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

☎ 1-800-340-0772
FAX 1-800-340-0773
E-MAIL: support@mgchemicals.com
WEB www.mgchemicals.com

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

☎ 1-905-331-1396
FAX 1-905-331-2682
E-MAIL: info@mgchemicals.com

E-MAIL (Competent Person): sds@mgchemicals.com

Emergency Phone Number

For hazardous material incidents ONLY—leaks, spills, fires, exposures or accidents
USA or CANADA: Call CHEMTREC ☎: ***1-800-424-9300***

For emergencies involving dangerous goods; Collect 24/7
CANADA: Call CANUTEC ☎: ***1-613-996-6666*** or ****666*** on cellular phones

Section 2: Hazards Identification

Classification of Hazardous Chemical

WHMIS Classification

E – Corrosive

GHS Categories

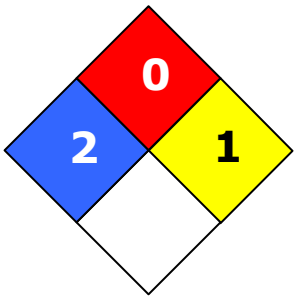
Criteria		Category	Signal Word	Pictograms
Serious Eye Damage		1B	Danger	
Metal Corrosive		1	Warning	
Skin Irritation		2	Warning	
Environmental Hazard	Acute Aqua. Tox.	3	—	

Other Classifications

HMIS® RATING

HEALTH:	**2**
FLAMMABILITY:	**0**
PHYSICAL HAZARD:	**1**
PERSONAL PROTECTION:	

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

Signal Word	**DANGER**
Pictograms	**Hazard Statements**
	H318: Causes serious eye damage H315: Cause skin irritation H290: May be corrosive to metals
	H402: Harmful to aquatic life
	Precautionary Statements
Prevention	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.
Response	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
Storage	P501: Store in corrosive resistant plastic container with a resistant inner lining.
Disposal	P501: Dispose of contents/container in accordance to local/regional/international regulations.

Other Hazards

Not applicable

Section 3: Hazardous Ingredients

CAS #	Chemical Name	Wt%
7705-08-0	iron trichloride ($FeCl_3$)	38–40%
7758-94-3	iron dichloride ($FeCl_2$)	<1.5%
7647-01-0	hydrochloric acid	<0.8%

Section 4: First Aid Measures

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

Section 5: Fire Fighting Measures

Auto-ignition Temperature	Not applicable	**Flash Point** [a)]	Not applicable	**LFL [LEL]**[b)] **UFL [UEL]**	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 ($Ca(OH)_2$ or $CaC0_3$) or soda ash/sodium carbonate (Na_2C0_3). 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.

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.

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 [a)]	ACGIH	1 mg/m^3	—
(soluble iron salt)	U.S.A. OSHA PEL	1 mg/m^3	—
	Canada AB	1 mg/m^3	—
	Canada BC	0.01 ppm	—
	Canada ON	1 mg/m^3	—
	Canada QC	1 mg/m^3	—
iron dichloride [a)]	ACGIH	1 mg/m^3	—
(soluble iron salt)	U.S.A. OSHA PEL	1 mg/m^3	—
	Canada AB	1 mg/m^3	—
	Canada BC	0.01 ppm	—
	Canada ON	1 mg/m^3	—
	Canada QC	1 mg/m^3	—
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[2], OSHA, and Canadian provinces exposure limits were consulted. Limits from by RTECS database[1] 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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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.

Section 9: Physical and Chemical Properties

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

Section 10: Stability and Reactivity

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

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 [a)]	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)[1] data from supplier MSDS were also consulted.
a) Monsanto reported value

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

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.

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.

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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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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.

Continued on the next page

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.

Email: support@mgchemicals.com

Mailing Addresses

Manufacturing & Support
1210 Corporate Drive
Burlington, Ontario, Canada
L7L 5R6

Head Office
9347–193rd Street
Surrey, British Columbia, Canada
V4N 4E7

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