

Buffered Oxide Etch

Not Available

Chemwatch Hazard Alert Code: 4

Chemwatch: 4598-82

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Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

L.GHS.USA.EN

SECTION 1 IDENTIFICATION

Product Identifier

Product name	Buffered Oxide Etch
Synonyms	Aqueous NH4-HF Etchant Solutions etching compound
Proper shipping name	Corrosive liquids, toxic, n.o.s. (contains hydrofluoric acid)
Other means of identification	Not Available

Recommended use of the chemical and restrictions on use

Relevant identified uses	Laboratory reagent. Operators should be trained in procedures for safe use of this material.
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Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Registered company name	Not Available
Address	Not Available
Telephone	Not Available
Fax	Not Available
Website	Not Available
Email	Not Available

Emergency phone number

Association / Organisation	Not Available
Emergency telephone numbers	Not Available
Other emergency telephone numbers	Not Available

SECTION 2 HAZARD(S) IDENTIFICATION

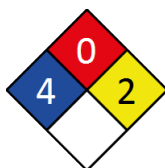
Classification of the substance or mixture

CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability	0	
Toxicity	4	
Body Contact	4	
Reactivity	2	
Chronic	2	

0 = Minimum
1 = Low
2 = Moderate
3 = High
4 = Extreme

NFPA 704 diamond



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

Classification	Metal Corrosion Category 1, Acute Toxicity (Oral) Category 2, Acute Toxicity (Dermal) Category 1, Acute Toxicity (Inhalation) Category 1, Skin Corrosion/Irritation Category 1A, Serious Eye Damage Category 1
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Label elements

Hazard pictogram(s)	
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SIGNAL WORD	DANGER
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Hazard statement(s)

H290	May be corrosive to metals.
H300	Fatal if swallowed.
H310	Fatal in contact with skin.
H330	Fatal if inhaled.
H314	Causes severe skin burns and eye damage.

Hazard(s) not otherwise specified

Not Applicable

Precautionary statement(s) Prevention

P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P262	Do not get in eyes, on skin, or on clothing.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.

Precautionary statement(s) Response

P301+P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P301+P330+P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+P361+P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Precautionary statement(s) Storage

P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.

Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.
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SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS**Substances**

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
12125-01-8	30-50	<u>ammonium fluoride</u>
7664-39-3	0.5-10	<u>hydrofluoric acid</u>
7732-18-5	40-70	<u>water</u>

SECTION 4 FIRST-AID MEASURES**Description of first aid measures**

Eye Contact	<p>DO NOT delay.</p> <p>If this product or its vapours come in contact with the eyes,</p> <ul style="list-style-type: none"> ▶ DO NOT DELAY: Immediately irrigate continuously by holding the eyelids apart and washing with fresh running water. ▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids
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	<ul style="list-style-type: none"> ▶ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. ▶ Transport to hospital, eye clinic or eye specialist, ophthalmologist without delay.
Skin Contact	<p>DO NOT delay.</p> <p>If there is evidence of severe skin irritation or skin burns:</p> <ul style="list-style-type: none"> ▶ Avoid further contact. Immediately remove contaminated clothing, including footwear. ▶ Flush skin under running water for 15 minutes. ▶ Avoiding contamination of the hands, massage calcium gluconate gel into affected areas, pay particular attention to creases in skin. ▶ Contact the Poisons Information Centre. ▶ Continue gel application for at least 15 minutes after burning sensation ceases. ▶ If pain recurs, repeat application of calcium gluconate gel or apply every 20 minutes. ▶ If no gel is available, continue washing for at least 15 minutes, using soap if available. If patient is conscious, give six calcium gluconate or calcium carbonate tablets in water by mouth. ▶ Transport to hospital, or doctor, urgently.
Inhalation	<p>For massive exposures:</p> <ul style="list-style-type: none"> ▶ If dusts, vapours, aerosols, fumes or combustion products are inhaled, remove from contaminated area. ▶ Lay patient down. ▶ Keep warm and rested. ▶ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▶ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. ▶ If victim is conscious, give six calcium gluconate or calcium carbonate tablets in water by mouth. ▶ Transport to hospital, or doctor, urgently.
Ingestion	<p>DO NOT delay.</p> <p>Rinse mouth out with plenty of water.</p> <p>Transport to hospital or doctor and seek immediate medical attention.</p> <p>DO NOT INDUCE vomiting.</p> <p>If patient is conscious, give six calcium gluconate or calcium carbonate tablets dissolved in water, by mouth.</p>

