SAFETY DATA SHEET

FERROUS CHLORIDE SOLUTION

Reg. No. 2001/019171/07

SDS 009/R03
2018-11-30

Safety Data Sheet (SDS) According to ISO / SANS 11014:2009/10, UN Transport of Dangerous Goods, UN Globally Harmonised System of Classification & Labelling and EC Directive 1272/2008

SECTION 1. Identification – Chemical Product and Company

Trade Name	:	Ferrous Chloride
Chemical Name / Proper Shipping Name:	:	Iron (II) Chloride Solution
UN Number	:	1760 (Corrosive Liquid, n.o.s)
CAS Number	:	7758-94-3
GHS Product Identifier	:	Iron Dichloride
Chemical Family	:	Inorganic mono constituent substance
EC Number	:	231-843-4
IUPAC Name	:	Iron (II) chloride
Other means of identification	:	Dark orange to brown Liquid
Recommended use of the chemical	:	Coagulation of raw and effluent waters, precipitation of phosphate in sewage treatment, precipitation of heavy metals and chrome (VI) reduction.
Restrictions on use	:	Not for retail or domestic use, nor use by untrained persons
Supplier's details	:	NCP Chlorchem (Pty) Ltd
Address	:	Cnr. Allandale Road and Chloor Road Chloorkop, Gauteng, South Africa:
Telephone No.	:	+27 (0) 11 976 2115
24hour Emergency phone number	:	+27 (0) 11 976 2115

SECTION 2. Hazards Identification

Commented [PG1]:

Hazard classes/Hazard categories **Transport – Class 8** Corrosive substance	**GHS Hazard Statement**
Acute Toxicity Oral Category 4	H302: Harmful if swallowed.
Skin Corrosion Irritation Category 2	H315 Causes skin irritation
Skin Sensitivity Category 1	H317: May cause an allergic skin reaction.
Eye damage / eye irritation Category 1	H318: Causes serious eye damage.
Metal Corrosion Category 1	H290: May be corrosive to metals

GHS classification of the substance: Corrosive liquid, acidic, inorganic, n.o.s. (Iron Dichloride, Iron II Chloride).
The most important adverse effects to know in emergency are –Oral Toxicity and Skin Corrosion

GHS label elements, including precautionary Statements:

Regn No 2003/071152/07

GHS 05 Corrosion

GHS 07 Exclamation Mark – **Warning**
- Skin Corrosion Irritation
- Skin Sensitivity
- Eye damage / eye irritation
- Metal Corrosion

Signal word: Danger

Hazard Statements – this substance is harmful if swallowed, causes serious eye damage, may be corrosive to metals, causes skin irritation and may cause an allergic skin reaction.

Precautionary statements:
P261: Avoid breathing dust/fume/gas/mist/vapours/spray.
P264: Wash hands thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P272: Contaminated work clothing should not be allowed out of the workplace.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P301+P312: IF SWALLOWED: Call a POISON CENTER/doctor/... if you feel unwell.
P302+P352: IF ON SKIN: Wash with plenty of 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.
P310: Immediately call a POISON CENTER/doctor/…
P321: Specific treatment (see ... on this label).
P330: Rinse mouth.
P333+P313: If skin irritation or rash occurs: Get medical advice/attention.
P362+P364: Take off contaminated clothing and wash it before reuse.

Response:
Refer Sections 5, 6 and 8

Storage:
Refer Section 7

Special Labelling requirements – refer Section 14 for transport labels

Main hazards
This substance is harmful if swallowed, causes serious eye damage, may be corrosive to metals, causes skin irritation and may cause an allergic skin reaction.

SECTION 3. Composition/information on ingredients

Chemical identity	:	Inorganic Substance
Other means of identity	:	Dark green to brown clear liquid
Common name, synonyms, etc.	:	Iron Dichloride
CAS number	:	7758-94-3
EC number	:	231-843-4
IUPAC names	:	Iron (II) chloride
Impurities and stabilizing additives	:	Hydrochloric Acid < 1%

Ingredient name	UN Number	CAS number	% m/m	EC List number
Ferrous Chloride	1760	7758-94-3	0 – 0.5	231-843-4
Ferric Chloride	2582	7705-08-0	42.5 – 44.0	231-729-4
Water		7732-18-5	Max 80	231-791-2

SECTION 4. First Aid Measures

Product in eye
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling for medical assistance. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes for medical assistance even if no symptoms (such as redness or irritation) develop.

