, aluminum etching, process engraving and lithography, in redox polymerization. In fertilizer, as food and feed supplement; in radiation dosimeters, as reducing agent in chemical processes, in leather dyes and writing inks. Component of weed killer, wood preservative, water treatment processes. In prevention of chlorosis in plants. Used therapeutically as hematinic and in veterinary medicine, to combat iron deficiency and as an astringent

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Section 2 - HAZARDS IDENTIFICATION

Hazard Class and Category Code	Acute Tox. 4, Eye Irrit. 2 Skin Irrit. 2, Skin Sens. 1
Hazard Statement	H302, H319, H315, H317

Explanation phrases in section 16

Human Health effects

Skin effect	Slight irritation of the skin is likely to appear.
Eyes effect	Irritation of the eyes felt for long time is likely to appear.
S wallowing	Swallowing of small amount is do not cause toxic effect. Swallowing a large amount leads to nausea, vomiting, diarrhea, drop of blood pressure. Upon absorption of large doses cardiovascular disturbances and toxic action towards liver and kidneys follow.
Inhalation	High concentration of dust in the air may cause cough and irritation of nose and respiratory tract.

Pictogram

GHS07

Signal Word	Warning
Hazard Statement	H302 H319 H315 H317
Precautionary Statement	P270 P280 P301+P312 P302+P352 P305+P351+P338

Other hazards

Iron sulphate is neither a PBT nor a vPvB substance.

Iron sulphate can contain nickel sulphate up to 0.1% (EC Number 232-104-9, CAS 7786-81- 4). This triggers the hazard statement H317. The substance is not included in the list established in accordance with Article 59(1) of Regulation (EC) 1907/2006 for having endocrine disrupting properties, there is no information if the substance is a substance identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

Substances

Iron (II) sulphate monohydrate

By-product from titanium dioxide production by sulphate methods containing as a main component the iron sulphate monohydrate with chemical formula of $FeSO4 * H2O$ (85.5%). Iron content in product as Fe^{+2} is 28.2%. Besides the product contains less than 0.3% of free acids (as sulphuric acid).

Dangerous ingredient	CAS number	EC number (EINECS)
Iron (II) sulphate monohydrate	17375-41-6	231-753-5

Iron (II) sulphate contains anti-caking substance (not classified as hazardous) in amount not exceeding 1%.

Section 4 - FIRST AID MEASURES

First aid measures

Description of first aid measures

Inhalation Remove the injured person from the contaminated area. Ensure access to the fresh air. Seek medical help if injured person is not getting better.

Skin contact The contaminated clothes and shoes should be removed and the contaminated skin areas washed with water and soap

Eye contact Rinse eyes profusely for at least 10 minutes with plenty of water. Ensure the proper by separating eyelids with fingers. If the irritation persists, provide medical assistance.

Swallowing Give plenty of water to drink if the injured person is conscious. Cause vomiting. Give medical assistance if injured is not getting better.

Most important symptoms and effects, both acute and delayed

Ingestion of large amounts leads to nausea, vomiting, diarrhea, drop in blood pressure. Cardiovascular disorders and toxic effects on the liver and kidneys occur after taking large amounts

Indication of any immediate medical attention and special treatment needed

Medical assistance is needed in case of inhalation of large amounts of dust.

Section 5 - FIRE FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media	Inflammable substance. Use extinguishing means suitable for materials stored in the immediate neighborhood.
Unsuitable extinguishing media	No data

Special hazards arising from the substance or mixture mixture Fire and products of thermal decomposition

Inhalation of vapors and gases produced during thermal decomposition may cause irritation and may be corrosive to the respiratory system. The effect on lungs may be delayed. Fire and heating When heated the product loses crystalline water. In case of fire, a toxic thermal decomposition products containing Sulphur oxides may be released.

In case of inhalation of the burning product
Persons exposed to inhalation of vapors and gases produced during decomposition should immediately obtain the medical assistance.

When the product is exposed to the fire
Call the fire brigade. Keep safe distance. Avoid inhalation of the vapors and gases. Evacuate in direction perpendicular to direction of the wind. Use suitable respiratory protection equipment (RPE) during fire extinguishing. Use plenty of water. Open the doors and windows of the production / storage room to give maximum ventilation. If water containing dissolved product enters any drains or watercourse, inform local authorities immediately.

Advice for firefighters
Standard protective equipment for firefighters

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
When there is excessive dust wear dustproof goggles and masks to protect the respiratory system.

Environmental precautions
Maintain caution, to avoid contamination of water and sewage system. Inform the local authority if accidental contamination occurs.

Methods and material for containment and cleaning up
Any spillage of iron (II) sulphate should be cleaned up promptly (avoiding dusting) and placed in a clean, labelled container for safe disposal (recycling or neutralization) according to the rules and regulations of environmental protection.

Reference to other sections
Information about personal precautions - see Section 8. Information about waste disposal see Section 13.

