

**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: 8/4/06  
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): **22-237**  
**22-238**  
**Z-9419**  
**22-239**  
**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 #: 7705-08-0  
Chemical Family: Inorganic Salt Solution  
Formula: FeCl<sub>3</sub>  
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

<u>Component</u>	<u>CAS #</u>	<u>% by Weight</u>	<u>OSHA TLV</u>	<u>ACGIH TLV</u>	<u>NIOSH</u>
Ferric Chloride (as soluble iron salts)	7705-08-0	32 - 45	1 mg/m <sup>3</sup> TWA, 8-hr	1 mg/m <sup>3</sup> TWA, 8-hr	1 mg/m <sup>3</sup> TWA, 8-hr
Hydrochloric Acid (as hydrogen chloride gas)	7647-01-0	<=3.0	5 ppm ceiling	5 ppm ceiling	100 ppm IDLH
Water	7732-18-5	Balance			

### Section 3 – Physical Data

Boiling Point: 230°F or 110°C  
Specific Gravity: 40% solution = [1.432@17.5°C](#) (water = 1)  
Freezing Point: -58°F or -50°C  
Percent Volatile by Volume%: N.D.  
Vapor Pressure (mm hg): Negligible

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Vapor Density (air=1)	NA
Evaporation Rate (nBuAc):	1
Solubility in Water:	Complete
pH:	<2.0
Appearance and Odor:	Reddish brown . Slightly iron/acid odor
VOC (wt %)	N.A.
VOC (lbs. Gal)	N.A.

For information on flash point, flammability, oxidizing properties, autoflammability, and explosive properties, please see Section 4.

<b>Section 4 – Fire and Explosion Hazard Data</b>
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Flammability:	Product not flammable
Flash Point (TCC method used):	Not applicable
Oxidizing Properties:	Data not available
Autoflammability:	Not applicable
Autoignition Temperature:	Not applicable
Flammable Limits:	LEL: NA                      UEL: NA
Extinguishing Media:	Use water spray, fog, foam, dry chemical, CO <sub>2</sub> or other agents as appropriate for surrounding fire.
Fire Fighting Instructions:	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. During fire, irritating and toxic gases of hydrogen chloride may be generated by thermal decomposition. Cool exterior of storage tanks.
Fire and Explosion Hazards:	None.
Sensitivity to Mechanical Impact/Static Discharge:	NA

<b>Section 5 – Health Hazard Data</b>
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**EMERGENCY OVERVIEW: DANGER!**

A reddish brown liquid with a slight odor of iron/acid. Avoid inhaling concentrated vapor or mist, may cause irritation of respiratory tract. May result in severe liver and/or kidney damage, if swallowed, and can be fatal. Do not induce vomiting. Avoid contact with skin. Liquid, mist, or vapor can cause immediate irritation to all human tissue. Contact with eyes can result in permanent visual loss unless removed quickly by thorough irrigation with water. **Caution:** May release irritating and toxic gases of hydrogen chloride during fire. Contain spills and keep liquid out of water sources. See Sections 4, 5 and 7.

Threshold Limit Value:	* 1 mg/m <sup>3</sup> (OSHA 29 CFR 1910.Z-1-A) * 1 mg/m <sup>3</sup> (ACGIH 1996) Exposure limits for iron soluble salts, as Fe.
Routes of Exposure:	Eyes. Ingestion. Inhalation. Skin.
Target Organs:	Eyes. Liver. Respiratory System. Skin. Kidney.

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**Effects of Overexposure**

**Direct Eye Contact:** Corrosive – Contact with eyes may cause irritation, tearing and eye tissue discoloration and may result in permanent visual loss unless removed quickly by thorough irrigation with water.

**Direct Skin Contact:** This product is an irritant. Contact may include irritation with dryness, discomfort and rash. Prolonged and repeated exposure may cause sensitization. Ferric chloride has been infrequently associated with skin sensitization in humans.

**Inhalation:** Inhalation of concentrated 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.

**Medical Conditions Aggravated by Exposure:** None known.

**Carcinogens (NTP, IARC, or OSHA):** None

**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, give victim water or milk. If swallowed, **DO NOT** induce vomiting. **CALL A PHYSICIAN OR POISON CONTROL CENTER immediately. Get immediate medical attention.** 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, perform artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. **Get medical attention immediately.**

**Fire Fighting Measures**

**Inhalation:** Remove victim to fresh air. If not breathing, perform artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention.

**Ingestion:** If swallowed, do NOT induce vomiting. Give victim water or milk. Call a physician or poison control center immediately. Get immediate medical attention. Never give anything by mouth to an unconscious person.