Product on skin
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY transport for medical treatment after washing the affected areas even if no symptoms (such as redness or irritation) develop

Product ingested
DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call for medical assistance. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. Transport the victim IMMEDIATELY to a hospital or other medical facility for attention

Product inhaled
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call for medical assistance and be prepared to transport the victim to a hospital or other medical facility for attention.

Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

SECTION 5. Fire Fighting Measures

Suitable extinguishing media if involved in a fire

- Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Direct water stream will scatter and spread flames and therefore should be avoided.
- Special exposure hazards in a fire includes hydrogen chloride that may be released when heating above the decomposition temperature.
- Special protective equipment for fire-fighters- In the event of fire, wear self-contained breathing apparatus. Fire fighters must wear fire resistant personnel protective equipment.

NFPA hazard rating

• **Fire: 0**	material that will not burn
• **Health: 3**	material which on exposure could cause serious, temporary or moderate residual injury
• **Reactivity: 1**	Normally stable, even under fire exposure conditions, and are not reactive with water.

ERG - Emergency Response Guide 2016 and SANS 10232 - 3 Guide 156 & 157
Small Fire - immediate response action should quickly put out the fire• CO_2, dry chemical, dry sand, alcohol-resistant foam can be used.

Large fires – evacuate area, move containers out and away from fire if can be done safely without increasing risk. Isolate and contain fire as much as possible, and dike or use inert material to contain run-off water for later disposal. Do not scatter the material. Water spray, fog or alcohol-resistant foam. Do not use straight streams.

Special hazards:

- Reaction with water or moist air may release toxic, corrosive or flammable gases.

- Reaction with water may generate much heat that will increase the concentration of fumes in the air.
- Fire will produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.
- Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars, etc.).
- Substance may react with water (some violently), releasing corrosive and/or toxic gases and runoff.
- Contact with metals may evolve flammable hydrogen gas.
- Containers may explode when heated or if contaminated with water.

Protective clothing - Wear full protective clothing and self-contained, positive breathing apparatus for large fires.

NB: Prompt actions can stop small fires but large fires involving chemicals require professional Emergency Response teams

SECTION 6. Accidental Release Measures

Personal precautions

Avoid breathing fumes from burning material. Keep upwind and avoid bodily contact with the material. Do not handle broken packages unless wearing appropriate personal protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water.

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 surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Neutralize with agricultural lime (CaO), crushed limestone ($CaCO_3$) or sodium bicarbonate ($NaHCO_3$).

Clean-up methods

Small Spills:

All equipment used when handling the product must be grounded. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Use clean, non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.

Large Spills:

All equipment used when handling the product must be grounded. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop the leakage e.g. by shutting valves, if this can be done safely. Collect leaking product in suitable acid-proof containers. A vapor-suppressing foam may be used to reduce vapors. DO NOT GET WATER IN
SIDE CONTAINERS. Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material. Prevent entry into waterways, sewers, basements or confined areas.

GHS Disposal Precautionary Statement - P501 dispose of product and containers in accordance with SA National and / or regional Regulations refer National Environmental Management: Waste Act.

SECTION 7. Handling and Storage

Storage requirements

Regn No 2003/071152/07

Store in a cool well-ventilated area that is out of direct sunlight and away from fire hazards to avoid high temperatures.
Store away from incompatible products.
Avoid freezing.

