



1801 Morgan Street
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 www.gcelectronics.com

SDS Number: 115
 Revision Date: 10/15/2014
 Supersedes Date: 10/13/2011

SAFETY DATA SHEET

Complies with OSHA Hazard Communication Standard 29 CFR 1910.1200

Product Name: PC Board Etching Solution

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Type: PC Developing Etching
 Product Name: **PC Board Etching Solution**
 Part Number(s): **22-237**
22-238
~~22-239~~

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

SECTION 2: HAZARDS IDENTIFICATION

Hazard Rating System	NFPA Rating System
Health: 3*	Health: 3
Flammability: 0	Flammability: 0
Reactivity: 0	Reactivity: 0
* = Chronic Health Hazard	Special Hazard: None



Signal Word: Danger

GHS Classification: Substance or mixture corrosive to metals Category 1
 Skin Corrosion/Irritation Category 1A
 Serious Eye Damage/Eye Irritation Category 1
 Respiratory Sensitisation Category 1
 Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 2
 Specific Target Organ Systemic Toxicity (STOT) - Repeated Exposure Category 2
 Acute Toxicity - Oral Category 4

Hazard Statements: May be corrosive to metals.
 Harmful if swallowed.
 Causes severe skin burns and eye damage.
 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
 May cause damage to organs.
 May cause damage to organs through prolonged or repeated exposure.



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SECTION 2: HAZARDS IDENTIFICATION (CONTINUED)

Precautionary Statements:

Prevention: Keep only in original container.
Do not breathe dust, fume, gas, mist, vapours or spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear gloves, eye and face protection and protective clothing.
In case of inadequate ventilation wear respiratory protection.

Response: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
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/physician.
Specific treatment (see First Aid on SDS or on this label).
If experiencing respiratory symptoms: Call a POISON CENTER or doctor.
Wash contaminated clothing before reuse.
Absorb spillage to prevent material damage.

Storage: Store in a secure manner.
Store in corrosive resistant container with a resistant inner liner.

Disposal: Dispose of in accordance with local, regional and international regulations.

Hazards Not Otherwise Classified: None known.

Percentage of Components with Unknown Acute Toxicity:

Dermal: 45.0 %
Inhalation Vapor: 45.0 %
Inhalation Dust/Mist: 45.0 %



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SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<u>Component</u>	<u>CAS Number</u>	<u>% by Wt.</u>
Water	7732-18-5	55 - 63 %
Ferric Chloride	7705-08-0	37 - 45 %
Hydrogen Chloride	7647-01-0	<= 1.0 %

SECTION 4: FIRST-AID MEASURES

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes while holding eyelids open. Tilt head to avoid contaminating unaffected eye. Get immediate medical attention. Do not attempt to neutralize with chemical agents.

Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash with soap and water. Do not apply oils or ointments unless ordered by the physician.

Inhalation: Remove to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration, preferably mouth-to-mouth. GET MEDICAL ATTENTION IMMEDIATELY.

Ingestion: If fully 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.

Note to Physicians:

Effects of exposure (inhalation, ingestion, or skin contact) may be delayed.

Most Important Symptoms/Effects:

Eye Contact: CORROSIVE-Causes severe irritation and burns. May cause: tearing. tissue discoloration. blurred vision. severe eye damage. blindness.

Skin Contact: CORROSIVE-Causes severe irritation and burns. Mists may cause: severe irritation. burns. Symptoms may include: drying. discomfort. severe burns. tissue damage. Prolonged or repeated exposure with dilute solutions may cause: dermatitis (inflammation of the skin). Contact may cause: permanent skin damage. ulceration. discoloration.

Skin Absorption: No absorption hazard expected under normal use.



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SECTION 4: FIRST-AID MEASURES (CONTINUED)

Inhalation: CORROSIVE-Causes severe irritation and burns. Vapors or mists may irritate or burn: nose. throat. respiratory tract. Symptoms may include: burning sensation. coughing. shortness of breath. lung inflammation. pulmonary edema. choking. difficulty breathing. headache. rapid heart beat. Prolonged or severe overexposure may cause: tissue destruction. death. Effects may be delayed.

Ingestion: CORROSIVE-Causes severe irritation and burns. May irritate or burn: mouth. throat. digestive tract. Symptoms may include: nausea. vomiting. abdominal pain. diarrhea. coma. death. Effects may be delayed. May cause: abnormal kidney function. abnormal liver function. Aspiration can result in severe lung damage or death.

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing Media: Not combustible. For fires in area use appropriate media. For example: Water spray. Water fog. Carbon dioxide. Dry chemical. Foam.

Fire Fighting Methods: Evacuate area of unprotected personnel. Wear protective clothing including 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. Move containers from fire area if possible without hazard. Run-off from fire control may cause pollution.

Fire and Explosion Hazards: Product may react with some metals (ex.: Aluminum, Zinc, Tin, etc.) to release flammable hydrogen gas. Heat can cause evolution of gaseous Hydrogen Chloride. Container may rupture from gas generation in a fire situation.

