

GC Electronics
 1801 Morgan Street
 Rockford, IL 61102
 Phone: (815) 968-9661
 Fax: (815) 968-9731
 www.gcelectronics.com

Product Name: PC Board Etching Solution
 MSDS Number: 115
 Revision Date: 11/17/03
 Supersedes Date: 1/27/03

MATERIAL SAFETY DATA SHEET

Complies with OSHA Hazard Communication Standard 29 CFR 1910.1200

Product Type: PC Developing Etching
 Product Name: **PC Board Etching Solution**
 Part Number(s): **22-0237**
22-0238
Z-9419
22-0239
Z-9420

Emergency Contact: Chemtrec
Phone: (800) 424-9300

Section 1 – Identification of Product

Common Name: PC Board Etching Solution
 Chemical Name Synonyms: Iron (III) Chloride Solutions
 CAS #: Mixture
 Chemical Family: Inorganic Salt Solution
 Formula: FeCl₃
 Product Name: Ferric Chloride Sol'N Photo Engraving Grade
 HMIS Ratings: NFPA Least 0
 Health: 3 Health: 3 Slight 1
 Flammability: 0 Flammability 0 Moderate 2
 Reactivity: 0 Reactivity: 0 High 3
 *= Chronic Health Hazard Special Hazard: None Extreme 4
 Gloves, Safety Glasses B

Section 2 – Hazardous Ingredients

Ingredient	CAS#	Percent	OSHA Hazard	ACGIH		OSHA	
				TWA Level	STEL/C	PEL Level	STEL/C
Ferric Chloride	7705-08-0	32-45%	Yes	* 1 mg/m ³	NE	* 1 mg/m ³ +	NE
Hydrogen Chloride	7647-01-0	<3%	Yes	NE	C5ppm	NE	C5ppm
Water	7732-18-5	Balance					

NOTE: * Exposure limit for iron salts, soluble, as Fe.
 + Vacated 1989 OSHA PEL (S).

Section 3 – Physical Data

Boiling Point: 230°F
 Specific Gravity: [1.432@17.5C](#)
 Freezing Point: -58°F
 Percent Volatile by Volume%: N.D.
 Vapor Pressure (mm hg): Negligible
 Vapor Density (air=1): NA
 Evaporation Rate (nBuAc): 1

Part Number(s): 22-0237, 22-0238, Z-9419, 22-0239, Z-9420

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Solubility in Water: Complete
pH: <2.0
Appearance and Odor: Reddish brown liquid. Slightly iron/acid odor
VOC (wt %): N.A.
VOC (lbs. Gal): N.A.

Section 4 – Fire and Explosion Hazard Data

Flash Point (method used): None
Flammable Limits: LEL: NA UEL: NA
Extinguishing Media: For fires in area use appropriate media. For example: water spray. Fog. Foam. Dry Chemical. Carbon Dioxide.
Special Fire Fighting Procedures: Evacuate area of unprotected personnel. Wear protective clothing including a NIOSH-Approved self-contained breathing apparatus. Remain upwind of fire to avoid hazardous vapors and decomposition products. Use water spray to cool fire-exposed containers and disperse vapors. Keep out of low areas where gases (fumes) can accumulate. Run-off from fire control may cause pollution. Neutralize run-off with lime, soda ash, etc., to prevent corrosion of metals and formation of hydrogen gas.
Unusual Fire Explosion Hazards: Product may react with some metals (example: aluminum, zinc, tin, etc.) to release flammable hydrogen gas. Heat can cause evolution of gaseous hydrogen chloride.
Hazardous Combustion: Hydrogen Chloride gas. Chlorine containing gases.

Section 5 – Health Hazard Data

EMERGENCY OVERVIEW: DANGER! CAUSES EYE BURNS. CORROSIVE TO MOST METAL. REACTS WITH MOST METALS TO FORM EXPLOSIVE/FLAMMABLE HYDROGEN GAS. MAY CAUSE SKIN AND RESPIRATORY IRRITATION. HARMFUL OR FATAL IF SWALLOWED.

