MATERIAL SAFETY DATA SHEET FERRIC CHLORIDE SOLUTION

1. Chemical Product Identification

Trade name	Ferric Chloride Solution
Chemical family	Inorganic Chloride Solution
Chemical name	Ferric Chloride Hexahydrate Solution
Synonyms	Iron (III) Chloride Hexahydrate Solution
Chemical abstracts no.	7705-08-0 (Anhydrous), 10025-77-1 (hexahydrate)
NIOSH No.	LJ9150000
HAZCHEM CODE	2R
UN No.	2582

2. Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ferric chloride	See Section 1	42.5–44.0% m/m

EEC CLASSIFICATION	Not available
RISK PHRASES	R22: Harmful if swallowed

R34: Causes burns.

R41 Risk of serious damage to eyes

SAFETY PHRASES	S1/2: Keep locked up and out of reach of children.

S7/8: Keep container tightly closed and dry.

.

S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

S28: After contact with skin, wash immediately with plenty of water.

S39 Wear eye/ face protection.

S45: In case of accident or if you feel unwell, seek medical advice immediately, show label where possible

3. Hazards Identification

Main Hazards Primary routes of exposure: Skin or eye contact, inhalation. Mists are extremely corrosive to the nose, throat, and mucous membranes. Bronchitis, pulmonary oedema, and chemical pneumonitis may occur. Irritation, coughing, chest pain, and difficulty in breathing may occur with brief exposure while prolonged exposure may result in severe irritation and tissue damage. Liquid and mists may severely irritate, burn, or damage the eyes. Brief contact with liquid will cause irritation. Prolonged or repeated exposure may cause burns.

Swallowing the liquid burns the tissues, causes severe abdominal pain, nausea, vomiting, and collapse.

Hazard Rating (NFPA 704)

Health: 2	Hazard Rating Scale:
Fire: 0	0=Minimal 3=Serious
Reactivity: 0	1=Slight 4=Severe
Special: None	2=Moderate

Exposure Limits - TLV, 8 h TWA (ACGIH): 1 mg/m³ , Iron Salts, Soluble, as Fe

Health Effects

Eyes	Eye contact may cause discoloration of eye tissues; eye irritation with discomfort, tearing, or blurring of vision; or eye corrosion with corneal or conjunctival ulceration.

Skin	Skin contact may cause skin irritation with discomfort or rash; or skin burns or ulceration. The compound has been infrequently associated with skin sensitization in humans.
Ingestion	May cause corrosive damage to the gastrointestinal tract. Repeated ingestion of sub-lethal doses can lead to excessive deposition of iron in the tissues with liver and pancreatic damage. Higher ingestion exposures may lead to abnormal liver function with nausea or vomiting, reduced appetite, or abdominal pain, lethargy, nausea, vomiting, tarry stools, diarrhoea, fast and weak pulse, hypotension, dehydration, acidosis, and coma.
Inhalation	Inhalation overexposure may cause irritation of the upper respiratory passages with coughing.
Additional Medical Information	Individuals with pre-existing diseases of the liver may have increased susceptibility to the toxicity of excessive exposures.
Carcinogenicity	Ferric chloride is not listed by IARC, NTP, OSHA, or ACGIH as a carcinogen. Tests in animals demonstrate no carcinogenic activity

Mutagenicity Tests in bacterial and mammalian cell cultures demonstrate no genetic damage.

Reproductive Hazards	No data available.

4. First Aid Measures

Eye	In case of contact, immediately flush eyes with plenty of water for at least 30 minutes, lifting the upper and lower eyelids occasionally. Get immediate medical attention.
Product on skin	in case of contact, immediately wash skin with running water for 15 minutes. Remove contaminated clothing and shoes, wash before reuse. Get immediate medical attention.
Product ingested	If swallowed, do not induce vomiting. If conscious, give lots of water or milk, or milk of magnesia to drink. Do not give anything by mouth to an unconscious or convulsing person. Get immediate medical attention.
Product inhaled	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give medical oxygen. Get immediate medical attention.

