



PURITAN PRODUCTS

Effective Date: 02/05/16

Replaces Revision: 01/01/13, 09/14/09

NON-EMERGENCY TELEPHONE
610-866-4225

24-HOUR CHEMTREC EMERGENCY TELEPHONE
800-424-9300

SDS – SAFETY DATA SHEET

1. Identification

Product Identifier: BUFFERED OXIDE ETCH

Synonyms: Aqueous NH₄-HF Etchant Solutions

Chemical Formula: Not applicable to mixtures

Recommended Use of the Chemical and Restrictions On Use: Laboratory Reagent

Manufacturer / Supplier: Puritan Products; 2290 Avenue A, Bethlehem, PA 18017 **Phone:** 610-866-4225

Emergency Phone Number: 24-Hour Chemtrec Emergency Telephone 800-424-9300

2. Hazard(s) Identification

Classification of the Substance or Mixture:

Acute toxicity, Oral (Category 2)

Acute toxicity, Inhalation (Category 2)

Acute toxicity, Dermal (Category 1)

Skin corrosion (Category 1A)

Serious eye damage (Category 1)

Risk Phrases:

Symbol: T, C

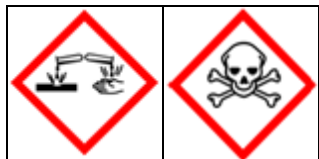
R 26/27/28: Very toxic by inhalation, in contact with skin and if swallowed.

R35: Causes severe burns.

Label Elements:

Trade Name: BUFFERED OXIDE ETCH

Signal Word: Danger



Hazard Statements:

H300 + H310: Fatal if swallowed or in contact with skin.

H314: Causes severe skin burns and eye damage.

H330: Fatal if inhaled.

Precautionary Statements:

P260: Do not breathe dust/ fume/ gas/ mist/ vapors / spray.

P264: Wash hands thoroughly after handling.

P280: Wear protective gloves / protective clothing / eye protection/ face protection.

P284: Wear respiratory protection.

P302 + P350: IF ON SKIN: Gently wash with plenty of soap and water.

P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310: Immediately call a POISON CENTER or doctor / physician.

3. Composition / Information on Ingredients

CAS Number: Not applicable to mixtures

EC Number: Not applicable to mixtures

Molecular Weight: Not applicable to mixtures

Ingredient	CAS Number	EC Number	Percent	Hazardous	Chemical Characterization
Ammonium Fluoride	12125-01-8	009-006-00-8	30 - 50%	Yes	Substance
Hydrogen Fluoride	7664-39-3	231-634-8	0.5 - 10%	Yes	Substance
Water	7732-18-5	231-791-2	40 - 70%	No	Mixture

4. First-aid Measures

For any route of contact: Detailed First Aid procedure should be planned before beginning work with HF. In all cases, immediately call a POISON CENTER or doctor/ physician.

Inhalation: Get medical help immediately. If patient is unconscious, give artificial respiration or use inhalator. Keep patient warm and resting, and send to hospital after first aid is complete.

Ingestion: DO NOT INDUCE VOMITING! Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

- 1) Remove the victim from the contaminated area and immediately place him under a safety shower or wash him with a water hose, whichever is available.
- 2) Remove all contaminated clothing. Handle all HF-contaminated material with gloves made of appropriate material, such as PVC or neoprene.
- 3) Keep washing with large amounts of water for a minimum of 15 minutes.
- 4) Have someone make arrangements for medical attention while you continue flushing the affected area with water.
- 5) If the following materials are available, limit the washing to five minutes and immerse the burned area in a solution of 0.2% iced aqueous *Hyamine 1622 or 0.13% iced aqueous **Zephiran Chloride. If immersion is not practical, towels should be soaked with one of the above solutions and used as compresses for the burn area. Ideally compresses should be changed every 2 minutes. Alternately, 2.5% calcium gluconate gel should be massaged into the affected area.

- 6) Seek medical attention as soon as possible for all burns regardless of how minor they may appear initially.
 - * Hyamine 1622 is a trade name for Tetracaine Benzethonium Chloride, Merck Index Monograph 1078, a quaternary ammonium compound sold by Rohm & Haas, Philadelphia.
 - ** Zephiran Chloride is a trade name for Benzalkonium Chloride, Merck Index Monograph 1059, also a quaternary ammonium compound, sold by Sanofi-Synthelabo Inc., New York, NY.

