MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Ultra Clean 160-AL

I. PRODUCT AND COMPANY IDENTIFICATION

REVISION DATE: 1/25/05

SYNONYMS:	Aluminum Brightener
CHEMICAL FAMILY:	Organic/Inorganic acid
DESCRIPTION / USE:	Acid
FORMULA:	Proprietary

Manufacture/Supplier:	Advanced Fluid Technologies
Address:	P.O. Box 505 Jackson, MI 49204 United States of America
Phone Numbers:	Phone - 517-796-9737 Fax –517-796-9738
Emergency Phone Numbers:	USA Chemtrec 800-424-9300 International Chemtrec 703-527-3887

II. COMPOSITION/INFORMATION ON INGREDIENTS

CAS or CHEMICAL NAME	CAS#	% Conc.
Hydrofluoric Acid	7664-39-3	>1.0%

III. HAZARDS IDENTIFICATION

OSHA Hazard Classification: corrosive to eyes, corrosive to skin, corrosive to mucous membrane, eye hazard, skin hazard, lung toxin, toxic by ingestion, highly toxic by inhalation

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: Hydrofluoric acid	0.042 ppm
Irritation Threshold: Hydrofluoric acid	3.0 ppm approximately

Ratings	Health	Flammability	Reactivity
HMIS	3	0	0
NFPA	Not established		

Immediate (Acute) Health Effects

Inhalation Toxicity: Highly toxic. Inhalation of high concentrations may be fatal.

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 functions. Inhalation of high concentrations

Can also result in permanent lung damage. Burns may or may not be immediately painful or visible.
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. Burns may or may not be immediately painful ox visible.
Skin Absorption: May be fatal or cause severe toxicity if absorbed through the skin.
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. Burns may or may not be immediately painful or visible.
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. Burns may or may not be immediately painful or visible.
Ingestion Toxicity: Toxic if swallowed. Aspiration of material into the lungs can cause chemical pneumonias, which can be fatal.
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 inhalation may cause lung damage. Prolonged exposure to high concentrations may cause dental discoloration and erosion.
Skin Contact: Prolonged or repeated exposure may cause 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, Bone, connective tissue and muscles, Skin, Eyes, Teeth, Liver, Kidneys.
Supplemental Health Hazard Information: Fluoride, at an acidic pH, is corrosive and causes immediate or delayed onset of deep penetrating injury and possible death.
Burns may or may not be immediately painful or visible. Fluorosis may occur which is characterized by increased density of bone. Fluoride may also deposit in tendons, ligaments and muscles. Such deposition may result in crippling effects. Nausea, vomiting, loss of appetite, diarrhea or constipation can occur. Mottling of teeth can occur.

IV. FIRST AID

Inhalation: IF INHALED: Remove individual to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Can a physician.
Skin Contact: IF ON SKIN: Immediately flush skin with water for 15 minutes. Remove and double-bag contaminated clothing white flushing exposed skin and hair with water

then cover exposed skin with one of the following preparations:
a) Calcium-containing gel (2.5 g calcium gluconate in 100 mL of water-soluble lubricant such as K-Y Jelly® or 1 ampule of 10% calcium gluconate per ounce of KY Jelly.

b) Aqueous quaternary ammonium salt (Zephiran® 0.13% solution) cooled with ice cubes, not crushed ice; or
c) Magnesium-containing solution (e.g., Maalox®, Epsom salts).
Seek medical attention immediately. If the above preparations are not available, continue irrigation with water and seek medical attention.
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.
Notes to Physician: Hydrogen fluoride is a corrosive chemical that can cause immediate or delayed onset of deep, penetrating injury and possible cardiac arrest RAPID DECONTAMINATION IS CRITICAL. Arrange ahead of time to provide first aid or medical treatment measures if necessary. Patients exposed only to hydrogen fluoride gas or vapor does not pose substantial risks of secondary contamination to personnel outside the area of the incident However, patients whose clothing or skin is contaminated with hydrogen fluoride liquid or solution can secondarily contaminate personnel by direct contact or through off-gassing vapor. Special precautions must be taken by treating personnel to avoid exposure. Hydrogen fluoride is a corrosive chemical that can cause immediate or delayed onset of deep, penetrating injury. Absorption of fluoride ion can cause hypocalcaemia, hypomagnesaemia, and hyperkalemia, which can result in cardiac arrest. Hypocalcaemia should be considered a risk in all instances of inhalation or ingestion and whenever skin bums exceed 25 square inches (an area about the size of the palm). Quickly ensure a patent airway. Ensure adequate respiration; administer supplemental oxygen if necessary. Attach a cardiac monitor. Monitor EKG for prolonged Q-T interval or QRS duration
EYES: Irrigate exposed eyes with a 1% aqueous solution of calcium gluconate (50 mL of 10% calcium gluconate solution in 450 mL of sterile saline) using a nasal prong or Morgan Therapeutic Lens. Up to 500 mL over 1 to 2 hours may be used. A topical anesthetic can minimize the tendency for eyelid closure and facilitate irrigation. An ophthalmologist should be consulted.
SKIN: Because of hydrogen fluoride's rapid skin penetration and the serious toxicity of the fluoride ion, rapid decontamination is critical. Calcium-containing gels, solutions, and medications can be used to neutralize the fluoride ion. The intense pain of hydrogen fluoride burns should not be suppressed with local anesthetics because the degree of pain is an indicator of treatment efficacy. Continuously massage the burned area with calcium gluconate gel (2.5 grams in 100 mL water-soluble lubricant such as K-Y Jelly until the pain is relieved If used as definitive treatment, the gel should be applied 4 to 6 times daily for 3 to 4 days. Initially, health care providers should wear rubber gloves to protect their fingers from secondary contamination. If some relief of pain is not obtained within 30 to 60 minutes, consider calcium gluconate injections.
Large burns or deeply penetrating bums (i.e., from delayed treatment or exposure to hydrogen fluoride concentrations greater than 50%) may require injections of sterile aqueous calcium gluconate into and around the burned area. Authorities in industry

