

FERRIC CHLORIDE

415-LIQUID

# Safety Data Sheet

## Section 1: Product and Company Identification

### Product Identifier and Other Means of Identification

**Product Name:** Ferric Chloride**SDS Code:** 415-Liquid**Related Part #:** 415-500ML, 415-1L, 415-4L, 415-20L

### Recommended Use and Restriction on Use

**Use:** Etchant for printed circuit boards and photoengraving processes**Uses Advised Against:** Not available

### Details of Manufacturer or Importer

#### Manufacturer

MG Chemicals  
1210 Corporate Drive  
Burlington, Ontario L7L 5R6  
CANADA

MG Chemicals (Head Office)  
9347-193 Street  
Surrey, British Columbia V4N 4E7  
CANADA

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FAX 1-800-340-0773

E-MAIL: [support@mgchemicals.com](mailto:support@mgchemicals.com)WEB [www.mgchemicals.com](http://www.mgchemicals.com)

☎ 1-905-331-1396

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E-MAIL: [info@mgchemicals.com](mailto:info@mgchemicals.com)E-MAIL (Competent Person): [sds@mgchemicals.com](mailto:sds@mgchemicals.com)

### Emergency Phone Number

**For hazardous material incidents ONLY**—leaks, spills, fires, exposures or accidentsUSA or CANADA: Call CHEMTREC ☎: **1-800-424-9300****For emergencies involving dangerous goods;** Collect 24/7CANADA: Call CANUTEC ☎: **1-613-996-6666** or **\*666** on cellular phones

**FERRIC CHLORIDE**

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**Section 2: Hazards Identification**



**Classification of Hazardous Chemical**

**WHMIS Classification**



E – Corrosive

**GHS Categories**

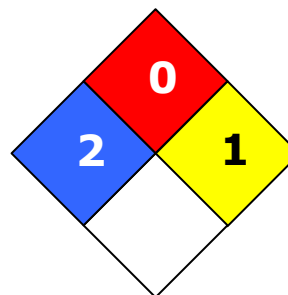
Criteria	Category	Signal Word	Pictograms	
Serious Eye Damage	1B	Danger		
Metal Corrosive	1	Warning		
Skin Irritation	2	Warning		
Environmental Hazard	Acute Aqua. Tox.	3	—	

**Other Classifications**

**HMIS® RATING**

<b>HEALTH:</b>	<b>2</b>
<b>FLAMMABILITY:</b>	<b>0</b>
<b>PHYSICAL HAZARD:</b>	<b>1</b>
<b>PERSONAL PROTECTION:</b>	

**NFPA® 704 CODES**



*Approximate HMIS and NFPA Risk Ratings Legend:*



0 (Low or none); 1 (Slight); 2 (Moderate); 3 (Serious); 4 (Severe)

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**Label Elements**

<b>Signal Word</b>	<b>DANGER</b>
<b>Pictograms</b>	<b>Hazard Statements</b>
	H318: Causes serious eye damage H315: Cause skin irritation H290: May be corrosive to metals
	H402: Harmful to aquatic life
	<b>Precautionary Statements</b>
<b>Prevention</b>	P234: Keep only in original container. P102: Keep out of reach of children. P264: Wash thoroughly after handling. P280: Wear eye protection/face protection/gloves. P273: Avoid release to the environment.
<b>Response</b>	P390: Absorb spillage to prevent material damage. P305 + P351 + P338 + P310: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor P302 + P352 + P362 + P364: IF ON SKIN: Wash with plenty of water. Take off all contaminated clothing and wash it before reuse. P332 + P313: If skin irritation occurs: Get medical advice/attention
<b>Storage</b>	P501: Store in corrosive resistant plastic container with a resistant inner lining.
<b>Disposal</b>	P501: Dispose of contents/container in accordance to local/regional/international regulations.