Handling precautions
The work place and work methods shall be organized in such a way that direct contact with the product is prevented or minimized. 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. Eating, drinking and smoking shall be prohibited in areas where chemicals are handled, stored or processed. Workers must wash hands before eating, drinking or smoking to remove any chemicals that could be ingested or inhaled. Remove contaminated clothing and protective equipment before entering eating areas. Use handling equipment (pumps, hoses, etc.) compatible with product, i.e., polyethylene, polypropylene, PVC, Teflon, rubber, FRP, and titanium. Avoid contact with bare metals other than titanium.

Conditions for Safe Storage - refer SANS 10263: The Warehousing of dangerous goods, and
10263 - Part 8 The storage and handling of corrosive substances, for more specific information and relevant regulations and recognised practices for storage, warehousing and handling.

GHS Precautionary Statement P406 store in corrosion resistant containers.

Suitable materials
Packaging material - Plastic (PE, PP, PVC), Fiberglass-reinforced polyester, Epoxy-coated concrete, Titanium, Acid-proof or rubber-coated steel.

To be avoided:
Non-acid-proof metals (such as aluminium, copper and iron)
Bases
Unalloyed steel
Galvanized surfaces
Do not store together with incompatible materials

Unsuitable materials
Mild steel, iron, copper, aluminum and alloys. Bases, unalloyed steel and galvanized surfaces.

SECTION 8. Exposure Controls/Personal Protection

Control parameters e.g. occupational exposure limit values or biological limit values:

Ingredient name		Recommended Exposure limits – (NIOSH)
Ferrous Chloride and Ferric Chloride		TWA = 1 mg/m3 - Iron salts, soluble, as Fe

NIOSH = National Institute for Occupational Safety and Health

American Conference of Governmental Industrial Hygienists (ACGIH): TLV (TWA) =1 mg/m3; as soluble Fe salts.

Engineering control measures: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Provide adequate general and local exhaust ventilation.

Respiratory protection: In the event of exposure to fumes and mist use filter masks with filter type E. Be aware of the filter capacity and the use-time limitation. When exposed to high concentrations or unknown exposure or prolonged activity self-contained breathing apparatus maybe required.

Hand protection:
- Protective gloves should conform to EN 374 requirements.
- Suited glove material: butyl rubber, chloroprene rubber. neoprene. polyethylene. PVC.
- The suitability of a specific glove of a supplier has to be determined depending on the use conditions (chemical, mechanical, thermal stress, and use/contact time)

Eye and face protection:
- Tightly fitting safety goggles or safety glasses with side protection shield that conforms to EN 166.
- Full face mask.

Skin and body protection:
- Acid-resistant safety shoes with high tops and clothing that covers the whole body.

General protective and hygiene measures:
- Avoid contact with skin and eyes.
- Do not inhale gas or aerosol (mist).
- Apply PPE as required.
- Remove contaminated clothing immediately.
- Wash hands immediately after handling chemicals and before breaks.
- Do not eat, drink and smoke at work, keep away foodstuffs and beverages.
- Wash hands immediately after handling chemicals and before breaks.
- Do not eat, drink and smoke at work, keep away foodstuffs and beverages.

SECTION 9. Physical and Chemical Properties

Appearance	Greyish white (Commercial product usually contains about 20 % water and is yellowish in colour.)
Odour	Slightly pungent
pH	<1 - acidic
Boiling point/range	104 - 105 °C @ 101.3kPa
Melting point/range	Not Applicable
Flash point	Not applicable
Flammability	Not flammable
Explosive properties	Not applicable
Oxidising properties	None
Vapour pressure	20.0 hPa at 20 °C.
Density	min 1.25 @ 20°C
Viscosity	3 - 8**mPa s**
Solubility - water	Complete

SECTION 10. Stability and Reactivity

Stability: Stable under normal storage and handling conditions. Containers may burst when heated.

Conditions to avoid:
Reaction with acids could result in dangerous decomposition reaction.
Heat, flames, sparks and other sources of ignition.
Dangerous gases may accumulate in confined spaces.
May ignite or explode on contact with combustible materials.
Containers may explode when heated.

