Electronics

Safety Data Sheet

70125797

Section 1: Identification

Product Identifier and Other Means of Identification

Product Name: 415

Other Means of Identification: Ferric Chloride

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

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FAX +1-800-340-0773
E-MAIL support@mgchemicals.com
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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 at *+1-800-424-9300*

For emergencies involving the transport of dangerous goods; 24/7 service CANADA—Call CANUTEC collect at *+1-613-996-6666* or **666* on cellular phones

Section 2: Hazard(s) Identification

Classification of Hazardous Chemical

GHS Categories

Criteria		Category	Signal Word	Pictograms
Eye Damage		1B	Danger	Corrosion
Corrosive to Metals		1	Warning	Corrosion
Skin Irritation		2	Danger	Exclamation
Acute Toxicity	Oral	4	Warning	Exclamation
Hazardous to the Aquatic Environment	Acute	3	none	none

Note: The degree of severity is ranked within each hazard class from 1 (Highest Severity) to up to 5 (Lowest Severity), which is opposite to HMIS and NFPA conventions. Severity category rankings do not allow comparisons between classes.

Label Elements

Signal Word	**DANGER**
Pictograms	**Hazard Statements**
	H318: Causes serious eye damage H290: May be corrosive to metals
	H315: Causes skin irritation H302: Harmful if swallowed
No symbol mandated	H402: Harmful to aquatic life

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Prevention	Precautionary Statements
P102	Keep out of reach of children.
P234	Keep only in original packaging.
P264	Wash thoroughly after handling.
P280	Wear eye protection/face protection/protective gloves.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
Response	**Precautionary Statements**
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	IF ON SKIN: Wash with plenty of water.
P332 + P313	If skin irritation occurs: Get medical advice/attention.
P362 + P364	Take off all contaminated clothing and wash it before reuse.
P301 + P312	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
P330	Rinse mouth.
Storage	**Precautionary Statements**
P406	Store in corrosion resistant container with a resistant inner lining.
Disposal	**Precautionary Statements**
P501	Dispose of contents/container in accordance to local/regional/international regulations.

Hazards Not Otherwise Classified

Other Criteria	Hazard Statements/Precautionary Statement	Signal Word	Pictograms
None	None	None	None

Section 3: Composition/Information on Ingredients

CAS #	Chemical Name	%(weight)
7705-08-0	iron trichloride ($FeCl_3$)	37–42%
7647-01-0	hydrochloric acid	1.0%
7758-94-3	iron dichloride ($FeCl_2$)	<1.0%

Section 4: First-Aid Measures

Exposure Condition	*GHS Code/Symptoms/Precautionary Statements*
IF IN EYES	P305 + P351 + P338, P310
Immediate Symptoms	*burns, severe irritation, redness, pain*
Response	Rinse cautiously with water for 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTRE/doctor
IF ON SKIN	P302 + P352, P362 + P364, P332 + 313
Immediate Symptoms	*redness, pain, brown stain on skin*
Response	Wash with plenty of water. If skin irritation occurs. Get medical advice/attention. Take off immediately all contaminated clothing and wash it before reuse.
IF INHALED	P304 + P340
Immediate Symptoms	*irritation, cough, sore throat*
Response	Remove person to fresh air (out of the contaminated zone) and keep comfortable for breathing.
IF SWALLOWED	P301 + P312, P330
Immediate Symptoms	*abdominal pain, irritation, nausea, vomiting, diarrhea*
Response	Rinse mouth. If you feel unwell, call a POISON CENTRE/doctor.

Section 5: Fire-Fighting Measures

Extinguishing Media	In case of fire: Use extinguishing media suitable for surrounding material.
Specific Hazards	Not flammable or combustible. Produces irritating and toxic fumes in fires or in contact with hot surfaces. Prolonged contact with metals in an enclosed space may produce explosive quantities of hydrogen gas.
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 and full fire-fighting turn-out gear.

Section 6: Accidental Release Measures

Personal Protection	See personal protection recommendations in Section 8.
Precautions for Response	Avoid breathing the mist/spray/fumes.
Environmental Precautions	Avoid releasing to the environment. Prevent spill from entering drains and waterways. Do not flush to sewer.
Containment Methods	Contain with inert and non-flammable absorbent (such as soil, sand, vermiculite).
Cleaning Methods	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 Methods	Dispose of spill waste according to Section 13.

Section 7: Handling and Storage

Prevention	Keep out of reach of children.
	Keep only in original container.
	Do not eat, drink or smoke when using this product.
	Take off all contaminated clothing and wash it before reuse.
	Avoid release to the environment.
Handling	Wash thoroughly after handling.
	Wear eye protection/face protection/protective gloves.
Storage	Store in corrosion resistant container with a resistant inner lining.