Threshold Limit Value: * 1 mg/m³ (OSHA 29 CFR 1910.Z-1-A)
* 1 mg/m³ (ACIGH 1996)
Exposure limits for iron soluble salts, as Fe.
Routes of Exposure: Eyes. Ingestion. Inhalation. Skin.
Target Organs: Eyes. Gastrointestinal Tract. Liver. Respiratory System. Skin.
Effects of Overexposure
Eye Contact: Corrosive – Contact with eyes may cause irritation, tearing and eye tissue discoloration. May be corrosive to the eyes. Severe irritation and burns may result. Permanent eye damage may result from contact with this product.
Skin Contact: May cause mild to moderate irritation. Contact may include irritation with dryness, discomfort and rash. Prolonged and repeated exposure may cause sensitization.
Inhalation: Vapors or mist may cause irritation to the throat, mucous membranes and respiratory tract. May cause moderate irritation.
Ingestion: Ingestion may result in severe liver and/or kidney damage. May cause severe irritation. Harmful or fatal if swallowed.
Other: None known.
Cancer Information: This product does not contain >0.1% of the known or potential carcinogens listed in NTP, IARC, or OSHA.

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Potential Environmental Effects: See Section 11

Emergency and First Aid Procedures

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes. Hold eyelids open during this flushing with water. Tilt head to avoid contaminating unaffected eye. Call a physician immediately.

Skin Contact: Flush skin with plenty of water while removing contaminated clothing and shoes. Do not reuse clothing or shoes until cleaned. If irritation develops or persists, get medical attention. Do not apply oils or ointments unless ordered by the physician.

Ingestion: If conscious, drink a quart of water. DO NOT induce vomiting. CALL A PHYSICIAN immediately. If unconscious or in convulsions, take immediately to a hospital or a physician. NEVER induce vomiting or give anything by mouth to an unconscious victim. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs.

Inhalation: Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Get medical attention immediately.

Section 6 – Reactivity Data

Stability: Stable under normal conditions.
Conditions to Avoid: Avoid elevated temperatures.
Incompatibility: Strong alkalis. Alkali metals. Metals.
Hazardous Decomposition Products: Mixing with strong bases can cause high heat of reaction and generate steam. The following may be released at very high temperatures: Hydrogen Chloride. Chlorine-containing gases. May react with certain metals to produce flammable hydrogen gas.
Hazardous Polymerization: Will Not Occur under normal conditions.

Section 7 – Spill or Leak Procedures

Steps to be taken in case material is released or spilled: Corrosive material. Evacuate unprotected personnel from area. Maintain adequate ventilation. Use proper safety equipment. Follow personal protection equipment recommendations found in Section 8. Never exceed any occupational exposure limit. Contain spill, place into drums for proper disposal. Flush remaining area with water and neutralize with soda ash or lime and dispose of properly. Avoid direct discharge to sewers and surface waters. Notify authorities if entry occurs.

Waste disposal method: Observe all local, state and federal regulations. Dispose of at approved Waste Treatment Facility following all State, Local and Federal Regulations. If approved, neutralize material and flush to sewer. Since emptied containers retain product residue, follow label warnings even after container is empty.

Hazardous Waste Number: DO NOT pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks or other sources of ignition.
D002

Section 8 – Special Protection Information

CONSULT SAFETY EQUIPMENT DISTRIBUTOR

Engineering Controls:	General room ventilation is required. Avoid creating dust or mist. Maintain adequate ventilation. Do not use in closed or confined spaces. Keep levels below exposure limits. To determine exposure levels, monitoring should be performed regularly.
Respiratory Protection:	Respiratory protection must be worn if ventilation does not eliminate symptoms or keep levels below recommended exposure limits. If exposure limits are exceeded, wear: NIOSH approved respirator. Do not exceed limits established by the respirator manufacturer. Respiratory protection programs must comply with OSHA 29 CFR 1910.134 and ANSI Z88.2 requirements and must be followed whenever workplace conditions require a respirator's use.
Ventilation:	See Engineering Controls.
Protective Gloves:	Impervious. Rubber (latex).
Eye Protection:	Chemical safety goggles, face shield. Do not wear contact lenses.
Other Protective Equipment:	Eye-wash station, safety shower, rubber apron, chemical safety shoes, rubber boots, protective clothing.
Skin Protection:	Prevent contact with this product. Wear gloves and protective clothing depending on condition of use.
General Hygiene Considerations:	Wash with soap and water before meal times and at the end of each work shift.