Hazardous Combustion Products: Thermal decomposition may release: Hydrogen Chloride gas. Phosgene gas. Hydrogen gas.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Spill Clean-Up Procedures: CORROSIVE MATERIAL. Evacuate unprotected personnel from area. Maintain adequate ventilation. Follow personal protective equipment recommendations found in Section 8. Never exceed any occupational exposure limit. Shut off source of leak if safe to do so. Contain spill, place into drums for proper disposal. Flush remaining area with water and neutralize with Soda Ash, Lime or Limestone and dispose of properly. Adequate ventilation is required if soda ash is used, because of the consequent release of carbon dioxide gas. Avoid direct discharge to sewers and surface waters. Notify authorities if entry occurs.



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SECTION 7: HANDLING AND STORAGE

Handling: Avoid contact with eyes, skin, and clothing. Use with adequate ventilation. Do not swallow. Avoid breathing vapors, mists, or dust. Do not eat, drink, or smoke in work area. Wash thoroughly after handling. Ferric chloride will permanently stain clothing and temporarily stain skin.

Storage: CORROSIVE MATERIAL. Store in a cool, well ventilated area, out of direct sunlight. Store in a dry location away from heat. Keep away from incompatible materials. Keep containers tightly closed. Do not store in unlabeled or mislabeled containers. Highly corrosive to most metals with evolution of hydrogen gas. Do not freeze. Protect containers against physical damage. See Section 10 for incompatible materials.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

OSHA Exposure Guidelines:

<u>Component</u>	<u>Limits</u>
No components found.	

ACGIH Exposure Guidelines:

<u>Component</u>	<u>Limits</u>
Ferric Chloride	1 mg/m ³ TWA (as Fe)
Hydrogen Chloride	2 ppm Ceiling

Engineering Controls: General room ventilation is required. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits.

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.

Eye/Face Protection: Wear chemical safety goggles and a full face shield while handling this product. Do not wear contact lenses.

Skin Protection: Prevent contact with this product. Wear gloves and protective clothing depending on condition of use. Protective gloves: Impervious. Neoprene. Acid-proof. Gauntlet-type.

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 full facepiece respirator with: Acid gas cartridge. HEPA filter. NIOSH-Approved Supplied Air Respirator (SAR). NIOSH-Approved self-contained breathing apparatus. DO NOT exceed limits established by the respirator manufacturer. All 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.



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SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION (CONTINUED)

Other Protective Equipment: Eye-wash station. Safety shower. Rubber apron. Rubber boots. Protective clothing. Full-rubber acid suit.

General Hygiene Conditions: Wash with soap and water before meal times and at the end of each work shift.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid.
Color: Clear to slightly hazy. Dark red-brown.
Odor: Sharp odor.
Odor Threshold: N.D.
pH: < 2.00 (as is)
Freezing Point (deg. F): N.D.
Melting Point (deg. F): N.D.
Initial Boiling Point or Boiling Range: 223 - 230 °F
Flash Point: N.A.
Flash Point Method: N.A.
Evaporation Rate (nBuAc = 1): N.A.
Flammability (solid, gas): N.D.
Lower Explosion Limit: N.A.
Upper Explosion Limit: N.A.
Vapor Pressure (mm Hg): Negligible
Vapor Density (air=1): N.A.
Specific Gravity or Relative Density: 1.40 @ 25C
Solubility in Water: Complete
Partition Coefficient (n-octanol/water): N.D.
Autoignition Temperature: N.A.
Decomposition Temperature: N.D.
Viscosity: N.D.
% Volatile (wt%): N.D.
VOC (wt%): 0
VOC (lbs/gal): 0
Fire Point: N.D.



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SECTION 10: STABILITY AND REACTIVITY

Reactivity: No data available.

Chemical Stability: Stable under normal conditions.

Possibility of Hazardous Reactions: Hazardous polymerization will not occur under normal conditions. May release hydrogen chloride gas at elevated temperatures. May react with certain metals to produce flammable hydrogen gas. Contact with water may cause violent reaction with evolution of heat. To dilute: Add product slowly to lukewarm water; not water to product. Hazardous gases are evolved on contact with chemicals such as cyanides, sulfides, carbides, etc. Contact with oxidizing agents may produce chlorine gas. May react violently with incompatible substances, releasing large amounts of heat.

Conditions to Avoid: Avoid elevated temperatures. Avoid heat, sparks or open flames. Keep away from incompatibles.

Incompatible Materials: Metals. Bases. Strong reducing agents. Oxidizing agents. Alcohols. Sulfides. Monomers (e.g. Styrene).

Hazardous Decomposition Products: Hydrogen chloride gas. Hydrogen gas. Chlorine.