Eye Contact:

- 1) Irrigate eyes for at least 30 minutes with copious quantities of water, keeping the eyelids apart and away from eyeballs during irrigation.
- 2) Get competent medical attention immediately, preferably an eye specialist.
- 3) If a physician is not immediately available, apply one or two drops of ophthalmic anesthetic, (e.g., 0.5% Pontocaine Hydrochloride solution.)
- 4) Do not use oily drops, ointment or HF skin burn treatments. Place ice pack on eyes until reaching emergency room.

Note to Physician:

General: For burns of moderate areas, (greater than 8 square inches,) ingestion and significant inhalation exposure, severe systemic effects may occur, and admission to a critical care unit should be considered. Monitor and correct for hypocalcemia, cardiac arrhythmias, hypomagnesemia, and hyperkalemia. In some cases renal dialysis may be indicated. For certain burns, especially of the digits, use of intra-arterial calcium gluconate may be indicated

Inhalation: Treat as chemical pneumonia. Monitor for hypocalcemia, 2.5% calcium gluconate in normal saline by nebulizer or by IPPB with 100% Oxygen may decrease pulmonary damage. Bronchodilators may also be administered.

Skin: For deep skin burns or contact with concentrated HF (over 50%) solution, consider infiltration about the affected area with 5% calcium gluconate (equal parts of 10% calcium gluconate and sterile saline for injection.) Burns beneath the nail may require splitting the nail and application of calcium gluconate to the exposed nail bed. For certain burns, especially of the digits, use of intra-arterial calcium gluconate may be indicated.

Eyes: Irrigation may be facilitated by use of Morgan lens or similar ocular irrigator, using 1% aqueous calcium gluconate solution (50ml of calcium gluconate 10% in 500 ml normal saline.)

Medical Surveillance: Provide physical examinations of exposed personnel every six months including fluoride determinations in urine, studies of liver and kidney function: chest X-ray, annually. Protect from exposure those individuals with diseases of kidneys, liver, and lung. (ITII. Toxic and Hazardous Industrial Chemicals Safety Manual.)

An Alternative First Aid Procedure:

Hydrofluoric Acid (HF) is a highly corrosive and toxic acid, even in a dilute form. It can severely damage the skin and eyes causing severe burns which are extremely painful. Additionally, the vapor from anhydrous HF or its concentrated solutions can cause damage to skin, eyes and the respiratory system. HF differs from other strong acids in that it not only causes surface burns but rapidly penetrates the skin, even in dilute solution, and causes destruction of underlying tissue and even bone by the extraction of Calcium. For this reason, washing the burn with water is not sufficient. A neutralizing agent which will also penetrate the skin is required.

The effect of HF, i.e. onset of pain, particularly in dilute solutions, may not be felt for up to 24 hours. It is important, therefore, that persons using HF have immediate access to an effective antidote even when they are away from their work place in order that first aid treatment can be commenced immediately.

It has been conclusively shown (references 1,2,3 and 4 below) that flushing the affected area with water for one minute and then massaging HF Antidote Gel into the wound until there is a cessation of pain is the most effective first aid treatment available. HF Antidote Gel contains Calcium Gluconate which combines with HF to form insoluble Calcium Fluoride, thus preventing the extraction of Calcium from the body tissue and bones.

HF Antidote Gel is available in 25g tubes. Since the effects of the dilute acid may not be apparent for some hours, we recommend that any person in contact with HF should carry, or have access to a tube of HF Antidote Gel at all times; ideally with one tube at the work place, one on the person and one at home.

It is imperative that any person who has been contaminated by HF should seek medical advice when the treatment by HF Antidote Gel has been applied.

For safety's sake, we believe that HF Antidote Gel should be issued to all employees who may come into contact with HF.

EYE INJURIES: Irrigate the affected part immediately with copious amounts of cold water. Urgent medical advice must be sought. HF Antidote Gel is NOT for use in the eye. It is imperative that any person who has been contaminated by HF should seek medical advice even when the treatment by HF Antidote Gel has been applied.

