ACSI Material Safety Data Sheet

NOE Etch I **MSDS No. 57401**

Date of Preparation: April 24, 1996 Revision Date: 9/24/98 Revision: A-3

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: NOE Etch I
Chemical Formula: Not applicable
Other Designations: None
General Use: Oxide etching
Manufacturer: ACSI, Inc., 510 Alder Drive, Milpitas, CA 95035-7443
Phone: 408-321-8900
FAX: 408-321-9321
Hours of operation: 9 A.M. to 5 P.M. (P.S.T.)
CHEMTREC 24 Hour Emergency Phone Number: 800-424-9300

Section 2 - Information on Hazardous Ingredients (This may not be a complete list of components)

Ingredient Name	CAS Number	% wt
Ammonium Fluoride	12125-01-8	≤ 10
Ethylene Glycol	107-21-6	≤ 99

	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH
Ingredient	**TWA**	**STEL**	**TWA**	**STEL**	**TWA**	**STEL**	**IDLH**
Ammonium fluoride (as F)	2.5 mg/m^3	none estab.	2.5 mg/m^3	none estab.	2.5 mg/m^3	none estab.	250 mg/m^3
Ethylene glycol	none estab.	none estab.	50 ppm 127 mg/m^3 (ceiling)	none estab.	none estab.	none estab.	none estab.

Section 3 - Hazards Identification

☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

Colorless liquid. Causes eye and skin burns which may not be immediately apparent. Combustible.

Potential Health Effects

Target Organs: Ammonium fluoride: skin, bone, eyes, lungs
Ethylene glycol: eyes, skin, liver, kidney, central nervous system

Acute Effects

Inhalation: Mist may cause damage to nasal and respiratory passages.

Eye: Causes severe damage and even blindness very rapidly.

Skin: Both the liquid and vapor cause severe burns which may not be immediately painful or visible.

Ingestion: Results in severe damage to mucous membranes and deep tissues. Causes acute systemic toxicity. Ethylene glycol causes gastrointestinal irritation, nausea, vomiting, and diarrhea. Excessuve exposure to ethylene glycol may cause central nervous system effects (metabolic acidosis), and kidney failure.

Carcinogenicity: IARC, NTP, and OSHA do not list any components as carcinogens.

Medical Conditions Aggravated by Long-Term Exposure: Skin, eye, and respiratory conditions.

Chronic Effects: Repeated, prolonged overexposure to inorganic fluoride compounds may result in increased bone density, fluorosis, digestive disturbances, loss of weight, anemia, diseases of the teeth. Ethylene glycol has been shown to produce dose-related teratogenic effects in rats and mice when given by gavage (forced feeding) or in drinking water at high concentrations. While there is currently no information to suggest that Ethylene glycol has caused birth defects in humans, it is recommended that every effort be made to keep personnel exposure below the ACGIH CEILING. Overexposure to Ethylene glycol has caused kidney damage in laboratory animals. Overexposure to Ethylene glycol has been suggested as a cause of liver abnormalities, kidney damage, and central nervous effects in humans.

Section 4 - First Aid Measures

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Keep victim warm and quiet.

Eye Contact: Immediately flush with large amounts of water for at least 15 minutes lifting upper and lower lids occasionally.

Skin Contact: Immediately flush with large quantities of cool water for at least 15 minutes. Remove contaminated clothing. Launder contaminated clothing before re-use. Discard shoes saturated with this product.

Ingestion: DO NOT induce vomiting. Vomiting will cause further damage to the throat. Dilute by giving water. Give milk of magnesia. Keep victim warm and quiet.

Seek immediate in-plant, paramedic, or community medical support for all medical emergencies.

Note to Physicians: Early administration of ethanol may counter the toxic effects of Ethylene glycol--metabolic acidosis and renal damage. Hemodialysis or peritoneal dialysis have been of benefit. New England J. Med. 304:21 1981. Supportive care. Treatment based on judgment of the physician in response to reaction of the patient.

Section 5 - Fire-Fighting Measures

Flash Point: 119°C (for ethylene glycol) (246 F)

Flash Point Method: Stetaflash closed tester

Autoignition Temperature: 398°C

LEL: 3.2%

UEL: Not determined

Flammability Classification: IIIB

Extinguishing Media: Water fog, carbon dioxide, dry chemical. Alcohol resistant foams (ATC type) are preferred if available. General purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively.