Most important symptoms and effects, both acute and delayed

See Section 11

Indication of any immediate medical attention and special treatment needed

Following acute or short term repeated exposure to hydrofluoric acid:

- ▶ Subcutaneous injections of Calcium Gluconate may be necessary around the burnt area. Continued application of Calcium Gluconate Gel or subcutaneous Calcium Gluconate should then continue for 3-4 days at a frequency of 4-6 times per day. If a "burning" sensation recurs, apply more frequently.
- ▶ Systemic effects of extensive hydrofluoric acid burns include renal damage, hypocalcaemia and consequent cardiac arrhythmias. Monitor haematological, respiratory, renal, cardiac and electrolyte status at least daily. Tests should include FBE, blood gases, chest X-ray, creatinine and electrolytes, urine output, Ca ions, Mg ions and phosphate ions. Continuous ECG monitoring may be required.
- ▶ Where serum calcium is low, or clinical, or ECG signs of hypocalcaemia develop, infusions of calcium gluconate, or if less serious, oral Sandocal, should be given. Hydrocortisone 500 mg in a four to six hourly infusion may help.
- ▶ Antibiotics should not be given as a routine, but only when indicated.
- ▶ Eye contact pain may be excruciating and 2-3 drops of 0.05% pentocaine hydrochloride may be instilled, followed by further irrigation

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Methaemoglobin in blood	1.5% of haemoglobin	During or end of shift	B, NS, SQ

B: Background levels occur in specimens collected from subjects **NOT** exposed.

NS: Non-specific determinant; Also seen after exposure to other materials

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

SECTION 5 FIRE-FIGHTING MEASURES**Extinguishing media**

- ▶ Foam.
- ▶ Dry chemical powder.
- ▶ BCF (where regulations permit).
- ▶ Carbon dioxide.

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Special hazards arising from the substrate or mixture

Fire Incompatibility	<ul style="list-style-type: none"> ▶ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous Avoid storage with glass, cement, concrete and other silicon materials; reaction produces toxic silicon tetrafluoride gas; which may pressurise and/or rupture containers. Avoid reaction with organic materials / compounds , powdered metals , reducing agents and hydrogen sulfide (H₂S) as ignition may result ▶ Reacts with mild steel, galvanised steel / zinc producing hydrogen gas which may form an explosive mixture with air.
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Special protective equipment and precautions for fire-fighters

Fire Fighting	<ul style="list-style-type: none"> ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Wear full body protective clothing with breathing apparatus. ▶ Consider evacuation (or protect in place). ▶ Use water delivered as a fine spray to control fire and cool adjacent area.
Fire/Explosion Hazard	<ul style="list-style-type: none"> ▶ Non combustible. ▶ Not considered to be a significant fire risk. ▶ Acids may react with metals to produce hydrogen, a highly flammable and explosive gas. ▶ Heating may cause expansion or decomposition leading to violent rupture of containers. <p>Other decomposition products include:</p> <p>carbon dioxide (CO₂)</p> <p>,</p> <p>hydrogen fluoride</p> <p>,</p> <p>nitrogen oxides (NO_x)</p> <p>and</p> <p>sulfur oxides (SO_x)</p>

SECTION 6 ACCIDENTAL RELEASE MEASURES**Personal precautions, protective equipment and emergency procedures**

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	<ul style="list-style-type: none"> ▶ DO NOT touch the spill material Clean up all spills immediately. Avoid breathing vapours and contact with skin and eyes. Wear impervious gloves and safety glasses. Use soda ash or slaked lime to neutralise. Trowel up/scrape up. Place spilled material in clean, dry, sealable, labelled container. Flush spill area with water.
Major Spills	<ul style="list-style-type: none"> ▶ Clear area of personnel and move upwind. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Wear full body protective clothing with breathing apparatus. ▶ Prevent, by any means available, spillage from entering drains or water course.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE**Precautions for safe handling**