References:

- 1) Brown, T.D. Treatment of Hydrofluoric Acid Burns
- 2) Sprout, W.L. et al Treatment of Severe Hydrofluoric Acid Exposures (Journal of American Occupational Medicine 25:12, 1993)
- 3) Bracken, W.M. et al Comparative Effectiveness of Topical Treatments for Hydrofluoric Acid Burns, University of Kansas (Journal of Occupational Medicine 27:10:1985)
- 4) Burke, W.J. , et al Systemic Fluoride Poisoning Resulting from A Fluoride Skin Burn (Journal of Occupational Medicine (5,39:1973)

HF ANTIDOTE GEL:
Distributed by Pharmascience Inc.
8400 Darnley Rd. Montreal, Canada. H4T 1M4
Phone: (514) 340 - 1114
Fax: (514) 342 - 7764
U.S. (Buffalo, NY) distributor: 1-800-207-4477

5. Fire-fighting Measures

Fire: Not considered to be a fire hazard. If involved in a fire, can emit toxic fumes and irritating and corrosive gases.

Explosion: Violent exothermic reaction occurs with water. Sufficient heat may be produced to ignite combustible materials. Reacts with metals forming flammable Hydrogen gas.

Fire Extinguishing Media: Keep upwind of fire. Use water or carbon dioxide on fires in which Hydrofluoric Acid is involved. Halon or foam may also be used. In case of fire, the sealed containers can be kept cool by spraying with water.

Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode. Avoid getting water in tanks or drums; water can cause generation of heat and spattering. In contact with air, the acid gives off corrosive fumes which are heavier than air.

6. Accidental Release Measures

Personal Precautions, Protective Equipment and Emergency Procedures: Notify safety personnel, provide adequate ventilation, and remove ignition sources since Hydrogen may be generated by reactions with metals. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Evacuate the danger area. Keep unnecessary and unprotected personnel from entering.

Environmental Precautions and Methods and Materials for Containment and Cleaning Up: Apply magnesium sulfate (dry) to the spill area. Follow up with inert absorbent and add soda ash or magnesium oxide and slaked lime. Collect in appropriate plastic containers and save for disposal. Wash spill site with soda ash solution. NOTE: Porous materials (concrete, wood, plastic, etc.) will absorb HF and become a hazard for an indefinite time. Such spills should be cleaned and neutralized immediately. Do not flush to sewers or waterways! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Precautions for Safe Handling and Conditions for Safe Storage, Including Any Incompatibilities: Keep in tightly closed polyethylene containers. Store in a cool, dry place with adequate ventilation separated from other chemicals. Protect from physical damage. Storage facilities should be constructed for containment and neutralization of spills. Handling and storage of HF requires special materials and technology for containers, pipes, valves, etc., which is available from suppliers. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls / Personal Protection

Airborne Exposure Limits:

For Hydrogen Fluoride:

OSHA Permissible Exposure Limit (PEL) - 3 ppm (TWA)

ACGIH Threshold Limit Value (TLV) - 3 ppm Ceiling as F

Ventilation System: A system of local and / or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved): If the exposure limit is exceeded, a full face piece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full face piece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in Oxygen-deficient atmospheres. Since the IDLH is low (30 ppm,) the above cartridge system is not specifically approved for HF (reference - 3M Respirator Selection Guide.)

Skin Protection: Wear protective clothing, including boots or safety shoes with polyvinyl chloride (PVC) or neoprene. Use chemical goggles and / or a full face shield. Wear coveralls with long sleeves, gauntlets and gloves of PVC or neoprene. A high degree of protection is obtained with an air-inflated suit with mask and safety belt. Use protection suitable for conditions.

Eye Protection: Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance: Colorless liquid.

Odor: Acrid odor - do not breathe fumes

Odor Threshold: No information found

pH: 1.0 (0.1M HF)

% Volatiles by volume @ 21C (70F): 80

Melting Point: 18C (64F)

Boiling Point / Boiling Range: No information found

Flash Point: Not applicable

Evaporation Rate (BuAC=1): Not determined
Flammability: Not applicable
Upper / Lower Flammability or Explosive Limits: Not applicable
Vapor Pressure (mm Hg): No information found
Vapor Density (Air=1): No information found
Relative Density: No information found
Solubility: Soluble in water
Partition Coefficient: n-octanol / water: No information found
Auto-ignition Temperature: No information found
Decomposition Temperature: No information found
Viscosity: No information found

10. Stability and Reactivity

Reactivity and / or Chemical Stability: Stable at room temperature (68F) when stored and used under proper conditions.

Possibility of Hazardous Reactions and Conditions to Avoid: Heat, moisture and incompatibles.