Section 9 – Special Precautions

Precautions to be taken in handling and storing:	Corrosive material: Store in cool, well-ventilated area, out of direct sunlight. Keep containers tightly closed. Store in a dry location away from heat. Keep away from incompatible materials. Highly corrosive to most metals with evolution of Hydrogen Gas. Do not store in unlabeled or mislabeled containers.
Other Precautions:	Avoid contact with skin, eyes and clothing. Do not swallow. Use with adequate ventilation. Avoid breathing vapors, mists or dusts. Wash thoroughly after handling. Do not eat, drink, or smoke in work area. Ferric chloride will permanently stain clothing and temporarily stain skin.

Section 10 – Regulatory Information

Carcinogen Content

% ppm Ingredient

IARC

NTP

OSHA

Note: This product does not contain greater than 0.1% of the known or potential carcinogens listed in NTP, IARC, or OSHA.

LD50 Oral:	No Data
LD50 Skin:	No Data
LD50 Inhalation:	No Data

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This product or all components of this product are listed on the EPA/TSCA Inventory of Chemical Substances.

SARA Title III Section 311/312 Category:

Immediate (Acute) Health Hazard: Yes
 Delayed (Chronic) Health Hazard: Yes
 Fire Hazard: No
 Sudden Release of Pressure Hazard: No
 Reactive Hazard: No

SARA Section 302/304/313/HAP:

Component	RQ (LBS) (*1)	RQ(LBS) (*2)	TPQ (LBS) (*3)	SEC 313 (*4)	HAP (*5)
Ferric Chloride	1000	N.A.	N.A.	No	No
Hydrogen Chloride	5000	5000	500	Yes	Yes

Note: RQ, TPQ, Section 313 reporting requirements are dependent upon individual ingredients. Hydrogen Chloride (gas only) is on the Extremely Hazardous Substance List. In liquid form, Hydrogen Chloride (Hydrochloric Acid) is not required to be reported as an Extremely Hazardous Substance, but is subject to SARA 311 and 312 reporting requirements. Hydrochloric Acid also appears on the Section 313 list; however, the listing only applies to the aerosol forms of Hydrochloric Acid.

*1=CERCLA Reportable Quantity

*2=SARA Reportable Quantity

*3=SARA EHS Threshold Planning Quantity

*4=SARA 313 Toxic Chemical/Category

*5=U.S.EPA Hazardous Air Pollutant

State Regulations:

California—The following components are listed under Prop 65: No data available

Wisconsin—The following components are listed as a Wisconsin HAP: Iron Salt, soluble, as FE. Hydrogen Chloride.

Section 11- Other Information

Chemical Name Synonyms: Iron Chloride Solution
 Chemical Family: Inorganic Salt Solution
 Formula: FeCl₃
 DOT Proper Shipping Name: Ferric Chloride, Solution
 DOT Hazard Class: 8 (corrosive material)
 DOT Identification #: UN2582
 Packing Group: III
 DOT Label: Corrosive
 Ecotoxicological Information: Fat Head Minnows: LC50 >1000ppm;
 Daphnia Magna: LC50 >1000ppm
 Chemical Fate Information: No data available.
 Transportation Information: Reportable Quantity (RQ):1000# (/ferric /chloride); 5000# (Hydrogen Chloride)

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MSDS Abbreviations:

N.A.= Not applicable
N.D.= Not determined
HAP= Hazardous Air Pollutant
VOC= Volatile Organic Compound
C= Ceiling Limit
N.E./Not Estab.= Not Established

Disclaimer

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