5. Fire Fighting Measures

Extinguishing media Ferric Chloride solutions will not burn or support combustion. Use media appropriate for surrounding material.

Special hazards	May generate flammable, potentially explosive hydrogen gas on contact with metals.
Protective clothing	Fire fighters should wear self- contained breathing apparatus and full protective clothing.
Other information	Use water spray to cool nearby containers and structures exposed to fire.

6. Accidental Release Measures

Personal precautions	Restrict access to area until completion of the clean-up. Ensure clean-up is conducted by trained personnel only.

Wear acid-resistant slicker suit and complete protective equipment including suitable eye protection, rubber gloves, rubber boots, and a self-contained breathing apparatus in the pressure demand mode or a supplied-air respirator.

If the spill or leak is small, a full face- piece air-purifying cartridge respirator equipped for acid gases may be satisfactory.

Environmental precautions	Keep non-neutralized material out of sewers, storm drains, surface waters, and soil.

Clean-up methods

Small Spills	contain; neutralize spill with lime or soda ash. Mop or wipe up and dispose of in approved waste containers. Flush area with water.
Large spills	Contain by diking with soil or other non-combustible absorbent material and carefully neutralize with soda ash or lime. If soda ash is used, provide adequate ventilation to dissipate the carbon dioxide gas produced.

Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate state and local regulatory agencies to ascertain proper disposal procedures.

Flush area with water to waste treatment system.

7. Handling and Storage

Suitable materials	Store in rubber-lined steel, suitable GFPR or plastic tanks.

Unsuitable materials Do not store in containers constructed of aluminium/aluminium alloys, carbon steel, stainless steel, or copper/copper alloys.

Handling/storage precautions	Store in a cool, dry, well-ventilated place, away from all other chemicals and potential sources of contamination. Keep containers tightly closed when not in use. Do not use pressure to empty containers.

Wash thoroughly after handling. Do not get in eyes, on skin, or on clothing.

Do not cut, grind, weld, or drill on or near this container.

8. Exposure Controls/Personal Protection

Occupational exposure standards

HSE	No data available.
MAK	No data available.
ACGIH T	LV: 1 mg/m³ , Iron Salts, Soluble, as Fe - 8 h TWA
Engineering control measures	Use local mechanical exhaust ventilation capable of minimizing emissions at the point of use to keep employee exposure below recommended exposure limits.
Personal protection - respiratory	Wear a NIOSH/MSHA approved air purifying respirator with an acid gases /mist cartridge or canister if there is potential for exposure to mists more than applicable limits. Under severe conditions a self-contained breathing apparatus in the pressure demand mode, or a supplied-air respirator may be necessary.
Personal protection – hand	Avoid contact with this chemical. Wear rubber gloves.
Personal protection – eye	Wear safety glasses with side shields. Wear a face shield/chemical splash goggle combination if there is any possibility of eye or face contact due to splashing or spraying of the material.
Personal protection - skin	Wear rubber gloves, boots, apron, and acid resistant trousers and jacket.

Other protective measures	An eyewash and safety shower should be nearby and ready for use.

9. Physical and Chemical Properties

Appearance	brown liquid
Odour	slightly acrid
pH	less than 1
Boiling point/range	~ 106°c at 760 mm hg.
Melting point/range	~-50°c
Flash point	not flammable.
Flammability	not applicable.
Auto flammability	not applicable
Explosive properties	none
Oxidizing properties	none
Vapor pressure	~40 mm hg at 35°c.
Density	1,45 g/cm³ at 20°c
Solubility - water	100 % m/m

10. Stability and Reactivity

Stability:	Stable.
Conditions to avoid:	Alkalis and metals
Incompatible materials	Rapidly corrodes most metals; may generate flammable, potentially explosive hydrogen gas. Avoid contact with nylon, aluminium/aluminium alloys, carbon steel, stainless steel, and copper/copper alloys.

Hazardous decomposition products: Thermal decomposition may liberate hydrogen gas and hydrogen chloride gas.