Safe handling	<ul style="list-style-type: none"> ▶ DO NOT allow clothing wet with material to stay in contact with skin Use good occupational work practice. Observe manufacturer's storage and handling recommendations contained within this SDS. ▶ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
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	<p>Avoid all personal contact, including inhalation Wear protective clothing when risk of exposure occurs. Avoid contact with incompatible materials. WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material. ▶ Handle and open container with care When handling, DO NOT eat, drink or smoke. Keep containers securely sealed when not in use Avoid physical damage to containers. Wash hands with soap and water after handling. Work clothes should be laundered separately: NOT at home.</p>
Other information	<p>▶ Store in original containers. ▶ Keep containers securely sealed. ▶ Store in a cool, dry area protected from environmental extremes. ▶ Store away from incompatible materials and foodstuff containers. ▶ Keep containers securely sealed Store in a cool, dry and well-ventilated area. ▶ Store away from incompatible materials.</p> <p>Floors should be covered or coated with acid resistant material. DO NOT stack on wooden pallets. ▶ DO NOT store in pits, depressions, basements or areas where vapours may be trapped Protect containers against physical damage ▶ Check regularly for spills and leaks</p>

Conditions for safe storage, including any incompatibilities

Suitable container	<p>▶ Polyethylene or polypropylene container. ▶ Packing as recommended by manufacturer. ▶ Check all containers are clearly labelled and free from leaks.</p>
Storage incompatibility	<p>Avoid storage with glass, cement, concrete and other silicon materials; reaction produces toxic silicon tetrafluoride gas; which may pressurise and/or rupture containers. ▶ DO NOT use unlined steel containers ▶ DO NOT use aluminium, galvanised or tin-plated containers ▶ Segregate from alkalis, oxidising agents and chemicals readily decomposed by acids, i.e. cyanides, sulfides, carbonates. , combustible materials and metal oxides</p>

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US NIOSH Recommended Exposure Limits (RELs)	hydrofluoric acid	Anhydrous hydrogen fluoride; Aqueous hydrogen fluoride (i.e., Hydrofluoric acid); HF-A	2.5 mg/m ³ / 3 ppm	Not Available	5 mg/m ³ / 6 ppm	[15-minute]
US ACGIH Threshold Limit Values (TLV)	hydrofluoric acid	Hydrogen fluoride, as F	0.5 ppm	Not Available	2 ppm	TLV® Basis: URT, LRT, skin, & eye irr; fluorosis; BEI
US OSHA Permissible Exposure Levels (PELs) - Table Z1	hydrofluoric acid	Hydrogen fluoride	Not Available	Not Available	Not Available	(as F);2 See Table Z-2.
US OSHA Permissible Exposure Levels (PELs) - Table Z2	hydrofluoric acid	Hydrogen fluoride	3 ppm	Not Available	Not Available	(Z37.28-1969)

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
ammonium fluoride	Ammonium fluoride	15 mg/m ³	160 mg/m ³	980 mg/m ³
hydrofluoric acid	Hydrogen fluoride; (Hydrofluoric acid)	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
ammonium fluoride	500 mg/m ³	250 mg/m ³

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hydrofluoric acid	30 ppm	30 [Unch] ppm
water	Not Available	Not Available

MATERIAL DATA

None assigned. Refer to individual constituents.

Exposure controls

Appropriate engineering controls	<p>Use in a well-ventilated area</p> <p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.</p>
Personal protection	
Eye and face protection	<ul style="list-style-type: none"> ▶ Chemical goggles. ▶ Full face shield may be required for supplementary but never for primary protection of eyes. ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task.
Skin protection	See Hand protection below
Hands/feet protection	<ul style="list-style-type: none"> ▶ Barrier cream and ▶ Neoprene rubber gloves or ▶ Nitrile rubber gloves or ▶ Elbow length PVC gloves ▶ Rubber boots or ▶ PVC safety gumboots
Body protection	See Other protection below
Other protection	<ul style="list-style-type: none"> ▶ Overalls. ▶ PVC Apron. ▶ PVC protective suit may be required if exposure severe. ▶ Eyewash unit. <p>Always ensure that a supply, is on hand, of calcium gluconate gel for treatment of burns and calcium carbonate tablets for accidental ingestion.</p>
Thermal hazards	Not Available

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the **computer-generated** selection:

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Material	CPI
NEOPRENE	A
NATURAL RUBBER	B

* CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following

Respiratory protection

Type B-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required.

Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	B-AUS P2	-	B-PAPR-AUS / Class 1 P2
up to 50 x ES	-	B-AUS / Class 1 P2	-
up to 100 x ES	-	B-2 P2	B-PAPR-2 P2 ^

^ - Full-face

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN),

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long-term or frequent use. A qualified practitioner should be consulted.

E = Sulfur dioxide(SO₂), G = Agricultural chemicals, K = Ammonia(NH₃),
Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low
boiling point organic compounds(below 65 degC)

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Clear colourless acidic liquid; mixes with water.		
Physical state	Liquid	Relative density (Water = 1)	1.1
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Applicable
pH (as supplied)	1.0	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Applicable	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Applicable	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water (g/L)	Miscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> ▶ Presence of heat source ▶ Unstable in the presence of incompatible materials. ▶ Product is considered stable. ▶ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	<p>The vapour is extremely discomforting to the upper respiratory tract and lungs and is harmful if inhaled</p> <p>Inhalation hazard is increased at higher temperatures.</p> <p>Acute effects of fluoride inhalation include irritation of nose and throat, coughing and chest discomfort.</p> <p>Even brief exposure to high concentrations of inorganic fluoride may cause sore throat, chest pains, pulmonary oedema, and</p>
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	<p>in rare cases irreparable damage to the lungs, and death</p> <p>A single acute over-exposure may cause nose bleed. Pre-existing respiratory conditions such as emphysema, bronchitis may be aggravated by exposure. Occupational asthma may result from exposure.</p> <p>The material may produce respiratory tract irritation. Symptoms of pulmonary irritation may include coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and a burning sensation.</p> <p>Unlike most organs, the lung can respond to a chemical insult or a chemical agent, by first removing or neutralising the irritant and then repairing the damage (inflammation of the lungs may be a consequence).</p> <p>The repair process (which initially developed to protect mammalian lungs from foreign matter and antigens) may, however, cause further damage to the lungs (fibrosis for example) when activated by hazardous chemicals.</p>				
Ingestion	<p>Considered an unlikely route of entry in commercial/industrial environments</p> <p>The liquid is extremely corrosive to the gastro-intestinal tract and contact may cause rapid tissue destruction with severe burns and may be fatal if swallowed unless immediate treatment is applied</p>				
Skin Contact	<p>The liquid is highly corrosive to the skin and may rapidly cause severe burns, ulceration</p> <p>The skin is readily penetrated by the fluoride ion causing liquefaction necrosis of the soft tissues and decalcification and corrosion of bone. Healing is delayed and necrotic changes may continue to occur and spread beneath a layer of tough coagulated skin.</p> <p>Percutaneous absorption of pure liquefied hydrogen fluoride gas produced severe hypocalcaemia, multiple attacks of ventricular fibrillation, and death 9.5 hours after exposure. Skin contact with hydrogen fluoride or solutions containing more than 30 percent hydrogen fluoride produces immediate pain; reactions to more dilute solutions may be delayed for many hours.</p> <p>The vapour is highly discomforting to the skin and may be harmful if exposure is prolonged</p> <p>The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.</p>				
Eye	<p>Eye contact is extremely painful and may cause rapid corneal damage</p> <p>The liquid is extremely corrosive to the eyes and is capable of causing severe damage with loss of sight</p> <p>The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.</p>				
Chronic	<p>Considered toxic by all exposure routes.</p> <p>Principal routes of exposure are usually by skin contact, eye contact with the material and inhalation of vapour</p> <p>Repeated human exposures to hydrogen fluoride (6 hours/day for 10-50 days) at concentrations as high as 4.7 ppm were tolerated without severe adverse reaction. At concentrations exceeding 3 ppm, researchers noted burning and irritation of the eyes and nose and burning of the skin. Three subjects who inhaled approximately 3 ppm had severe urinary excretions of 6.7-9.4 mg fluoride/day. One epidemiological study was able to demonstrate that there was no significant change in pulmonary function resulting from occupational exposure to average concentrations of 1.02 ppm hydrogen fluoride.</p>				
Buffered Oxide Etch	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: left;">TOXICITY</th> <th style="width: 50%; text-align: left;">IRRITATION</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Not Available</td> <td style="text-align: left;">Not Available</td> </tr> </tbody> </table>	TOXICITY	IRRITATION	Not Available	Not Available
TOXICITY	IRRITATION				
Not Available	Not Available				