**Other Hazards**

Not applicable

**FERRIC CHLORIDE**
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**Section 3: Hazardous Ingredients**

CAS #	Chemical Name	Wt%
7705-08-0	iron trichloride (FeCl <sub>3</sub> )	38-40%
7758-94-3	iron dichloride (FeCl <sub>2</sub> )	<1.5%
7647-01-0	hydrochloric acid	<0.8%

**Section 4: First Aid Measures**

<i>Exposure Condition</i>	<i>GHS Code: Precautionary Statement</i>
<b>IF IN EYES</b>	P305
<b>Symptoms</b>	Immediate: <i>burns, severe irritation, redness, pain</i>
<b>Response</b>	P351: Rinse cautiously with water for several minutes. P338: Remove contact lenses, if present and easy to do. Continue rinsing. P310 : Immediately call a POISON CENTRE/doctor
<b>IF ON SKIN</b>	P302
<b>Symptoms</b>	Immediate: <i>redness, pain, brown stain on skin</i>
<b>Response</b>	P352: Wash with plenty of water. P361: Take off immediately all contaminated clothing and wash it before reuse.
<b>If skin irritation occurs</b>	P313: Get medical advice/attention
<b>IF INHALED</b>	P304 ( <i>Not a likely route of exposure under normal use</i> )
<b>Symptoms</b>	Immediate: <i>irritation, cough, sore throat</i>
<b>Response</b>	P340: Remove person to fresh air (out of the contaminated zone) and keep comfortable for breathing.
<b>If feeling unwell</b>	P312: Call a POISON CENTRE/doctor
<b>IF SWALLOWED</b>	P301 ( <i>Not a likely route of exposure under normal use</i> )
<b>Symptoms</b>	Immediate: <i>Abdominal pain, irritation, nausea, vomiting, diarrhea</i>
<b>Response</b>	P330: Rinse mouth. P331: Do NOT induce vomiting. If conscious, give water to drink.
<b>If feeling unwell</b>	P312: Call a POISON CENTRE/doctor

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**Section 5: Fire Fighting Measures**

<b>Auto-ignition Temperature</b>	Not applicable	<b>Flash Point</b> <sup>a)</sup>	Not applicable	<b>LFL [LEL]<sup>b)</sup></b>	Not applicable
				<b>UFL [UEL]</b>	Not applicable

**In case of fire** P370

**Response** Non flammable or combustible: Use extinguishing media suitable for surrounding material.

**Combustion Products** At high temperatures (>200 °C), toxic and corrosive gases including chlorine, hydrogen chloride, and iron oxides are formed.

**Fire-Fighter** Wear self-contained breathing apparatus for fire fighting

**General Information** Prolonged contact with metals in an enclosed space may produce explosive quantities of hydrogen gas.

a) Supplier value for the component with the lowest know flash point

b) LFL = Lower Flammability [or Explosion] Limit (in volume %);

UFL = Upper Flammability [or Explosion] Limit (in volume %)

**Section 6: Accidental Release Measures**

**Personal Protection** See Section 8. Avoid breathing the mist/vapors.

**Containment** Contain with inert absorbent (such as soil, sand, vermiculite).

**Cleaning** Neutralize with lime (Ca(OH)<sub>2</sub> or CaCO<sub>3</sub>) or soda ash/sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>). Collect liquid in a plastic container. Wash spill area with soap and water to remove the last traces of residue.

**Disposal** Dispose of spill waste according to Section 13.

**FERRIC CHLORIDE****415-LIQUID****Section 7: Handling and Storage**

**Prevention** P260 + P271 + P284: Do not breathe vapors/spray/mist. In cases of inadequate ventilation wear respiratory protection.

P234: Keep only in original container.

P270: Do not eat, drink, or smoke when using this product.

**RECOMMENDATION:** Protect from excessive high heat. Do NOT process in a fashion that causes mist or fumes.

**Handling** P280: Wear protective gloves/protective clothing/eye protection.

**RECOMMENDATION:** Wear butyl rubber, PVC (polyvinyl chloride), nitrile or other impervious gloves with breakthrough time greater than intended use period.

P272 + 264: Contaminated work clothing should not be allowed out of the workplace. Wash hands thoroughly after handling.

**Storage** P405: Store locked up.

**RECOMMENDATION:** Keep in a dry and clean area, away from incompatible substances.

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**Section 8: Exposure Controls/Personal Protection**

