



FUJIFILM

MATERIAL SAFETY DATA SHEET

Product Number: 00000000000880085

FOR ANY HEALTH & MEDICAL EMERGENCY, 24 HOURS /7 DAYS CALL: 1-800-365-8951	
FOR ALL TRANSPORTATION ACCIDENTS, CALL CHEMTREC:	1-800-424-9300
FOR ALL MSDS REQUESTS & QUESTIONS, CALL CUSTOMER SERVICE:	1-800-553-6546

PRODUCT NAME: ALUMINUM ETCH 16:1:1:2; SEMI GRADE

1. PRODUCT AND COMPANY IDENTIFICATION

REVISION DATE: 03-30-2006
 SUPERCEDES: 12-19-2000

MSDS NO: 00379
 SYNONYMS: Metal etchants, aluminum etchants
 CHEMICAL FAMILY: Mixture
 DESCRIPTION / USE: Metal etch
 FORMULA: Not applicable/Mixture

FUJIFILM ELECTRONIC MATERIALS U.S.A., INC. 80 CIRCUIT ROAD NORTH KINGSTOWN, RI 02852

2. COMPOSITION / INFORMATION ON INGREDIENTS

CAS or CHEMICAL NAME	CAS #	% Range
Phosphoric acid	7664-38-2	60 - 80
Acetic acid	64-19-7	0 - 10
Nitric acid	7697-37-2	0.1 - 5

3. HAZARDS IDENTIFICATION

OSHA Hazard Classification: corrosive to eyes, corrosive to skin, corrosive to mucous membranes, skin hazard, eye hazard, lung toxin

Routes of Entry: Inhalation, skin, eyes, ingestion
 Chemical Interactions: No known interactions
 Medical Conditions Aggravated: Respiratory diseases including asthma and bronchitis, cardiovascular disease

Human Threshold Response Data

Odor Threshold:
 Acetic acid 0.48 ppm

Irritation Threshold:
 Acetic acid 10.0 ppm; 25.0 mg/cu m

Hazardous Materials Identification System/National Fire Protection Association Classifications

<u>Hazard Ratings:</u>	<u>Health</u>	<u>Flammability</u>	<u>Reactivity</u>
HMIS	3	0	1
NFPA	Not established		

Immediate (Acute) Health Effects

Inhalation Toxicity:	May be toxic if inhaled. May cause lung damage with high acute exposure.
Inhalation Irritation:	Inhalation of this material may produce severe irritating and/or corrosive effects to the nose, mouth, throat, and respiratory tract. It may cause burns which can result in symptoms which may include coughing, wheezing, choking, shortness of breath, chest pain, and impairment of lung function. Inhalation of high concentrations can also result in permanent lung damage. May cause pulmonary edema (fluid build-up in lungs).
Skin Contact:	Dermal exposure can cause severe irritation and/or burns characterized by redness, swelling, and scab formation. Prolonged skin exposure may cause permanent damage.
Eye Contact	Corrosive. Burns can occur following exposure. Direct contact may cause impairment of vision, corneal damage and/or blindness. Rinsing of the eye should take place immediately.
Ingestion Irritation:	Irritation and/or burns can occur to the entire gastrointestinal tract, including the stomach and intestines, characterized by nausea, vomiting, diarrhea, abdominal pain, bleeding, and/or tissue ulceration or perforation. Aspiration may lead to lung damage.
Ingestion Toxicity:	Toxic if swallowed.
Acute Target Organ Toxicity:	This product is corrosive to all tissues contacted and upon inhalation, may cause irritation to mucous membranes and respiratory tract.

Prolonged (Chronic) Health Effects

Carcinogenicity:	This product is not known or reported to be carcinogenic by any reference source including IARC, OSHA, NTP or EPA.
Reproductive and Developmental Toxicity:	No reproductive or developmental risk to humans is expected from exposure to this product.
Inhalation:	Prolonged or repeated exposure may cause continuous bronchitis. Prolonged or repeated inhalation may cause lung damage.
Skin Contact:	Prolonged or repeated exposure may cause extensive permanent skin damage.
Ingestion:	There are no known or reported effects from chronic ingestion except for effects similar to those experienced from single exposure. The acute corrosivity of this product, makes chronic ingestion of significant amounts unlikely.
Chronic Target Organ Toxicity:	Respiratory Tract, Skin, Eyes
Supplemental Health Hazard Information:	No additional health information available.