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ammonium fluoride	TOXICITY	IRRITATION
	Not Available	Not Available
hydrofluoric acid	TOXICITY	IRRITATION
	Inhalation (rat) LC50: 1276 ppm/4hr ^[2] Inhalation (rat) LC50: 319 ppm/1hr ^[2]	Eye (human): 50 mg - SEVERE
water	TOXICITY	IRRITATION
	Not Available	Not Available
Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

HYDROFLUORIC ACID	<p>The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.</p> <p>Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS.</p> <p>The material may produce respiratory tract irritation. Symptoms of pulmonary irritation may include coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and a burning sensation.</p> <p>Unlike most organs, the lung can respond to a chemical insult or a chemical agent, by first removing or neutralising the irritant and then repairing the damage (inflammation of the lungs may be a consequence).</p> <p>The repair process (which initially developed to protect mammalian lungs from foreign matter and antigens) may, however, cause further damage to the lungs (fibrosis for example) when activated by hazardous chemicals. (liver and kidney damage) [Manufacturer] for hydrogen fluoride (as vapour)</p>
	HYDROFLUORIC ACID & WATER

Acute Toxicity	✓	Carcinogenicity	⊘
Skin Irritation/Corrosion	✓	Reproductivity	⊘
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	⊘
Respiratory or Skin sensitisation	⊘	STOT - Repeated Exposure	⊘
Mutagenicity	⊘	Aspiration Hazard	⊘

Legend: ✗ – Data available but does not fill the criteria for classification
✓ – Data available to make classification
⊘ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
Buffered Oxide Etch	Not Available	Not Available	Not Available	Not Available	Not Available
ammonium fluoride	LC50	96	Fish	51mg/L	2
	EC50	48	Crustacea	2.94mg/L	2
	NOEC	672	Fish	0.17mg/L	2
hydrofluoric acid	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	51mg/L	2

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	EC50	48	Crustacea	=270mg/L	1
	NOEC	504	Fish	4mg/L	2
water	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	897.520mg/L	3
	EC50	96	Algae or other aquatic plants	8768.874mg/L	3
Legend:	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data				

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
water	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
water	LOW (LogKOW = -1.38)

Mobility in soil

Ingredient	Mobility
water	LOW (KOC = 14.3)



SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	<ul style="list-style-type: none"> ▶ Recycle wherever possible or consult manufacturer for recycling options. ▶ Consult State Land Waste Management Authority for disposal. ▶ Treat and neutralise at an effluent treatment plant. ▶ Use soda ash or slaked lime to neutralise.
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SECTION 14 TRANSPORT INFORMATION

Labels Required

	 
Marine Pollutant	NO

Land transport (DOT)

UN number	2922
UN proper shipping name	Corrosive liquids, toxic, n.o.s. (contains hydrofluoric acid)
Transport hazard class(es)	Class : 8 Subrisk : 6.1
Packing group	II
Environmental hazard	Not Applicable
Special precautions for user	Hazard Label : 8, 6.1 Special provisions : B3, IB2, T7, TP2

Air transport (ICAO-IATA / DGR)

UN number	2922
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UN proper shipping name	Corrosive liquid, toxic, n.o.s. * (contains hydrofluoric acid)	
Transport hazard class(es)	ICAO/IATA Class	8
	ICAO / IATA Subrisk	6.1
	ERG Code	8P
Packing group	II	
Environmental hazard	Not Applicable	
Special precautions for user	Special provisions	A3A803
	Cargo Only Packing Instructions	855
	Cargo Only Maximum Qty / Pack	30 L
	Passenger and Cargo Packing Instructions	851
	Passenger and Cargo Maximum Qty / Pack	1 L
	Passenger and Cargo Limited Quantity Packing Instructions	Y840
	Passenger and Cargo Limited Maximum Qty / Pack	0.5 L