Section 8: Exposure Controls/Personal Protection

Substances with Occupational Exposure Limit Values

Chemical Name	Country	Long Term Exposure Limits (PEL)	Short Term Exposure Limits (STEL)
iron trichloride [a] *(soluble iron salt)*	ACGIH	1 mg/m^3	Not established
	U.S.A. OSHA PEL	1 mg/m^3	Not established
	Canada AB	1 mg/m^3	Not established
	Canada BC	1 mg/m^3	Not established
	Canada ON	1 mg/m^3	Not established
	Canada QC	1 mg/m^3	Not established
iron dichloride [a] *(soluble iron salt)*	ACGIH	1 mg/m^3	Not established
	U.S.A. OSHA PEL	1 mg/m^3	Not established
	Canada AB	1 mg/m^3	Not established
	Canada BC	1 mg/m^3	Not established
	Canada ON	1 mg/m^3	Not established
	Canada QC	1 mg/m^3	Not established

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Chemical Name	Country	Long Term Exposure Limits (PEL)	Short Term Exposure Limits (STEL)
hydrogen chloride	ACGIH	Not established	2 ppm (Ceiling)
	U.S.A. OSHA PEL	Not established	5 ppm (Ceiling)
	Canada AB	Not established	2 ppm (Ceiling)
	Canada BC	Not established	4.7 ppm (Ceiling)
	Canada ON	Not established	4.7 ppm (Ceiling)
	Canada QC	Not established	5 ppm (Ceiling)

Note: Ingredients are listed in descending weight contribution order (from greatest to least). The ACGIH[1], OSHA (Table Z-1), and Canadian provinces exposure limits were consulted. Limits from the RTECS[2] database and 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

Engineering Controls

Ventilation

Keep airborne concentrations below the occupational exposure limits (OEL).

Personal Protective Equipment

Eye protection

Wear appropriate protective eyeglasses or chemical safety goggles.

RECOMMENDATION: Ensure that glasses have side shields for lateral protection.

Skin Protection

For likely contacts, use of protective butyl rubber or other chemically resistant gloves.

For incidental contacts, use nitrile or other chemically resistant gloves.

Respiratory Protection

For over-exposures up to 10 x OEL of mist/vapors/spray, wear respirator such as a half-mask respirator with organic vapor cartridges.

Above 10 x OEL, use a positive-pressure, air-supplied respirator or a self-contained breathing apparatus.

RECOMMENDATION: Consult your local safety supply store to ensure that your respirator has a NIOSH (U.S.) approved filter cartridges appropriate for the ingredients listed in Section 3. The respirator should be fitted to the employee by a professional. Ensure vapor cartridges are stored in sealed plastic bags when not being used.

General Hygiene Considerations

Wash hands thoroughly with water and soap after handling.

Section 9: Physical and Chemical Properties

Physical State	Liquid	**Lower Flammability Limit**	Not applicable
Appearance	Clear, dark red-brown	**Upper Flammability Limit**	Not applicable
Odor	Slight acidic/iron	**Vapor Pressure @20 °C**	Negligible
Odor Threshold	Not avaliable	**Vapor Density**	1 (Air = 1)
pH	<2	**Specific Gravity @25 °C**	1.38 - 1.49
Freezing/Melting Point	-50 °C [-58 °F]	**Solubility in Water**	Soluble
Boiling Point	110 °C [230 °F]	**Partition Coefficient**	Not available
Flash Point	Not applicable	**Auto-ignition Temperature** [b)]	Not available
Evaporation Rate	>1 (BuAc=1)	**Decomposition Temperature**	Not available
Flammability (solid, gas)	Not available	**Viscosity @25 °C**	Not available

Section 10: Stability and Reactivity

Reactivity	Reacts with metals and alkalis (bases).
Chemical Stability	Chemically stable at normal temperatures and pressures
Conditions to Avoid	Avoid extreme heat, open flames, and incompatible substances.
Incompatibilities	Alkali metals, allyl chloride, ethylene oxide, nylon, styrene, strong oxidizing agents, strong bases
Polymerization	Will not occur
Decomposition	Will not decompose under normal conditions. For thermal decomposition, see combustion products in Section 5.