Unusual Fire or Explosion Hazards: Acid reacts with most metals to release hydrogen gas, which can form explosive mixtures with air.

Hazardous Combustion Products: May form hydrogen fluoride acid vapors, carbon monoxide, carbon dioxide, and trace amounts of aldehydes and organic acids.

Fire-Fighting Instructions: Do not release runoff from fire control methods to sewers or waterways.

Fire-Fighting Equipment: Water may be used to keep fire-exposed containers cool until fire is out. Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in positive pressure demand mode when fighting fires.

Section 6 - Accidental Release Measures

Spill /Leak Procedures

Small Spills: Wearing appropriate personal protective equipment, contain the spill. Using an inert material (e.g. dry sand or earth), absorb material. Place in suitable container. Dispose of in accordance with local, state, and federal regulations.

Large Spills: Shut off and eliminate all ignition sources. Personnel not wearing protective equipment should be excluded from the area of spill until clean-up is completed. Stop spill at source. Dike to prevent spreading. Pump to salvage tank. Add sand, earth, or other suitable absorbent to remaining spill and dispose of in accordance with federal state and local regulations.

Regulatory Requirements: Follow applicable EPA (40 CFR) and OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Do not get in eyes, skin, or clothing. Wash thoroughly after handling. Since emptied containers contain product residues, all hazard precautions given in this data sheet must be observed.

Storage Requirements: Store in a cool, dry area. Keep away from heat, sparks, and flame. Keep away from incompatibles.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls

Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative Controls

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres*. If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Protective Clothing/Equipment: Wear chemically protective gloves such as polyvinyl chloride or neoprene, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear chemical splash goggles and face shield per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protective devices. Appropriate eye protection must be worn instead of, or in conjunction with contact lenses.

Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes (properly dispose if saturated) and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance and Odor: Colorless with weak to moderate acid odor
Vapor Pressure: 0.12 mm Hg at 25 °C
Vapor Density (Air=1): 2.14
Formula Weight: Not applicable

Specific Gravity (H_2O=1, at 4 °C): ≈1
pH: ≈ 7
Water Solubility: complete
Boiling Point: 197°C @760 mm Hg
% Volatile: 90-100
Evaporation Rate: slower than ether

Section 10 - Stability and Reactivity

Stability: Stable at room temperature in closed containers under normal storage and handling conditions. Ethylene glycol will ignite in air at 413°C

Polymerization: Hazardous polymerization cannot occur.

Chemical Incompatibilities: Strong oxidizing or dehydrating agents, materials that will react with hydroxyl compounds. Contact with strong acids or bases may result in explosive decomposition at elevated temperatures. According to Sax (8th edition) Ammonium fluoride is incompatible Chlorine trifluoride.

Conditions to Avoid: Do not store in unmarked containers.

Hazardous Decomposition Products: May form ammonia, hydrogen fluoride acid vapors, carbon dioxide, carbon monoxide. Other products may be formed depending on environmental conditions.

Section 11- Toxicological Information

Toxicity Data:*

Eye Effects:
Ethylene glycol
eye-rat 12 mg/m^3/3D
eye-rbt 500 mg/24H MLD
eye-rbt 100 mg/1H MLD

Skin Effects:
Ammonium fluoride:
scu-frg LD_{Lo}: 280 mg/kg
Ethylene glycol
skn-rbt 555 mg open MLD
scu-rat LD_{50}: 2800 mg/kg
scu-mus LD_{Lo}: 2700 mg/kg

Carcinogenicity: None listed

Mutagenicity:
Ethylene glycol
dni-hmn: lym 320 mmol/L
msc-mus: lym 100 mmol/L

Teratogenicity:
Ethylene glycol
orl-rat TD_{Lo}: 8580 mg/kg (female 6-15D post): TER

Acute Inhalation Effects:
Ethylene glycol
ihl-hmn TC_{Lo}: 10000 mg/ m^3: EYE, PUL

Acute Oral Effects:
Ethylene glycol
orl-mus TD_{Lo}: 84 mg/kg (female 1-21D post): REP
orl-chd TD_{Lo}: 5500 mg/kg: CNS,PUL,KID
orl-hmn LD_{Lo}: 786 mg/kg
orl-hmn LD_{Lo}: 398 mg/kg: CNS,GIT,LIV
orl-rat LD_{50}: 4700 mg/kg
orl-mus LD_{50}: 7500 mg/kg

* Information taken from Sax's Dangerous Properties of Industrial Materials (8th Edition).