Incompatible materials:
- Includes strong oxidisers, strong bases and acids, ethylene oxide, potassium and sodium
- Reacts with Alkali and organic bases with violent evolution of heat

- Reacts with strong oxidants (bleaching agents, conc. H_2O_2, HNO_3, etc. and their salts, chromates, permanganates) with the evolution of toxic chlorine gas.
- Forms shock sensitive explosive mixtures with some metals (e.g. potassium; sodium).
- May cause ethylene oxide to rearrange or polymerise and liberate heat.
  Reacts violently with alcohols, strong oxidants and strong reducing agents. Attacks many metals in the presence of water. On combustion, forms toxic and corrosive gases including hydrogen chloride.
- Corrosive to common construction metals with evolution of highly flammable hydrogen gas,

Hazardous decomposition products:
Thermal decomposition or combustion may liberate corrosive gases or fumes that could include Hydrogen Chloride, Chlorine and, Ferric Oxide.

SECTION 11. Toxicological Information

Acute toxicity	Result	Species	Dose/ Exposure	Caution
Oral	Abdominal pain, vomiting or diarrhoea.	Rat	LD50 220 - 2000 mg/kg bw	Do not ingest the product
		Mouse	LD50 440-1300 mg/kg bw	Avoid skin contact

GHS – EU Group Classification, and C & L Inventory:
- **Acute Toxicity** : Oral H302: Harmful if swallowed.
- **Skin Corrosion Irritation** H315 Causes skin irritation
- **Skin Sensitivity** H317: May cause an allergic skin reaction.
- **Eye damage / eye irritation** H318: Causes serious eye damage.

Potential Acute Health Effects:
- Eye contact: irritation or burns can occur.,
- Skin contact: Corrosive – irritates or burns the skin.
- Inhalation can irritate the nose and throat.
- Ingestion:
- Burns of the esophagus and stomach

Delayed Effects:
- **Skin contact or inhalation**: effects may be delayed.

Potential Long-Term Effects:
- **Eye Contact**: Prolonged contact may cause brown discoloration of the eyes. *
- **Ingestion**: Repeated or high-level exposures may lead to too much Iron build-up in the body causing nausea, stomach pain, vomiting, constipation, and black bowel movements. May damage the liver.

Other Potential Health:
- **Germ Cell Mutagenicity**: No data available
- **Carcinogenicity**: Not considered to be carcinogenic by IARC, ACGIH, NTP or OSHA
- **Reproductive Toxicity**: Not Considered to have any significant reproductive effects
- **Aspiration Hazard:** Not available data but inhalation of mist may irritate the respiratory tract

SECTION 12. Ecological Information

Iron speciates once released readily and rapidly transform into naturally occurring forms and therefore, humans and environmental organisms are exposed via the media water, sediment, suspended matter, soil and air.

Regn No 2003/071152/07

GHS – EU Group Classification, and C & L Inventory:
Hazardous to the Aquatic Environment: No evidence- Not Classified
Hazardous to the Ozone layer: No evidence - not Classified
Biodegradability: No data available
Bio-accumulation: No Bioaccumulation Potential
Mobility: No data available

SECTION 13. Disposal Considerations

Disposal methods
Neutralise prior to disposal (pH between 5.5 and 8.5 inclusive). Must undergo physico-chemical treatment prior to disposal. Take all necessary precautions when disposing of this product.
Hazardous Decomposition Products - None under normal use.
Hazardous Reactions Attacks many metals and gives off a highly flammable gas (hydrogen), which creates fire and explosion hazards.
Disposal must be made in accordance with the applicable National and Regional Government regulations at approved and permitted chemical disposal sites – refer to the SA National Environmental Management Waste Act - NEM: WA, its Regulations and local by-laws. This informs permitted Waste Facilities and Service providers see the South African Waste Information Centre sawic.environment.gov.za

Disposal of packaging
Contaminated Packaging - Wash with water
Dispose in compliance with Regulations – see above and Industry Best Practice
Always observe and comply with hazard warnings.