Polymerization:	Will not occur.

11. Toxicological Information

Acute toxicity	No human oral toxicity data available.
Animal data:	Oral ld50(rat): 900 mg/kg Toxic effects in animals from repeated exposures by ingestion include reduced weight gain, elevated serum iron levels, increased red blood cell counts, and iron deposition in many organs

Skin and eye contact No human data available. In animals, this compound is a skin and eye irritant.

Carcinogenicity	Ferric chloride is not listed by iarc, ntp, osha, or acgih as a carcinogen. Tests in animals demonstrate no carcinogenic activity.
Mutagenicity	Tests in bacterial and mammalian cell cultures demonstrate no genetic damage. Reproductive toxicity No data available.

12. Ecological Information

Aquatic toxicity - fish	96-hour LC50, fathead minnows: 61 mg/l
Aquatic toxicity - daphnia	Not applicable
Aquatic toxicity - algae	Not applicable
Biodegradability	Not applicable
Bioaccumulation	Not applicable.
Mobility	Not applicable

13. Disposal Considerations

Disposal methods	This material is highly corrosive. Disposal must be made in accordance with the applicable government regulations at approved chemical dumpsites.

Disposal of packaging Empty containers can contain residues, gases and mists and are subject to proper waste disposal.

Always obey hazard warnings and handle empty containers as if they were full.

14. Transport Information

UN No.	2582

Substance Identity No.

ADR/RID Class	8
ADR/RID Item No.	Not applicable
ADR/RID Hazard Identity No.	80
IMDG - Shipping Name	Ferric Chloride Solution
IMDG - Class	8, Corrosive
IMDG - Packaging Group	III
IMDG - Marine Pollutant	Corrosive

IMDG - EMS No.

IMDG - MFAG Table No.

IATA - SHIPPING NAME	Ferric Chloride Solution
IATA - CLASS	8
IATA - Subsidiary Risk(S)	Corrosive, Packaging Group III
ADNR - Class	Not applicable
UK - Description	Not applicable
UK - Emergency Action Code	Not applicable
UK - Classification	Not applicable

TREMCARD No.

15. Regulatory Information

EEC Hazard Classification	Not applicable
Risk Phrases	R22 Harmful if swallowed

R34: Causes burns.

R41 Risk of serious damage to eyes.

Safety Phrases	S1/2: Keep locked up and out of reach of children.

S7/8: Keep container tightly closed and dry.

S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S28: After contact with skin, wash immediately with plenty of water.

S39 Wear eye/ face protection.

S45: In case of accident or if you feel unwell, seek medical advice immediately, show label where possible.

National Legislation	Hazardous Substances Act 15 of 1973 and Regulations, Occupational Health and Safety Act 85 of 1993,

16. Other Information

CAS No.	7705-08-0 (anhydrous), 10025-77-1 (hexahydrate)
EINECS No.	231-729-4
EEC ANNEX 1 No.	Not applicable
MITI No.	Not applicable

FDA LIST No.	Not applicable
LISTING - TOSCA	Not applicable

EXCLUSION OF LIABILITY “All information and instructions provided in this Material Safety Data Sheet (“MSDS”) in respect of the substance is given solely in terms of the provisions of the Occupational Health and Safety Act No 85 of 1993 and Regulations (“the Act”), is based on scientific and technical knowledge as at the date indicated on this MSDS and is presented in good faith to be correct.

The information and instructions provided in this MSDS apply only to the substance in its present form and not to any formulation or mix, in which event it is the sole responsibility of the user of the substance as formulated and/or mixed to investigate and establish any danger which may arise out of its use, wherever such user may be situated.

It is the sole responsibility of the person in receipt of this MSDS, wherever such recipient may be situated, to ensure that the information provided is communicated to and understood by any person who may come in contact with the substance in any place and in any manner whatsoever. If such recipient produces formulations or mixes using the substance, then it is such recipient’s sole responsibility to comply with the provisions of the Act in respect of the provision of the necessary MSDS, or to comply with any other applicable legislation.”