Section 12 - Ecological Information

Movement and Partitioning: Bioconcentration potential of Ethylene glycol is low (BCF < 100 or Kow log <3). Log octanol/water partition coefficient (log Kow) is -1.36. Henry's Law Constant (H) is 6.0 x 10^{-8} atm-m^3/mol. Bioconcntration factor (BCF) is 10 in golden orfe.

Degradation and Transformation: Biodegradation of Ethylene glycol under aerobic static laboratory conditions is high (BOD_{20} or BOD_{28}/ThOD > 40%). BOD_5 (5-day biochemical oxygen demand) is 0.78 p/p. BOD_{10} is 1.06 p/p. BOD_{20} is 1.15 p/p. ThOD (theoretical oxygen demand) is calculated to be 1.29

p/p. Biodegradation may occur under both aerobic and anaerobic conditions. Inhibitory concentration (IC_{50}) in OECDD "Activated Sludge, Respiration Inhibition Test" (Guideline #209) is < 1000 mg/L. Degradation is expected in the atmospheric environment within days to weeks.

Ecotoxicology: Ethylene glycol is practically non-toxic to aquatic organisms based on an acute basis (LC_{50} > 100 mg/L in most sensitive species).

Environmental information for ammonium fluoride is not available.

Section 13 - Disposal Considerations

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Container Cleaning and Disposal: Containers of this material may be hazardous when emptied. Since emptied containers contain product residues, all hazard precautions given in this data sheet must be observed.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name: Non-regulated
Hazard Class: None
ID No.: None
Packing Group: None
Label: None
Special Provisions (172.102): None

Section 15 - Regulatory Information

EPA Regulations:

RCRA Hazardous Waste Number(40 CFR 261.33): None listed

RCRA Hazardous Waste Classification (40 CFR 261.??): None specifically classified. May apply depending upon the nature of the waste.

CERCLA Hazardous Substance (40 CFR 302.4) listed specific per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307(a), CAA, Sec. 112:
Ammonium Fluoride
Ethylene glycol

CERCLA Reportable Quantity (RQ):
Ammonium Fluoride 100 lbs (45.4 kgs)
Ethylene glycol 1 lb (0.454 kg)

SARA 311/312 Codes: Immediate (acute) health hazard, Delayed (chronic) health hazard
SARA Toxic Chemical (40 CFR 372.65):
Ethylene glycol
SARA EHS (Extremely Hazardous Substance) (40 CFR 355) Threshold Planning Quantity (TPQ):
None listed
SARA Title III Section 313 Reporting Requirements:
Ethylene glycol

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A):
Ammonium Fluoride

OSHA Specifically Regulated Substance (29CFR 1910.????): None listed

State Regulations: (The following substances are specifically listed in the state regulations. In some cases chemicals are not listed, but are regulated in broader terms by the states. See state regulations for details.

California Proposition 65 Chemicals: None listed

Massachusetts Substance List:
Ammonium Fluoride
Ethylene glycol

New Jersey Right to Know Hazardous Substance List:
Ammonium Fluoride
Ethylene glycol

Pennsylvania Hazardous Substance List:
Ammonium Fluoride
Ethylene glycol

Hydrofluoric AcidSection 16 - Other Information

Revision Notes: Revised ACSI part number 9/24/98

Additional Hazard Rating Systems: None

Disclaimer: While ACSI believes that the data contained herein are factual, and the opinions expressed are of qualified experts regarding the results of tests conducted, the data are not to be taken as warranty or representation for which ACSI assumes legal responsibility. The data are offered solely for consideration, investigation, and verification. Any use of this data and information must be determined by the user to be in accordance with federal, state, and local laws and regulations.