SECTION 11: TOXICOLOGICAL INFORMATION

<u>Component</u>	<u>Oral LD50</u>	<u>Dermal LD50</u>	<u>Inhalation LC50</u>
Ferric Chloride	Rat: 450 mg/kg	No Data	No Data
Hydrogen Chloride	Rat: 700 mg/kg	Rabbit: > 5010 mg/kg	1H Rat: 3,124.0 ppm

Acute Toxicity Estimate (ATE):

Oral: 986 mg/kg

Routes of Exposure: Eyes. Ingestion. Inhalation. Skin.

Eye Contact: CORROSIVE-Causes severe irritation and burns. May cause: tearing. tissue discoloration. blurred vision. severe eye damage. blindness.

Skin Contact: CORROSIVE-Causes severe irritation and burns. Mists may cause: severe irritation. burns. Symptoms may include: drying. discomfort. severe burns. tissue damage. Prolonged or repeated exposure with dilute solutions may cause: dermatitis (inflammation of the skin). Contact may cause: permanent skin damage. ulceration. discoloration.

Skin Absorption: No absorption hazard expected under normal use.



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SECTION 11: TOXICOLOGICAL INFORMATION (CONTINUED)

Inhalation: CORROSIVE-Causes severe irritation and burns. Vapors or mists may irritate or burn: nose, throat, respiratory tract. Symptoms may include: burning sensation, coughing, shortness of breath, lung inflammation, pulmonary edema, choking, difficulty breathing, headache, rapid heart beat. Prolonged or severe overexposure may cause: tissue destruction, death. Effects may be delayed.

Ingestion: CORROSIVE-Causes severe irritation and burns. May irritate or burn: mouth, throat, digestive tract. Symptoms may include: nausea, vomiting, abdominal pain, diarrhea, coma, death. Effects may be delayed. May cause: abnormal kidney function, abnormal liver function. Aspiration can result in severe lung damage or death.

Medical Conditions Aggravated by Exposure to Product: Eye disorders, Respiratory system disorders, Skin disorders.

Other: Chronic or prolonged exposure may be associated with changes in pulmonary function, laryngitis, glottal edema, chronic bronchitis, dermatitis, erosion of tooth enamel, conjunctivitis and upper respiratory tract irritation.

Cancer Information:

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

SECTION 12: ECOLOGICAL INFORMATION

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

Chemical Fate Information: This product should not be allowed to enter drains or water courses or be deposited where it can affect ground or surface waters.

SECTION 13: DISPOSAL CONSIDERATIONS

Hazardous Waste Number: N.A.

Disposal Method: Dispose of in a permitted hazardous waste management facility following all local, state and federal regulations. Since emptied containers retain product residue, follow label warnings even after container is emptied. DO NOT pressurize, cut, weld, solder, drill, grind or expose empty containers to heat, flame, sparks or other sources of ignition. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.



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SECTION 14: TRANSPORT INFORMATION

DOT (Department of Transportation):

Identification Number: UN2582
 Proper Shipping Name: Ferric Chloride, Solution
 Hazard Class: 8
 Packing Group: III
 Label Required: CORROSIVE
 Reportable Quantity (RQ): 1000# (Ferric Chloride); 5000# (Hydrogen Chloride)

SECTION 15: REGULATORY INFORMATION

TSCA Inventory Status: All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements.

SARA Title III Section 311/312 Category Hazards:

<u>Immediate (Acute)</u>	<u>Delayed (Chronic)</u>	<u>Fire Hazard</u>	<u>Pressure Release</u>	<u>Reactive</u>
Yes	Yes	No	No	No

Regulated Components:

<u>Component</u>	<u>CAS</u> <u>Number</u>	<u>CERCLA</u> <u>RQ</u>	<u>SARA</u> <u>EHS</u>	<u>SARA</u> <u>313</u>	<u>U.S.</u> <u>HAP</u>	<u>WI</u> <u>HAP</u>	<u>Prop</u> <u>65</u>
Ferric Chloride	7705-08-0	Yes	No	No	No	Yes	No
Hydrogen Chloride	7647-01-0	Yes	Yes	Yes	Yes	Yes	No

Note: RQ, TPQ, Section 313 reporting requirements are dependent upon individual ingredients. Hydrogen Chloride (gas and aerosol forms 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 gas and aerosol forms of Hydrochloric Acid.



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SECTION 16: OTHER INFORMATION

Hazard Rating System

Health: 3*

Flammability: 0

Reactivity: 0

* = Chronic Health Hazard

NFPA Rating System

Health: 3

Flammability: 0

Reactivity: 0

Special Hazard: None

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

SECTION 17: DISCLAIMER

GC Electronics believes that the information contained herein is accurate and reliable as of the date of this material safety data sheet, but no representation guarantee or warranty, express or implied, is made as to the accuracy, reliability or completeness of the information. Persons receiving information are encouraged to make their own determination as to the information's suitability and completeness for their particular application. NO INFORMATION CONTAINED HEREIN CONSTITUTES A PRODUCT WARRANTY OF ANY KIND, WHETHER EXPRESS OR IMPLIED; AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED BY GC ELECTRONICS.