4. FIRST AID MEASURES

Inhalation:	IF INHALED: Remove individual to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Skin Contact:	IF ON SKIN: Immediately flush skin with plenty of water for 15 minutes. If clothing comes in contact with the product, the clothing should be removed immediately and should be laundered before re-use. Call a physician.

Eyes: IF IN EYES: Immediately flush eyes with plenty of water for at least 15 minutes while holding eyelids apart. Call a physician immediately.

Ingestion: IF SWALLOWED: Call a physician immediately. DO NOT induce vomiting unless directed to do so by a physician. Never give anything by mouth to an unconscious person.

5. FIRE FIGHTING MEASURES

Flammability Summary (OSHA): Product is not known to be flammable, combustible, pyrophoric or explosive. Reacts with most metals to form flammable hydrogen gas.

Flammable Properties

Flash Point: None

Autoignition Temperature: Not applicable

Upper Flammable/Explosive Limit, % in air: Not applicable

Lower Flammable/Explosive Limit, % in air: Not applicable

Fire/Explosion Hazards: Material will not ignite or burn. Reacts with most metals to form flammable hydrogen gas.

Extinguishing Media: Not Applicable. - Choose extinguishing media suitable for surrounding materials.

Fire Fighting Instructions: Response to this material requires the use of a full encapsulated suit and full-face (NIOSH approved) self-contained breathing apparatus (SCBA). Use water to cool containers.

Hazardous Combustion Products: Phosphorus compounds, carbon dioxide, carbon monoxide, Oxides of nitrogen

6. ACCIDENTAL RELEASE MEASURES

Personal Protection for Emergency Situations: Additional protective clothing must be worn to prevent personal contact with this material. Those items include but are not limited to boots, impervious gloves, hard hat, splash-proof goggles, impervious clothing, i.e., chemically impermeable suit, self-contained breathing apparatus.

Spill Mitigation Procedures

Air Release: Hazardous concentrations in air may be found in local spill area and immediately downwind. Vapors may be suppressed by the use of water fog. Contain all liquid for treatment and/or disposal as a (potential) hazardous waste. Hazardous concentrations in air may be found in local spill area and immediately downwind.

Water Release: This material is heavier than water. This material is soluble in water. Notify all downstream users of possible contamination. Contain all liquid for treatment and/or disposal as a (potential) hazardous waste.

Land Release: Create a dike or trench to contain materials. Cover with dry lime, sand or soda ash. Absorb spill with inert material (e.g., dry sand, clay, earth or commercial absorbent), then place in a chemical waste container.

Additional Spill Information: Stop source of spill as soon as possible and notify appropriate personnel. Utilize emergency response personal protection equipment prior to the start of any response. Evacuate all non-essential personnel. Dispose of spill residues per guidelines under Section 13, Disposal Consideration. This material may be neutralized for disposal.

7. HANDLING AND STORAGE

Handling: Do not take internally. Avoid contact with skin, eyes and clothing. Upon contact with skin or eyes, wash off with water. Avoid breathing (dust, vapor, mist, gas). Keep container closed when not in use. Use only with adequate ventilation.

Storage: Store in a cool, dry and well ventilated place. Isolate from incompatible materials. Store in a tightly closed container.

Shelf Life Limitations: See label or certificate of analysis for shelf life if applicable.

Incompatible Materials for Storage: Refer to Section 10, "Incompatible Materials."

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Ventilation: Local exhaust ventilation or other engineering controls are necessary when handling or using this product. Use local exhaust ventilation to maintain levels below exposure limits.

Protective Equipment for Routine Use of Product

Respiratory Protection: Wear a NIOSH approved respirator if any exposure occurs.

Respirator Type(s): A NIOSH approved full-face air purifying respirator with acid gas cartridge. Air purifying respirators should not be used in oxygen deficient or IDLH atmospheres or if exposure concentrations exceed ten (10) times the published limit.

Skin: Wear impervious gloves, boots and apron to avoid skin contact. A full impervious suit is recommended if exposure is possible to a large portion of the body.

Eyes: Use chemical goggles and a faceshield.

Protective Clothing Type: Neoprene

Other PPE: An eye wash and safety shower should be provided in the immediate work area.