Sea transport (IMDG-Code / GGVSee)

UN number	2922	
UN proper shipping name	CORROSIVE LIQUID, TOXIC, N.O.S. (contains hydrofluoric acid)	
Transport hazard class(es)	IMDG Class	8
	IMDG Subrisk	6.1
Packing group	II	
Environmental hazard	Not Applicable	
Special precautions for user	EMS Number	F-A , S-B
	Special provisions	274
	Limited Quantities	1 L

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION**Safety, health and environmental regulations / legislation specific for the substance or mixture****AMMONIUM FLUORIDE(12125-01-8) IS FOUND ON THE FOLLOWING REGULATORY LISTS**

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs	US - Rhode Island Hazardous Substance List
US - Alaska Limits for Air Contaminants	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants
US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)	US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants
US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)	US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants
US - Hawaii Air Contaminant Limits	US - Washington Permissible exposure limits of air contaminants
US - Idaho - Limits for Air Contaminants	US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants
US - Massachusetts - Right To Know Listed Chemicals	US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift
US - Michigan Exposure Limits for Air Contaminants	US ACGIH Threshold Limit Values (TLV)
US - Minnesota Permissible Exposure Limits (PELs)	US CWA (Clean Water Act) - List of Hazardous Substances
US - Oregon Permissible Exposure Limits (Z-1)	US OSHA Permissible Exposure Levels (PELs) - Table Z1
US - Oregon Permissible Exposure Limits (Z-2)	US OSHA Permissible Exposure Levels (PELs) - Table Z2
US - Pennsylvania - Hazardous Substance List	US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

HYDROFLUORIC ACID(7664-39-3) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Continued...

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

US - Alaska Limits for Air Contaminants

US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELS)

US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELS)

US - California Permissible Exposure Limits for Chemical Contaminants

US - Hawaii Air Contaminant Limits

US - Idaho - Acceptable Maximum Peak Concentrations

US - Idaho - Limits for Air Contaminants

US - Massachusetts - Right To Know Listed Chemicals

US - Michigan Exposure Limits for Air Contaminants

US - Minnesota Permissible Exposure Limits (PELs)

US - Oregon Permissible Exposure Limits (Z-1)

US - Oregon Permissible Exposure Limits (Z-2)

US - Pennsylvania - Hazardous Substance List

US - Rhode Island Hazardous Substance List

US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants

US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants

US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants

US - Washington Permissible exposure limits of air contaminants

US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values

US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants

US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift

US ACGIH Threshold Limit Values (TLV)

US ACGIH Threshold Limit Values (TLV) - Carcinogens

US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)

US Clean Air Act - Hazardous Air Pollutants

US CWA (Clean Water Act) - List of Hazardous Substances

US EPCRA Section 313 Chemical List

US NIOSH Recommended Exposure Limits (RELS)

US OSHA Permissible Exposure Levels (PELs) - Table Z1

US OSHA Permissible Exposure Levels (PELs) - Table Z2

US SARA Section 302 Extremely Hazardous Substances

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

WATER(7732-18-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US - Pennsylvania - Hazardous Substance List

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

Federal Regulations

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SECTION 311/312 HAZARD CATEGORIES

Immediate (acute) health hazard	Yes
Delayed (chronic) health hazard	No
Fire hazard	No
Pressure hazard	No
Reactivity hazard	No

US. EPA CERCLA HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES (40 CFR 302.4)

Name	Reportable Quantity in Pounds (lb)	Reportable Quantity in kg
Ammonium fluoride	100	45.4
Hydrofluoric acid	100	45.4

State Regulations

US. CALIFORNIA PROPOSITION 65

None Reported

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (ammonium fluoride; water; hydrofluoric acid)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	N (ammonium fluoride; hydrofluoric acid)
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Other information

Ingredients with multiple cas numbers

Name	CAS No
hydrofluoric acid	7664-39-3, 790596-14-4

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
PC—STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit.
IDLH: Immediately Dangerous to Life or Health Concentrations
OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index

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