Section 7 - HANDLING AND STORAGE

Precautions for safe handling
Handling of product can cause dust formation and eventually dust breathing. Transport and handling system should reduce dust generation to a minimum. Avoid excessive generation of dust. Avoid unnecessary exposure to atmosphere to prevent moisture absorption. While handling with the product wear protective clothes, protective gloves, protective glasses of goggle type and anti-dust masks of FFP2 or FFP3 class depending on dust concentration.

Conditions for safe storage, including any incompatibilities
Keep the product away from heat sources and fire. Ensure high quality of cleaning in storage facilities. Storage buildings should be dry and well ventilated.

Specific end use(s)
Exposure scenarios for identified uses are attached to this safety data sheet.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

		Iron sulphate ($FeSO_4$)	Iron sulphate monohydrate ($FeSO_4*H_2O$)
Acute systemic effects	**Dermal**	1.6 mg/kg bw/d	1.7 mg/kg bw/d
Acute systemic effects	**Inhalation**	5.5 mg/m³	6.1 mg/m³
Systemic long-term effects	**Dermal**	1.6 mg/kg bw/d	1.7 mg/kg bw/d
Systemic long-term effects	**Inhalation**	5.5 mg/m³	6.1 mg/m³

DNELs for the general population

		Iron sulphate ($FeSO_4$)	Iron sulphate monohydrate ($FeSO_4*H_2O$)	Iron sulphate heptahydrate ($FeSO_4*7H_2O$)
Acute systemic effects	**Oral**	0.79 mg/kg bw/d	0.88 mg/kg bw/d	1.4 mg/kg bw/d
Acute systemic effects	**Dermal**	0.79 mg/kg bw/d	0.88 mg/kg bw/d	1.4 mg/kg bw/d
Acute systemic effects	**Inhalation**	1.36 mg/m³	1.5 mg/m³	2.5 mg/m³
Systemic long-term effects	**Oral**	0.79 mg/kg bw/d	0.88 mg/kg bw/d	1.4 mg/kg bw/d
Systemic long-term effects	**Dermal**	0.79 mg/kg bw/d	0.88 mg/kg bw/d	1.4 mg/kg bw/d
Systemic long-term effects	**Inhalation**	1.36 mg/m³	1.5 mg/m³	2.5 mg/m³

PNEC[2]

	Iron sulphate ($FeSO_4$)	Iron sulphate monohydrate ($FeSO_4*H_2O$)	Iron sulphate heptahydrate ($FeSO_4*7H_2O$)
PNEC STP	1360 mg/L	1520 mg/L	2483 mg/L
PNEC Sediment (freshwater)	137 g/kg dry weight	150 g/kg dry weight	246 g/kg dry weight
PNEC Sediment (marine water)	137 g/kg dry weight	150 g/kg dry weight	246 g/kg dry weight
PNEC soil	151 g/kg dry weight	169 g/kg dry weight	276 g/kg dry weight

Exposure controls

Prevent excessive dust formation and provide local exhaust ventilation where it's necessary.

Personal protection measures

Eye protection	If the concentration of dust may be exceeded, it is recommended to use goggles to protect against dust or glasses with side walls (adhering tightly to the eyes).
Skin protection	Observe the principles concerning protective clothing when handling chemicals. Protect your skin by wearing appropriate clothing, eg overalls.
Hand protection	Avoid prolonged exposure through appropriate impervious gloves.
Respiratory protection	If dust concentrations exceed the permissible concentration in the working environment, use the mask. It is recommended to use FFP2 or FFP3 type dust masks depending on the dust concentration.

Environmental exposure controls See section 6.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

State of the substance at 20°C and 101.3 kPa	Solid
Melting/freezing point	anhydrous 300°C (decomposes without melting) monohydrate 300°C (water loss) heptahydrate 60ºC (water loss)
Boiling point	Data not required
Relative density	anhydrous: 3.65 g/cm³ monohydrate 3.0 g/cm³ heptahydrate 1.895 g/cm³
Water solubility	Anhydrous above 400 g/L at ambient conditions. Monohydrate and heptahydrate 295 g/L in 25ºC
Vapor pressure	Data not required
Surface tension	Data not required Not applicable or appropriate for this substance

Partition coefficient n-octanol/water

Dissociation constant	pKa = 3.05
Oxidizing properties	Negative (READ ACROSS)
Flash-point	Data not required
Flammability	Negative (READ ACROSS)

Explosive properties	Data not required
Self-ignition temperature	Negative (READ ACROSS)
Stability in organic solvents and identity of relevant degradation products	Data not required
Viscosity	Data not required

Other information

No other information.

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

Reactivity

Non-reactive during storage, use and application in normal conditions.

Chemical stability

Depending on storage conditions may occur moisture absorption from the air. Therefore, the storage time should be as short as possible.

Possibility of hazardous reactions

Sulphur oxides.

Conditions to avoid

Humidity. Hygroscopic substance. Heating above the temperature of thermal decomposition (> 600°C). Sulphur oxides formation.

Incompatible materials

Bases, soluble carbonates, strong oxidizing agents.

Hazardous decomposition products

Unknown.