Exposure Limit Data

CHEMICAL NAME	CAS #	OSHA PEL / STEL	ACGIH LIMITS	AIHA WEEL
Phosphoric acid	7664-38-2	1 mg/m ³ TWA	3 mg/m ³ STEL 1 mg/m ³ TWA	Not Established
Acetic acid	64-19-7	10 ppm TWA; 25 mg/m ³ TWA	15 ppm STEL 10 ppm TWA	Not Established
Nitric acid	7697-37-2	2 ppm TWA; 5 mg/m ³ TWA	4 ppm STEL 2 ppm TWA	Not Established

CHEMICAL NAME	NIOSH Immediately Dangerous to Life or Health:
Phosphoric acid	1000 mg/m ³ IDLH
Acetic acid	50 ppm IDLH
Nitric acid	25 ppm IDLH

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: clear liquid

Color: colorless to pale yellow

Odor: mild Vinegar like

Molecular Weight: Not Applicable/Mixture

pH: (@ 25 Deg. C) < 2 (1% solution in neutral, distilled water)

Octanol/Water Coeff: No data

Solubility in Water: Completely miscible

Bulk Density: 1.5 - 1.7 g/cc

Specific Gravity: 1.5 - 1.7

Vapor Density: No data

Vapor Pressure: (@ 25 Deg. C) No data
Evaporation Rate: < 1.00 (water = 1)
Volatiles, % by vol.: 15 - 30 %
Boiling Point: 118 - 121 Deg. C.
245 - 250 Deg. F.
Freezing Point: No data

10. STABILITY AND REACTIVITY

Stability and Reactivity Summary: Stable under normal conditions. Reacts with most metals to form flammable hydrogen gas. Not sensitive to static discharge. Not sensitive to mechanical shock.

Reactive Properties: Corrosive

Hazardous Polymerization: Will not occur

Conditions to Avoid: High temperatures

Chemical Incompatibility: metals, strong alkalis, strong oxidizing agents, sulfides, cyanides, organic materials, Polyethylene

Hazardous Decomposition Products: phosphorus oxides, hydrogen, oxides of nitrogen, Carbon monoxide, Carbon dioxide

Decomposition Temperature: No data

Product May Be Unstable At Temperatures Above: No data

11. TOXICOLOGICAL INFORMATION

Component Animal Toxicology

Oral LD50 value:
Phosphoric acid Rat Approximately 2 g/kg
Acetic acid Rat 3310 mg/kg

Dermal LD50 value:
Phosphoric acid Rabbit > 2 g/kg
Acetic acid Rabbit 1060 mg/kg

Inhalation LC50 value:
Acetic acid Inhalation LC50 (1h) Mouse 5620 ppm

Product Animal Toxicity (LD50 and/or LC50 values): No data.

Skin Irritation: This material is expected to be corrosive.

Eye Irritation: This material is expected to cause irreversible effects to the cornea with impairment of vision or corrosion to the eyes.

Reproductive and Developmental Toxicity: No reproductive or developmental risk to humans is expected from exposure to this product.

Mutagenicity: Not known or reported to be mutagenic.

Carcinogenicity: This chemical is not known or reported to be carcinogenic by any reference source including IARC, OSHA, NTP, or EPA.

12. ECOLOGICAL INFORMATION

Overview: Because of the low pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.

Ecological Toxicity Values:

Phosphoric acid

Mosquito fish (*Gambusia affinis*) 48 hr. LC50: = 138 mg/l.

13. DISPOSAL CONSIDERATIONS

CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL. THE USER OF THIS MATERIAL HAS THE RESPONSIBILITY TO DISPOSE OF UNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR HAZARDOUS AND NONHAZARDOUS WASTES.

Waste Disposal Summary: Spent or discarded material may be a hazardous waste.
Potential US EPA Waste Codes: D002
Disposal Methods: As a hazardous liquid waste, it must be disposed of in accordance with local, state and federal regulations in a permitted hazardous waste treatment, storage and disposal facility by treatment or incineration.

Components subject to land ban restrictions: Phosphoric acid (D002)
Acetic acid (D002)
Nitric acid (D002)

14. TRANSPORT INFORMATION

THIS MATERIAL IS REGULATED AS A DOT HAZARDOUS MATERIAL.

DOT Description (49 CFR 172.101):

Land (U.S. DOT): Corrosive liquids, N.O.S., (contains Phosphoric acid, Acetic acid) , 8 , UN1760 , PGII

Air (IATA/ICAO): SAME AS LAND

Water (IMO): SAME AS LAND

Hazard Label/Placard: (Primary) CORROSIVE

Phosphoric acid final RQ = 5000 pounds (2270 kg)

Acetic acid final RQ = 5000 pounds (2270 kg)

Nitric acid final RQ = 1000 pounds (454 kg)

Emergency Response Guide Number: 154

15. REGULATORY INFORMATION

UNITED STATES:

Toxic Substances Control Act (TSCA): The components of this product are listed on the TSCA Inventory of Existing Chemical Substances.