**Routes of Entry**

Eyes, ingestion, inhalation, and skin

**Substances with Occupational Exposure Limit Values**

Chemical Name	Country	Long Term Exposure Limits (PEL)	Short Term Exposure Limits (STEL)
iron trichloride <sup>a)</sup> (soluble iron salt)	ACGIH	1 mg/m <sup>3</sup>	—
	U.S.A. OSHA PEL	1 mg/m <sup>3</sup>	—
	Canada AB	1 mg/m <sup>3</sup>	—
	Canada BC	0.01 ppm	—
	Canada ON	1 mg/m <sup>3</sup>	—
	Canada QC	1 mg/m <sup>3</sup>	—
iron dichloride <sup>a)</sup> (soluble iron salt)	ACGIH	1 mg/m <sup>3</sup>	—
	U.S.A. OSHA PEL	1 mg/m <sup>3</sup>	—
	Canada AB	1 mg/m <sup>3</sup>	—
	Canada BC	0.01 ppm	—
	Canada ON	1 mg/m <sup>3</sup>	—
	Canada QC	1 mg/m <sup>3</sup>	—
hydrogen chloride	ACGIH	—	2 ppm (Ceiling)
	U.S.A. OSHA PEL	—	5 ppm (Ceiling)
	Canada AB	—	2 ppm (Ceiling)
	Canada BC	—	4.7 ppm (Ceiling)
	Canada ON	—	4.7 ppm (Ceiling)
	Canada QC	—	5 ppm (Ceiling)

*Note:* Ingredients are listed in descending weight contribution order (from greatest to least). The ACGIH<sup>2</sup>, OSHA, and Canadian provinces exposure limits were consulted. Limits from by RTECS database<sup>1</sup> of the Canadian Centre for Occupational Health and Safety (CCOHS) a data from suppliers' SDS were also consulted. Short term exposure limits (STEL) are for 15 min and long term permissible exposure limits (PEL) for 8 h.

a) Limit for iron salts, soluble as Fe

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**FERRIC CHLORIDE****415-LIQUID****Engineering Controls**

**Ventilation** Keep airborne concentrations below exposure limits.

**Personal Protective Equipment**

**Eye protection** Wear appropriate protective eyeglasses or chemical safety goggles.

**RECOMMENDATION:** Use safety glasses with lateral protection (side shields). If splashing is likely, use face shield.

**Skin Protection** Wear appropriate protective clothing to prevent skin contact.

**RECOMMENDATION:** Use of protective gloves in butyl rubber, PVC (polyvinyl chloride), nitrile, or other chemically resistant gloves.

Avoid nylon clothing when handling ferric chloride due to incompatibility.

**Respiratory Protection** If exposed to mist, wear respirator with a particulate filter of at least 95% filter efficiency.

**RECOMMENDATION:** Consult your local safety supply store to ensure your respirator has filter cartridges appropriate for the ingredients listed in section 3 of this MSDS, and that the respirator is fitted to the employee by a professional.

**General Hygiene Considerations**

Wash hands thoroughly with water and soap after handling.



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**Section 9: Physical and Chemical Properties**

<b>Physical State</b>	Liquid	<b>Appearance</b>	Orange-brown
<b>Odor</b>	Mild acidic/iron	<b>Odor Threshold</b>	Not established
<b>pH</b>	< 1	<b>Specific Gravity</b>	1.40
<b>Solubility in Water</b>	Soluble	<b>Freezing/Melting Point</b>	Not available
<b>Flash Point <sup>a)</sup></b>	Not applicable	<b>Vapor Pressure @ 20 °C</b>	Not available
<b>Boiling Point</b>	Not available	<b>Evaporation Rate</b>	Not available
<b>Lower Flammability Limit</b>	Not applicable	<b>Upper Flammability Limit</b>	Not applicable
<b>Auto-ignition Temperature</b>	Not available	<b>Decomposition Temperature</b>	Not available
<b>Viscosity @25 °C</b>	Not available	<b>Vapor Density</b>	1 (Air = 1)
<b>Partition Coefficient</b>	Not established		

**FERRIC CHLORIDE****415-LIQUID****Section 10: Stability and Reactivity**

<b>Reactivity</b>	Reacts with metals and alkalis (bases)
<b>Chemical Stability</b>	Chemically stable at normal temperatures and pressures.
<b>Possible Hazardous reactions</b>	<p>Reacts dangerously with alkali metals, like sodium or potassium, allyl chloride, ethylene oxide, and styrene.</p> <p>Iron trichloride can react with water to form hydrogen chloride.</p> <p>Prolonged exposure to metal in an enclosed space may produce flammable hydrogen gas.</p> <p>No hazardous polymerization</p>
<b>Conditions to Avoid</b>	Excessive heat and incompatible substances. Do not use in a way that forms a mist or aerosolize the product
<b>Incompatibilities</b>	Alkali metals, allyl chloride, ethylene oxide, nylon, styrene, strong oxidizing agents, strong bases
<b>Decomposition</b>	Will not decompose under normal conditions. For thermal decomposition, see combustion products in Section 5

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**Section 11: Toxicological Information**

**Routes of Exposure**

Eyes, ingestion, inhalation, and skin

**Symptoms Summary**

**Eyes** Cause chemical burns or severe eye irritation. Also cause eye redness or pain.

**Skin** Causes skin irritation.

**Inhalation** Inhalation of vapors or mist may cause irritation to the nose, throat and lung (upper respiratory tract).

Exposure to large doses of hydrogen chloride can cause cough, labored breathing, and shortness of breath.