SECTION 14. Transport information

	SANS 10228:2012	IMDG	IATA
UN Number	1760	UN 1760	UN 1760
UN proper shipping name – PSN	Ferrous Chloride	Ferrous Chloride	Ferrous Chloride
Transport Class 8 and hazard - Corrosive			
Packing group - III	Use UN Certified packaging	Use UN Certified packaging	Use UN Certified packaging
Environmental hazards	Not a marine pollutant	IMDG Supplement EmS: F-A & S-B	Refer ICAO & IATA 2015
Additional information			
Emergency Response Guide - ERG 2016	Guide 154 Toxic and/or corrosive/Noncombustible	Refer IMDG 37-14 2014 Supplement & MARPOL	Refer ICAO & IATA 2015

SECTION 15. Regulatory information

OHS Act - Occupational Health and Safety Act 85 of 1993: requires site Risk Assessment and monitoring to inform personnel Health / Biological Monitoring. **Section 9A** requirement to provide MSDS
MHI – Major Hazards Installations Regulations - OHS Act: require site Risk Assessment to ascertain potential impacts outside of the site and potential impacts on the public or neighbours. Copy to be lodged with the Dept Labour, and local Emergency Services.

Regn No 2003/071152/07

Pressure Equipment Regulations - OHS Act: encompasses containers and service equipment
NEMA – National Environmental Management Act 107 of 1998: Duty of Care and Producer Responsibility for products and packaging on a Life Cycle basis. Environmental Impact Assessment Regulations for new installations or proposed increase in capacity over 25%
NEM: WA – National Environmental Waste Act 59 of 2008: Extended Producer Responsibility, requirements and regulations for waste management, classification and disposal
NEM: AQA – National Environmental Air Quality Act 39 of 2004: AQA Licenses and Emissions
National Department of Health – Hazardous Substances Act
EU Directive EC 1272/2008 (EU GHS /CLP) – Safety Data Sheets and Labelling
ECHA – European Chemical Agency Website, Chemical information, C&L Inventory, Chemicals of High Concern (SVHCs) and Chemicals for Community Rolling Action Plan (CoRAP)
ERG 2016 Transport Canada and US Dept Transportation PHMSA - Pipeline and Hazardous Materials Safety Administration

SECTION 16. Other information, including information used for revision of this SDS:

ISO 11014:2009 Safety Data Sheets for Chemical Products – content and order of sections adopted as SANS 11014:2010
UN Recommendations for Transport of Dangerous Goods Model Regulations commonly known as **the "Orange Books"** 18th revision 2013 currently in effect, 19th revision published June 2015
UN Globally Harmonized System of Classification and Labelling of Chemicals – GHS commonly known as **the "Purple Book" 5th** revision 2013 in effect, 6th revision published July 2015
IMDG – International Maritime Dangerous Goods Code, 2014 edition, amendment 37-14
IATA Technical Regulations 56th edition, January 2015

Date of original MSDS : 2003-08-19 Compiled by DD Liebenberg
Date of Revision 01 : 2009-07-06 Compiled by HH Maringa
Date of Revision 02 : 2012-02-23 Compiled by HH Maringa
Date of Revision 03 : 2018-11-30 Compiled by P Govender

Approved as per Management of Change No. 7-12-2016-225

EXCLUSION OF LIABILITY

All information and instructions provided in this Safety Data Sheet (SDS) in respect of the substance is given in terms of the provisions of the Occupational Health and Safety Act No 85 of 1993 and its Regulations. Information is based on best available scientific and technical knowledge as at the date indicated on this SDS, and is presented in good faith to be correct.

The information provided in this SDS apply only to the product in its present form and not to any formulation or mix. It should be used only as directed, and any formulations or other use is at the responsibility of the user of the product as formulated and/or mixed to investigate and establish any hazards or risks which may arise out of its use, wherever such user may be situated.
It is the legal responsibility of the person in receipt of this SDS, wherever such may be situated, to ensure that the information provided is communicated to, and understood by any person who may come in contact with the product in any place and in any manner whatsoever. If such recipient produces formulations or mixes using the product, then it is the recipient's sole responsibility to comply with the provisions of the Act in respect of the provision of the necessary SDS, and/or to comply with any other applicable legislation.