Pesticide acceptance indication: US EPA Registration Number: Not applicable

Superfund Amendments and Reauthorization Act (SARA) Title III:

Hazard Categories Sections 311/312 (40 CFR 370.2):

Health: Acute

Chronic

Physical: None

Emergency Planning & Community Right to Know (40 CFR 355, App. A):

Extremely Hazardous Substance Section 302 - Threshold Planning Quantity:

Nitric acid TPQ = 1000 pounds; RQ = 1000 pounds

Reportable Quantity (40 CFR 302.4):

Phosphoric acid final RQ = 5000 pounds (2270 kg)

Acetic acid final RQ = 5000 pounds (2270 kg)

Nitric acid final RQ = 1000 pounds (454 kg)

Supplier Notification Requirements (40 CFR 372.45), 313 Reportable Components

Phosphoric acid form R reporting required for 1.0% de minimis concentration
Nitric acid form R reporting required for 1.0% de minimis concentration

Clean Air Act VOC Section 111 Acetic acid
Clean Air Act Toxic ARP Section 112r Nitric acid

State Right-to-Know Regulations Status of Ingredients

Pennsylvania: Phosphoric acid
Acetic acid
Nitric acid
New Jersey: Phosphoric acid
Acetic acid
Nitric acid
Massachusetts: Phosphoric acid, Acetic acid, Nitric acid

16. OTHER INFORMATION

MSDS REVISION STATUS: Internal validation of previous revision (Prep 060059).

MAJOR REFERENCES: Available upon request.

THIS MATERIAL SAFETY DATA SHEET (MSDS) HAS BEEN PREPARED IN COMPLIANCE WITH THE FEDERAL OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200. THE INFORMATION IN THIS MSDS SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. FUJIFILM ELECTRONIC BELIEVES THIS INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION BUT, MAKES NO WARRANTY THAT IT IS. ADDITIONALLY, IF THIS MSDS IS MORE THAN THREE YEARS OLD, YOU SHOULD CONTACT FUJIFILM ELECTRONIC MATERIALS AT THE PHONE NUMBER 1-800-553-6546 (CUSTOMER SERVICE) TO MAKE CERTAIN DOCUMENT IS CURRENT.

FUJIFILM Electronic Materials U.S.A., Inc.
PO Box 10099
Mesa, AZ 85216
Telephone: 1-480-987-7000

Material # : 880085
 Product : Aluminum Etch 16:1:1:2; SE
 Batch# : M6C02CDV

Delivery Note # : 21260822
 Customer # : 503910
 Customer P.O.# : P193556

Packaging Config : 4 X 13 LB CASE

Customer Part # :
 Customer Spec.# : N/A
 Customer Rev.# : N/A

Manufacture Date : Mar/2006
 Expiration Date : 31/Mar/2008

Method	Parameter	Value	Specification		Unit
			Min	Max	
TPA25010	Acetic Acid	3.18	2.83	3.83	Wt%
TPA55010	Nitric Acid	3.09	2.64	3.64	Wt%
TPA25010	Phosphoric Acid	73.35	72.17	74.17	Wt%
TPA85120	Fluoride	< 10	0	10	ppm
TPA15003	Antimony	2.9	0.0	5.0	ppm
TPA15003	Arsenic	< 0.1	0.0	0.2	ppm
TPA15003	Calcium	< 0.1	0.0	2.0	ppm
TPA15003	Copper	< 0.1	0.0	1.0	ppm
TPA15003	Iron	0.6	0.0	3.0	ppm
TPA15003	Lithium	< 0.1	0.0	0.3	ppm
TPA15003	Magnesium	< 0.1	0.0	0.5	ppm
TPA15003	Manganese	< 0.1	0.0	0.2	ppm
TPA15003	Nickel	0.1	0.0	0.5	ppm
TPA15003	Potassium	< 0.1	0.0	2.0	ppm
TPA15003	Sodium	0.2	0.0	3.0	ppm
TPA15003	Strontium	< 0.1	0.0	1.0	ppm
TPA45050	Particles (> 0.5u)	86	0	100	p/mL
TPA45050	Particles (> 1.0u)	6	0	25	p/mL

CERTIFICATE OF COMPLIANCE

This is to certify that FUJIFILM Electronic Materials U.S.A., Inc. has conformed to all published procedures and specifications in the production of this material. This certificate of analysis was composed electronically.

Issued Date: 10/May/2006