currently recommend injections of 5% calcium gluconate solution using a small-gauge needle. Do not inject more than 0.5 mL per cm^2 of affected skin surface. No local infiltration of anesthetic should be used, but in the case of severe burns, regional or general

anesthesia may be considered. DO NOT INJECT CALCIUM CHLORIDE to treat skin burns. It will cause extreme pain and may further injure tissues.
HAND EXPOSURE: Sublungual burns often do not respond to immersion treatment and digital injections may compromise the circulation of the hand. Use of intra-arterial calcium gluconate may be indicated and the consultation of hand surgeon expert should be sought.
INGESTION: Do not give emetics and do not administer activated charcoal. If the patient is conscious and alert, and treatment has not been administered previously, immediately give 4 to 12 ounces of water to dilute the acid. Orally administer a one-time dose of several ounces of Mylanta®, Maalox, or milk of magnesia; the magnesium in these products may act chemically to bind the fluoride in the stomach. Consider gastric lavage with a small lumen tube. Consider obtaining a consultation wit a Gastroentrologist.
INHALATION: Calcium gluconate (2.5 mL of 10% calcium gluconate diluted to 100 mL with water) may be administered with oxygen by nebulizer to victims who have severe respiratory distress. Pulmonary edema or edema of the upper airway may occur. Observe the patient for at least 24 hours and monitor with repeated chest examination, blood gas determinations, and other appropriate tests,

V. 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 fully encapsulated suit and full-face (NIOSH approved) self-contained breathing apparatus (SCBA). Use water to cool containers.
Hazardous Combustion Products: Fluorine containing gases

VI. ACCIDENTAL RELEASE MEASURES

Personal Protection for Emergency Situations: Response to this material requires the use of a fully encapsulated suit and self- contained breathing apparatus (SCBA).
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.
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. Neutralize product as soon as possible using extreme caution. Product may be absorbed using earthen materials but only

those, which are free of silica. Place in containers compatible for this material in a liquid form.
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 XIII. Disposal Consideration This material may be neutralized for disposal.

VII: 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. Avoid direct exposure to sunlight or ultraviolet (UV) light sources.
Incompatible Materials for Storage: Glass, Refer to Section 10, "Incompatible Materials."

VIII. 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, Respirator Type(s): Wear a NIOSH approved respirator if any exposure occurs. A NIOSH approved full-face air purifying respirator with acid gas cartridge and dust/mist filter. 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 face shield.
Protective Clothing Type: Butyl rubber, Saranex
Other PPE: An eyewash and safety shower should be provided in the immediate work area.
Exposure Limit Data

CHEMICAL NAME	CAS#	OSHA PEL/STEL	ACGIH LIMITS
Hydrogen fluoride	7664-39-3	3 ppm TWA	as F°: C 3 ppm
Hydrogen fluoride	7664-39-3	NIOSH Immediately Dangerous to Life or Health as F°: C 3o ppm IDLH	

IX. PHYSICAL DATA

Physical State:	Clear Liquid
Color:	Colorless
Odor	Irritating
pH	(@25Deg. C) < 2(1% solution in neutral, distilled water)
Solubility in Water	Completely miscible
Specific Gravity:	1.02 -1.153
Vapor Density:	No data
Vapor Pressure:	(@ 25 Deg. C) No data
Evaporation Rate:	No data
Volatiles, % by vol.:	90 %
Boiling Point:	95 -115 C (203- 239 F).
Freezing Point:	0 C (32 F).