Incompatible Materials: Hydrofluoric Acid is incompatible with Arsenic Trioxide, Phosphorus Pentoxide, Ammonia, Calcium Oxide, Sodium Hydroxide, Sulfuric Acid, Vinyl Acetate, Ethylenediamine, Acetic Anhydride, alkalis, organic materials, most common metals, rubber, leather, water, strong bases, carbonates, sulfides, cyanides, oxides of Silicon, especially glass, concrete, silica, Fluorine. Will also react with steam or water to produce toxic fumes. Ammonium Fluoride reacts with strong acids to produce hazardous Hydrogen Fluoride gas or Hydrofluoric Acid. Reacts with strong bases to yield Ammonia. Avoid strong oxidizing agents.

Hazardous Decomposition Products: On contact with metals, liberates Hydrogen gas. On heating to decomposition, could yield toxic fumes of Fluorides, Nitric Oxides and Ammonia. Attacks glass and other silicon containing compounds. Reacts with silica to produce Silicon Tetrafluoride, a hazardous colorless gas.

11. Toxicological Information

Emergency Overview: POISON! DANGER! CORROSIVE. EXTREMELY HAZARDOUS LIQUID AND VAPOR. CAUSES SEVERE BURNS WHICH MAY NOT BE IMMEDIATELY PAINFUL OR VISIBLE. MAY BE FATAL IF SWALLOWED OR INHALED. LIQUID AND VAPOR CAN BURN SKIN, EYES AND RESPIRATORY TRACT. CAUSES BONE DAMAGE. AFFECTS RESPIRATORY SYSTEM, HEART, CIRCULATORY SYSTEM, CENTRAL NERVOUS SYSTEM AND KIDNEYS. HARMFUL IF ABSORBED THROUGH SKIN. REACTION WITH CERTAIN METALS GENERATES FLAMMABLE AND POTENTIALLY EXPLOSIVE HYDROGEN GAS.

Potential Health Effects:

Exposure to hydrofluoric acid can produce harmful health effects that may not be immediately apparent. If inhaled or swallowed, this compound can cause fluoride poisoning. Early symptoms include nausea, vomiting, diarrhea, and weakness. Later effects include central nervous system effects, cardiovascular effects and death.

Inhalation: Corrosive! Severely corrosive to the respiratory tract. May cause sore throat, coughing, labored breathing and lung congestion / inflammation. Symptoms parallel those following ingestion exposure.

Ingestion: Corrosive! May cause sore throat, abdominal pain, diarrhea, vomiting, severe burns of the digestive tract, and kidney dysfunction. Affects the heart and circulatory system.

Skin Contact: Corrosive to the skin! Skin contact causes serious skin burns which may not be immediately apparent or painful. Symptoms may be delayed 8 hours or longer. The fluoride ion readily penetrates the skin causing destruction of deep tissue layers and even bone.

Eye Contact: Corrosive to the eyes! Symptoms of redness, pain, blurred vision, and permanent eye damage may occur.

Chronic Exposure: Intake of more than 6 mg of fluorine per day may result in fluorosis, bone and joint damage. Hypocalcemia and hypomagnesemia can occur from absorption of fluoride ion into blood stream.

Aggravation of Pre-existing Conditions: Persons with pre-existing skin disorders, eye problems, or impaired kidney or respiratory function may be more susceptible to the effects of this substance.

Specific Target Organ Toxicity - Single Exposure (Globally Harmonized System:) No data available.

Specific Target Organ Toxicity - Repeated Exposure (Globally Harmonized System:) No data available.

Numerical Measures of Toxicity: Cancer Lists: NTP Carcinogen

Ingredient	Known	Anticipated	IARC Category
Ammonium Fluoride (12125-01-8)	No	No	None
Hydrogen Fluoride (7664-39-3)	No	No	None
Water (7732-18-5)	No	No	None

Acute Toxicity:

For Ammonium Fluoride:

No LD50 / LC50 information found relating to normal routes of occupational exposure.

For Hydrogen Fluoride:

Highly Toxic:

Lowest Lethal Dose, Human LCLo: 50 ppm/30 min

Inhalation, Rat LC50: 1278 ppm/1hr

Inhalation, Mouse LC50: 500 ppm/1hr

Inhalation, Guinea Pig LC50: 4327 ppm/15 min

Inhalation, Monkey 1780 ppm/1 hr

12. Ecological Information

Ecotoxicity:

For Ammonium Fluoride:

This material is not expected to be toxic to aquatic life.

The LC50/96-hour values for fish are over 100 mg/l.

For Hydrogen Fluoride:

This material is expected to be slightly toxic to aquatic life. 60 ppm*/Fish/Lethal/Fresh Water *=time period not specified. > 300ppm/48hr./Shrimp/LC50/Aerated Saltwater

Persistence and Degradability:

For Ammonium Fluoride:

Expected to be readily biodegradable.