**Ingestion** *Not a likely route of exposure.* May cause severe irritation to the mouth, throat, esophagus, and stomach. In large doses, it may also cause abdominal pain, nausea, vomiting, diarrhea

**Chronic** No known effects

**Acute Toxicity (Lethal Exposure Concentrations)**

Chemical Name	LD50 oral	LD50 dermal	LC50 inhalation	TCLo inhalation
iron trichloride	316 mg/kg Rat	Not available	Not available	Not available
iron dichloride	45 mg/kg Rat	2 000 mg/kg Rat	Not available	Not available
hydrochloric acid	9 600 mg/kg Rabbit	5 010 mg/kg Rabbit <sup>a)</sup>	3 124 ppm 1 h Rat	Not available

*Note:* Representative toxicity data from by RTECS database of the Canadian Centre for Occupational Health and Safety (CCOHS)<sup>1</sup> data from supplier MSDS were also consulted.  
a) Monsanto reported value

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<b>Skin corrosion/irritation</b>	Cause skin irritation.
<b>Serious eye damage/irritation</b>	Mixture causes severe eye damage.
<b>Sensitization</b> (allergic reactions)	Not available
<b>Carcinogenicity</b> (risk of cancer)	Not classified or listed as a carcinogen under IARC, ACGIH, CA Prop 65, or NTP.
<b>Mutagenicity</b> (risk of heritable genetic effects)	Not available
<b>Reproductive Toxicity</b> (risk to sex functions)	No available
<b>Teratogenicity</b> (risk of fetus malformation)	No available
<b>STOT-single exposure</b>	Does not give rise to classification, because the concentration of hydrochloric acid is below the classification threshold.
<b>STOT-repeated exposure</b>	No data available
<b>Aspiration hazard</b>	Not a aspiration hazard because the mixture doesn't contain any organic material.

**FERRIC CHLORIDE****415-LIQUID****Section 12: Ecological Information**

The ecotoxicity of the mixture was estimated by the calculation method using the summation of classified ingredients. The IMDG Code criteria and the raw-material MSDS along with supporting data for the classification of registered substances from the European Chemical Agency database (<http://echa.europa.eu>) were used.

Iron trichloride is a category 3 chronic marine pollutant (with a LC50 48 h of 23 mg/L for *Oryzias latipes*; EC50 9.6 mg/L *Daphnia magna* (water flea).

Iron dichloride is a category 3 chronic marine pollutant (with a LC50 96 h of 46.6 mg/L for *Oryzias latipes*; EC50 19.0 mg/L *Daphnia magna* (water flea).

Hydrochloric acid is a category 2 chronic marine pollutant (with a LC50 24 h of 4 mg/L for *Carassius auratus* (goldfish); EC50 48 h of 1.5 mg/L *Daphnia magna* (water flea).

**Acute Ecotoxicity**

Category 3

*GHS Code: Hazard Statement*

H402: Harmful to aquatic life

P273: Avoid release to the environment

P391: Collect spillage

**Chronic Ecotoxicity**

Category 3

Data doesn't lead to classification under GHS.

**Biodegradability**

The content is not readily biodegradable.

**Section 13: Disposal Information**

P501: Dispose of contents in accordance with all local, regional, national, and international regulations.

**FERRIC CHLORIDE****415-LIQUID****Section 14: Transport Information****Ground**

**Refer to TDG regulations** (Canadian Transportation of Dangerous Goods regulations); **USA CFR 49 Regulations** (Parts 100 to 185). **ADR** (European Agreement Concerning the International Carriage of Dangerous Goods by Road, and **ADN** (Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways).