X. STABILITY AND REACTIVITY

Stability and Reactivity Summary: Stable under normal conditions. Not sensitive to mechanical shock. Not sensitive to static discharge. Reacts with most metals to form flammable hydrogen gas.
Reactive Properties: Corrosive
Hazardous Polymerization: Will not occur
Conditions to Avoid: High temperatures
Chemical Incompatibility: Strong alkalis, metals, strong oxidizing agents, sulfides, cyanides, glass, silica.
Hazardous Decomposition Products: Hydrogen, fluorine containing gases, silicon tetrafluoride
Decomposition Temperature: No data
Product May Be Unstable At Temperatures Above: > 500 C. > 932 F.

XI. TOXICOLOGICAL INFORMATION

Component Animal Toxicology
Oral LD50 value: No data
Dermal LD50 value: No data
Inhalation LC50 value:
Hydrofluoric acid: Inhalation LC50 (Ih) Rhesus monkey = 1774 ppm
Inhalation LC50(lh) Rat =1276 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: Industrial exposures kept at or below occupational exposures standards should not pose a reproductive or developmental toxicity hazard.
Component Data:
Hydrofluoric acid: Exposure to levels of approximately 30 ppm have resulted in male reproductive effects.

Mutagenicity: Not known or reported to be mutagenic.
Component Data:
Hydrofluoric acid: There are some reports in the literature that suggest that exposure to this chemical may produce effects on genetic material. These tests have not been well substantiated and are not conclusive on the mutagenic potential in humans
Carcinogenicity: This chemical is not known or reported to be carcinogenic by any reference source including IARC, OSHA, NTP, or EPA.

XII. 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. There is some evidence that values of 1.5 mg fluoride/liter of water may cause slight effects on some species offish. At levels greater than 100 mg fluoride/liter of water, lethality in several species has been reported.
Ecological Toxicity Values: No data

XIII. 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 U134
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: Hydrofluoric acid (D002)

XIV. TRANSPORTATION INFORMATION

THIS MATERIAL IS REGULATED AS A DOT HAZARDOUS MATERIAL.
DOT Description (49 CFR 172.101):
Land (U.S. DOT): Hydrofluoric acid, solution, 8, UN1790, PGH, (6.1)
Air (IATA/ICAO): SAME AS LAND
Water (IMO): SAME AS LAND
Hazard Label/Placard: (Primary) CORROSIVE
(Subsidiary) TOXIC
Reportable Quantity (49 CFR 172.101, Appendix):
Hydrogen fluoride: Final RQ = 100 pounds (45.4 kg); also listed as Hydrofluoric acid
Emergency Response Guide Number: 157

XV. 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:
Hydrogen fluoride TPQ = 100 pounds; RQ = 100 pounds
Reportable Quantity (40 CFR 302.4):
Hydrogen fluoride Final RQ = 100 pounds (45.4 kg)

Supplier Notification Requirements (40 CFR 372.45). 313 Reportable Components
Hydrogen fluoride Form R reporting required for 1.0% de minimis concentration

Clean Air Act Toxic ARP Section 112r Hydrogen fluoride (Hydrofluoric acid)
State Right-to-Know Regulations Status of Ingredients
Pennsylvania: Hydrofluoric acid
New Jersey: Hydrogen fluoride
Massachusetts: Hydrogen fluoride

XVI. ADDITIONAL INFORMATION

MAJOR REFERENCES:

- NIOSH Criteria for a recommended standard...occupational exposure to hydrogen fluoride. National Institute for Occupational Safety and Health, Washington, D.C., 1976.
- Edelman, P. Hydrofluoric acid burns. State of the Art Reviews: Occupational Medicine, Vol. 1,89-103, 1986.
- American Medical Association. Effects of Toxic Chemicals on the Reproductive System. Council on Scientific Affairs, Advisory Panel on Reproductive Hazards in the Workplace, Chicago, IL, 1985.
- Gerdes, R. A., Smith, J.D. and Applegate, H.G. The effects of atmospheric hydrogen fluoride upon Drosophila melanogaster. Atmospheric Environment, Vol. 5,117-122,1971.
- Voroshilin, S., Plotko, E., and Nikiforova, V. Mutagenic effect of hydrogen fluoride in animals. Tsitologryal Genetika, Vol. 9,42-44,1975.
- California State Water Resources Board. Water Quality Criteria, Second Edition California Institute of Technology, Pasadena, California, May 1963.
- Amoore, J.E. and Hautala,E. Odor as an Aid to Chemical Safety. Odor Thresholds Compared with TLVs and Volatiles for 214 Industrial Chemicals in Air and Water Dilutioa J. Applied Toxicology, Vol 3(6): 272-282. 1983.

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