Section 11: Toxicological Information

Summary of Effects and Symptoms by Routes of Exposure

Eyes	Causes burns, severe irritation, redness, or pain.
Skin	Causes redness, pain, or brown stain on skin.
Inhalation	Inhalation of vapors or mist may cause irritation, coughing, or sore throat. Exposure to large doses of hydrogen chloride can cause cough, labored breathing, and shortness of breath.
Ingestion	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
iron trichloride	316 mg/kg Rat	Not available	Not available
iron dichloride	300 mg/kg Rat	2 000 mg/kg Rat	Not available
hydrochloric acid	238—277 mg/kg Rat	5 010 mg/kg Rabbit [a)]	4.2 mg/L 1 h Rat (gas)

Note: Toxicity data from the RTECS[2] and ECHA databases were consulted. The data from supplier (M)SDSs were also consulted.

a) Monsanto reported value

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Other Toxicological Effects

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/irritation	Mixture causes severe eye damage.
Sensitization (allergic reactions)	Based on available data, the classification criteria are not met.
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)	Based on available data, the classification criteria are not met.
Reproductive Toxicity (risk to sex functions)	Based on available data, the classification criteria are not met.
Teratogenicity (risk of fetus malformation)	Based on available data, the classification criteria are not met.
STOT-single exposure	Does not give rise to classification, because the concentration of hydrochloric acid is below the classification threshold.
STOT-repeated exposure	Based on available data, the classification criteria are not met.
Aspiration hazard	Based on available data, the classification criteria are not met.

Section 12: Ecological Information

Ecological classifications are based on the IMDG/GHS criteria in conjunction with ecotoxicological data from our suppliers, the European Chemical Agency database (http://echa.europa.eu), and other reliable sources.

Iron trichloride is a category 3 acute aquatic 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 acute aquatic 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 acute aquatic 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).

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Acute Ecotoxicity

Category 3

Harmful to aquatic life

Avoid release to the environment. Collect spillage

Chronic Ecotoxicity

Not available

Biodegradability
The content is not readily biodegradable.

Other Effects

Not available

Section 13: Disposal Information

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 DOT 49 CFR** (Parts 100 to 185) **Regulations.**

Sizes 5 L and under	Sizes greater than 5 L
Limited Quantity	**UN number**: UN2582 **Shipping Name:** FERRIC CHLORIDE SOLUTION **Class:** 8 **Packing Group**: III **Marine Pollutant:** No

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Air

Refer to ICAO-IATA Dangerous Goods Regulations.	
Sizes 1 L and under	Sizes up to 5 L (Passenger), 60 L (Cargo)
Limited Quantity	**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.

Sea

Refer to IMDG regulations.	
Sizes 5 L and under	Sizes greater than 5 L
Limited Quantity	**UN number**: UN2582 **Shipping Name:** FERRIC CHLORIDE SOLUTION **Class:** 8 **Packing Group**: III **Marine Pollutant:** No

Note: **Shipper must be appropriately trained and certified before involvement with the transport of dangerous goods.**

Section 15: Regulatory Information

Canada

Domestic Substance List (DSL) / Non-Domestic Substance Lists (NDSL)

All hazardous ingredients are listed on the DSL/NDSL.

Hazardous Products Act (R.S.C., 1985, c. H-3)

The safety data sheet and label comply with the Hazardous Product Act and WHMIS 2015.

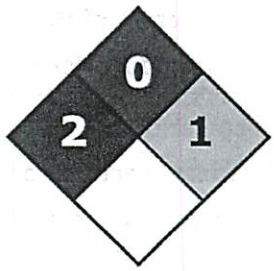
USA

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)

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.

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

This product contains iron dichloride (CAS# 7758-94-3; reportable quantity = 100 lb), iron trichloride (CAS# 7705-08-0; reportable quantity = 1 000 lb), and hydrochloric acid (CAS# 7647-01-0; reportable quantity = 5 000 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.

TSCA (Toxic Substances Control Act of 1976, USA)

All substances are TSCA listed.

California Proposition 65 (Chemicals known to cause cancer or reproductive toxicity, USA).

This product does not contain any listed substances in California.

Europe

RoHS (Restriction of Hazardous Substances Directive)

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

WEEE (Waste Electrical and Electronic Equipment Directive)

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

Section 16: Other Information

SDS Prepared by	Michel Hachey
Date of Issue	04 January 2018
Supersedes	24 March 2016

Reason for Changes: Format changes in compliance with HCS2012 and WHMIS 2015.

Reference

1) All toxicological data were checked against the RTECS (Registry of Toxic Effects of Chemical Substances®)

2) ACGIH *2017 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 (2017).

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Abbreviations

ACGIH American Conference of Governmental Industrial Hygienists
GHS: Globally Harmonized System of Classification of Labeling of Chemicals
LC50 Lethal Concentration 50%
LD50 Lethal Dose 50%
N/A Not Applicable
N/E Not Estimated
PEL Permissible Exposure Limit
STEL Short-Term Exposure Limit
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.

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