Sizes 5 liter and under

**Limited Quantity**

Sizes greater than 5 liter

**UN number:** UN2582**Shipping Name:** FERRIC CHLORIDE SOLUTION**Class:** 8**Packing Group:** III

Marine Pollutant: No

**Air****Refer to ICAO-IATA Dangerous Goods Regulations.**

Sizes 1 liter and under

**Limited Quantity**

Sizes greater than 1 liter up to 5 liter

**UN number:** UN2582**Shipping Name:** FERRIC CHLORIDE SOLUTION**Class:** 8**Packing Group:** III

Marine Pollutant: No

**Special Provision:** A803—Must use Packing Group II packaging.*Continued on the next page*

**FERRIC CHLORIDE****415-LIQUID****Sea**

Refer to IMDG regulations.

Sizes 5 liter and under

**Limited Quantity**

Sizes greater than 5 liter

**UN number:** UN2582

**Shipping Name:** FERRIC CHLORIDE SOLUTION

**Class:** 8

**Packing Group:** III

Marine Pollutant: No



*Note:* Component supplier SDS transportation sections and labeling were consulted. All involved staff of shipper must be appropriately trained before involvement with the transport of this product, or work under direct supervision of a trained person.

**Section 15: Regulatory Information****Canada****Domestic Substance List (DSL) / Non-Domestic Substance Lists (NDSL)**

All hazardous ingredients are listed on the DSL/NDSL.

**Industry and Science Canada**

MG Labels products intended for the workplace to conform to WHMIS labeling regulations. Product identification, net quantity declaration, minimum printing type size heights, and packaging of this product are in compliance.

**Health Canada**

Products produced by MG Chemicals intended for retail display conform to the Canadian Consumer Labeling Regulations.

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**FERRIC CHLORIDE****415-LIQUID****USA****TSCA** (Toxic Substances Control Act of 1976, USA)

All substances are TSCA listed.

**CAA** (Clean Air Act, USA)

This product does not contain any class 1 ozone depleting substances.

This product does not contain any class 2 ozone depleting substances.

This product does not contain ingredients that are listed as hazardous air pollutants.

**EPCRA** (Emergency Planning and Right to Know Act, USA, 40 CFR 372.45)

This product does contains iron dichloride (CAS# 7758-94-3; reportable quantity = 100 lb), iron trichloride (CAS# 7705-08-0; reportable quantity = 1000 lb), and hydrochloric acid (CAS#7647-01-0; reportable quantity = 5000 lb), which can be subject to the CERCLA reporting requirements.

This product does not contain ingredient listed in section 313 Title III of the SARA of 1986 and 40 CFR part 372.

**California Proposition 65** (Chemicals known to cause cancer or reproductive toxicity, Sept 2, 2011 revision, USA).

This product does not contain any listed substances.

**Europe****RoHS**

This product does not contain any lead, cadmium, mercury, hexavalent chromium, PBB's, or PBDE's, and complies with European RoHS regulations.

**WEEE**

This product is not a piece of electrical or electronics equipment, and is therefore not governed by this regulation.

**Section 16: Other Information**

**MSDS Prepared by** Michel Hachey

**Date of Issue** 16 August 2013

**Supersedes** 09 November 2010

**Reason for Changes:** Change to OSHA-GHS compliant format and revision of properties.

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**FERRIC CHLORIDE****415-LIQUID****Reference**

- 1) All toxicological data were checked against the RTECS (Registry of Toxic Effects of Chemical Substances®)
- 2) ACGIH 2011 TLVs and BEIs: Based on the documentation of the threshold limit values for chemical substances and physical agents & biological exposure indices, American Conference of Governmental of Industrial Hygienist Cincinnati, OH (2011).

**Abbreviations**

ACGIH American Conference of Governmental Industrial Hygienists  
GHS: Globally Harmonized System of Classification of Labeling of Chemicals  
LC50 Lethal Concentration 50%  
LCLo Lowest published lethal concentration  
LD50 Lethal Dose 50%  
N/A Not Applicable  
N/E Not Estimated  
PEL Permissible Exposure Limit  
STEL Short-Term Exposure Limit  
TCLo Lowest published toxic concentration  
TWA Time Weighted Average  
VOC Volatile Organic Content  
WEEL Workplace Environmental Exposure Levels

**Technical Queries** Contact us regarding any questions, improvement suggestions, or problems with this product. Application notes, instructions, and FAQs are located at [www.mgchemicals.com](http://www.mgchemicals.com).

Email: [support@mgchemicals.com](mailto:support@mgchemicals.com)

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