For Hydrogen Fluoride:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Bioaccumulative Potential: No further relevant information available.

Mobility in Soil: If the pH is >> 6.5, soil can bind fluorides tightly. High Calcium content will immobilize fluorides, which can be damaging to plants when present in acid soils.

Other adverse effects: US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

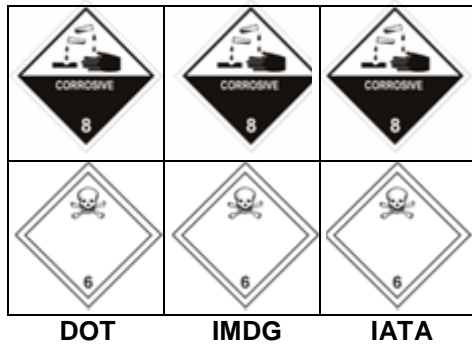
13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

UN Number: UN2922

Packing Group: II



Land Transport ADR/RID and GGVS/GGVE (Cross Border / Domestic)

UN Proper Shipping Name: RQ, CORROSIVE LIQUIDS, TOXIC, N.O.S. (HYDROFLUORIC ACID, AMMONIUM FLUORIDE)

Transport Hazard Class(es): 8, 6.1

Maritime Transport IMDG/GGVSea

UN Proper Shipping Name: CORROSIVE LIQUIDS, TOXIC, N.O.S. (HYDROFLUORIC ACID, AMMONIUM FLUORIDE)

Transport Hazard Class(es): 8, 6.1

Marine Pollutant: No

Air Transport ICAO-TI and IATA-DGR

UN Proper Shipping Name: CORROSIVE LIQUIDS, TOXIC, N.O.S. (HYDROFLUORIC ACID, AMMONIUM FLUORIDE)

Transport Hazard Class(es): 8, 6.1

Transport in Bulk According to Annex II of MARPOL 73/78 and the IBC Code

Special Precautions for User: Warning: Corrosive Substances

15. Regulatory Information

Chemical Inventory Status – Part 1

Ingredient	TSCA	EC	Japan	Australia
Ammonium Fluoride (1341-49-7)	Yes	Yes	Yes	Yes
Hydrogen Fluoride (7664-39-3)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

Chemical Inventory Status – Part 2

Ingredient	Korea	Canada		Phil.
		DSL	NDSL	
Ammonium Fluoride (1341-49-7)	Yes	Yes	No	Yes
Hydrogen Fluoride (7664-39-3)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

Federal, State & International Regulations - Part 1

Ingredient	SARA 302		SARA 313	
	RQ	TPQ	List Chemical	Catg.
Ammonium Fluoride (1341-49-7)	No	No	No	No
Hydrogen Fluoride (7664-39-3)	100	100	Yes	No
Water (7732-18-5)	No	No	No	No

Federal, State & International Regulations - Part 2

Ingredient	RCRA		TSCA
	CERCLA	261.33	8(d)
Ammonium Fluoride (1341-49-7)	100	No	No
Hydrogen Fluoride (7664-39-3)	100	U134	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: Yes		TSCA 12(b): No		CDTA: No
SARA 311/312:	Acute: Yes	Chronic: Yes	Fire: No	Pressure: No
Reactivity: Yes		Mixture / Liquid		

Australian Hazchem Code: None allocated

Poison Schedule: S6

16. Other Information

THE INFORMATION CONTAINED IN THIS DATA SHEET IS BASED ON THE DATA AVAILABLE TO PURITAN PRODUCTS AT THIS TIME. WHILE BELIEVED TO BE ACCURATE, PURITAN PRODUCTS DOES NOT CLAIM IT TO BE ALL INCLUSIVE. IT IS PROVIDED INDEPENDENT OF ANY SALE OF THE PRODUCT, FOR THE PURPOSE OF HAZARD COMMUNICATION, AND AS A GUIDE FOR THE APPROPRIATE PRECAUTIONARY HANDLING OF THE PRODUCT BY PROPERLY TRAINED INDIVIDUALS. IT IS NOT INTENDED TO PROVIDE PRODUCT PERFORMANCE OR APPLICABILITY INFORMATION, AND NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND IS MADE WITH RESPECT TO THE PRODUCT, THE UNDERLYING PRODUCT DATA, OR THE INFORMATION CONTAINED HEREIN.

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