Section 11 - TOXICOLOGICAL INFORMATION

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

		Iron sulphate ($FeSO_4$)	**Iron sulphate monohydrate ($FeSO_4*H_2O$)**
Acute toxicity *	$LD50^3$ oral (rat) (OECD 423)	598 mg $FeSO_4$/kg bw	669 mg $FeSO_4*H_2O$/kg bw
	LD50 dermal (rat) (OECD 402)	> 2396 mg $FeSO_4$/kg bw	> 2678 mg $FeSO_4*H_2O$/kg bw
Irritation/ Corrosivity	skin	Irritation	
	eye	Irritation	
Repeated dose toxicity **	$NOAEL^4$ oral (rat, 90 days)	155 – 177 mg $FeSO_4$/kg bw/90 days	173 – 180 mg $FeSO_4*H_2O$ /kg bw/90 days
Mutagenicity	Genetic toxicity: negative		
Carcinogenicity	There are no carcinogenicity data for iron sulfate, but based on data available for the iron trichloride salt it is not expected to be carcinogenic.		
Toxicity for reproduction	≥1000 mg/kg bw/day (rat) (≥200 mgFe/kg bw/day) (Iron (II) sulphate heptahydrate)		

Data were derived by read-across from related substances Ferrous chloride

** Data were derived by read-across from related substances Ferric chloride hexahydrate

Information on other hazards

No information is available on endocrine disrupting properties according to the criteria set out in the relevant Regulations ((EC) No 1907/2006, (EU) 2017/2100, (EU) 2018/605).

Section 12 – ECPLOGICAL INFORMATION

Toxicity

Iron sulphate does not fulfill the T criteria. Data are not accessible by standard test methods. Under standard test conditions, the ferrous ion, Fe^{2+}, is unstable and is oxidized to the ferric, Fe^{3+}, ion. Ferric iron salts have a high rate of conversion to insoluble ferric hydroxide, in consequence, Fe^{2+} is to a great extent removed from the test system. Furthermore, iron plays an important role in biological processes, with iron homeostasis being under strict control.
In conclusion, iron is not considered to be toxic to the aquatic environment under normal conditions.
The derivation of a realistic PNEC for the aquatic compartment is therefore not considered feasible.

Persistence and degradability

Iron sulphate does not fulfill the P nor vP criteria.

Bio accumulative potential

Iron sulphate does not fulfill the B nor vB criteria.

Mobility in soil

Soluble in water.

Results of PBT and vPvB assessment

Iron sulphate is neither a PBT nor a vPvB substance.

Endocrine disrupting properties

No information is available on endocrine disrupting properties according to the criteria set out in the relevant Regulations ((EC) No 1907/2006, (EU) 2017/2100, (EU) 2018/605).

Other adverse effects

No data.

Section 13 - DISPOSAL INFORMATION

Waste treatment methods

Product remains, including packaging wastes, should be transferred to the specialized companies with an appropriate waste management permit. In case of spill of iron (II) sulphate, see - Section 6 of the safety data sheet.

Section 14 - TRANSPORT INFORMATION

Dry iron (II) sulphate is sent in “big-bag” packages of 500 or 1000 kg or loaded in bulk on lorries, tank lorries or ships. It is not classified, that means it is not considered as a dangerous material according to Orange Book of UN and international transport codes, eg. RID (railway), ADR (roads transport) and IMDG (see transport).

UN number or ID number

Not applicable

UN proper shipping name

Not applicable.

Transport hazard class(es)

Not applicable.

Packing group

Not applicable.

Environmental hazards

Not applicable.

Special precautions for user

Not applicable.

Maritime transport in bulk according to IMO instruments

Not applicable.

Section 15 - REGULATORY INFORMATION

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

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18th December 2006 concerning Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EEC and 2000/21/EC. *(Official Journal of the European Union of 30.12.2006, L 396. with later changes)*
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labeling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 *(Official Journal of the European Union of 31.12.2008, L 353. with later changes)*

15.2. Chemical safety assessment

The chemical safety assessment has been made.

Section 16 - OTHER INFORMATION

H phrases	H302 - Harmful if swallowed H319 - Causes serious eye irritation. H315 - Causes skin irritation. H317 - May cause an allergic skin reaction
P phrases	P270 - Do no eat, drink or smoke when using this product. 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.
Category	Acute Tox. 4 - Acute toxicity category 4
Code(s)	Eye Irrit. 2 - Eye irritation category 2 Skin Irrit. 2 - Skin irritation category 2 Skin Sens. 1 - Skin sensitization category 1
Training	Employees should be trained in the proper substance handling. Read the safety data sheet before use.
Changes	Section 1-3, 5-9, 11, 12, 14-16. Safety Data Sheet amended in accordance with Regulation (EU) No. 2020/878.

Disclaimer:

This SDS is provided by DRON INDUSTRIES for safety guidance only and does not replace the user's own ER risk assessment as required by applicable health and safety laws. Information is based on current knowledge and describes safety aspects of the product only. No guarantees are made regarding specific product properties. DRON IDNSUTRIES accepts no legal liability except as required by law.

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