**Direct Contact:** Flush with water until material is removed. Remove contaminated clothing. Wash clothing before reuse.

**Direct Eye Contact:** Immediately flush with water for at least 15 minutes. Hold eyelids apart to ensure complete irrigation of eye/lid tissue. Get immediate medical attention.

**Section 6 – Reactivity Data**

**Stability:** Stable.

**Incompatible Materials and Conditions to Avoid:** Material is stable when properly handled. Material is acidic and corrodes most metals. Avoid contact with strong alkalis and alkali metals.

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Hazardous Decomposition Products: May release hydrogen chloride gas at elevated temperatures.  
Hazardous Polymerization: 4 Will Not Occur.

**Section 7 – Spill or Leak Procedures**

Steps to be taken in case material is released or spilled:

Contain spill in order to prevent contamination of water way; neutralize with lime or soda ash. Flush with water in accordance with applicable regulations to waste treatment system. Avoid runoff into storm sewers and ditches which lead to waterways. Spills of 1000 pounds (454 kilograms) or more must be reported to the **National Response Center, (800) 424-8802**. If water pollution occurs, notify the appropriate authorities.

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:

If airborne concentrations exceed the published exposure limits, use NIOSH/MSHA approved, full face respirator as appropriate. Consult respirator manufacturer to determine appropriate equipment.

Ventilation:

Good general ventilation should be sufficient to control airborne levels of vapor and mist.

Protective Gloves:

Impervious. Rubber (latex).

Eye Protection:

Wear splash proof chemical safety goggles. Do not wear contact lenses.

Other Protective Equipment:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Skin Protection:

Prevent contact with this product. Wear gloves and protective clothing depending on condition of use.

Work/Hygienic Practices:

Avoid ingestion and breathing mist. Ferric Chloride will permanently stain clothing and temporarily stain skin. Avoid contact with skin and clothing. Wash thoroughly after handling.

Other Precautions:

None

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**Section 9 – Special Precautions**

Precautions to be taken in handling and storing:

Store away from heat, strong alkalis and alkali metals. Keep containers closed and dry. Protect container from physical damage. Use handling equipment (pumps, hoses, etc.) compatible with product, i.e., polyethylene, polypropylene, PVC, Teflon, rubber, FRP, and titanium. See Section 6 for types of packaging materials to avoid. Avoid contact with bare metals other than titanium.

Other Precautions:

Avoid breathing vapors and/or mist. Avoid making contact with eyes and skin. Wash thoroughly after handling. Follow all MSDS/label precautions even after container is emptied because they may retain vapor and product residues.

**Section 10 – Regulatory Information**

Carcinogen Content (% ingredient):  
IARC, NTP, OSHA:

None

U. S. Federal Regulations:

OSHA:

This product is hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

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

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 313 Toxic Chemicals:

None % by Weight

CERCLA/SUPERFUND (40 CFR 117,302)

Ferric Chloride 1000 pounds  
Hydrogen Chloride 5000 pounds

Notification to the Response Center, Washington, D.C. (1-800-424-8802) is required if any of the above RQ's are exceeded.

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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.

RCRA: If discarded in its purchased form, this product would be a hazardous waste by characteristic. Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

This product contains no Class I or Class II ozone Depleting Chemicals.

DOT: Please see Section 11.

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

<b>Section 11- Other Information</b>
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Chemical Name Synonyms: Iron Chloride Solution  
Chemical Family: Inorganic Salt Solution  
Formula: FeCl<sub>3</sub>  
DOT Proper Shipping Name: Ferric Chloride, Solution  
DOT Hazard Class: 8 (corrosive material)  
DOT Identification #: UN2582  
Packing Group: III  
DOT Label: Corrosive to metals only – not to skin

Emergency Responses Guide Book Number 60

Ecotoxicological Information: Fat Head Minnows: LC50 >1000ppm;  
Daphnia Magna: LC50 >1000ppm

**Toxicological Information**

Immediate Effects: Can cause severe liver and/or kidney damage if swallowed, and may even be fatal. See Section 5 for other immediate health hazards.

Chemical Fate Information: No data available.

Transportation Information: Reportable Quantity (RQ):1000# (/ferric /chloride); 5000# (Hydrogen Chloride)

**DOT (Department of Transportation)**

Proper Shipping Name: Ferric Chloride, Solution  
Hazard Class: 8  
Identification Number: UN2582  
Packing Group: III  
Label: Data not available  
Emergency Response Guide Book Number: 60

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Corrosive: To metals only (not to skin)

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

<b>Disclaimer</b>
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