



SAFETY DATA SHEET

1. Identification

Product identifier Buffered Oxide Etchant 20:1

Other means of identification

Product code -

Recommended use Industrial use.

Recommended restrictions None known.

Manufacturer / Importer / Supplier / Distributor information

Supplier/Manufacturer KMG Electronic Chemicals, Inc.

Address 9555 W. Sam Houston Parkway South
Suite 600
Houston, Texas 77099

Telephone 713-600-3800

Emergency telephone 760-476-3960

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards

Acute toxicity, oral	Category 2
Acute toxicity, dermal	Category 2
Acute toxicity, inhalation	Category 2
Skin corrosion/irritation	Category 1A
Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
Specific target organ toxicity, repeated exposure	Category 2 (Bone, lung, liver, kidney, tooth)

OSHA defined hazards Not classified.

Label elements



Signal word Danger

Hazard statement Fatal in contact with skin. Fatal if inhaled. Fatal if swallowed. May cause respiratory irritation. May cause damage to organs (Bone, tooth, lung, liver, kidney) through prolonged or repeated exposure. Causes severe skin burns and eye damage.

Precautionary statement

Prevention Wear protective gloves/protective clothing/eye protection/face protection. Wear respiratory protection. Do not breathe mist or vapor. Do not get in eyes, on skin, or on clothing. Use only outdoors or in a well-ventilated area. Do not eat, drink or smoke when using this product. Wash thoroughly after handling.

Response If exposed or if you feel unwell: Get medical advice/attention. If swallowed: Immediately call a poison center/doctor. Rinse mouth. If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center/doctor. Remove/Take off immediately all contaminated clothing. Wash contaminated clothing before reuse. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

Storage Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) Not classified.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Ammonium fluoride	12125-01-8	30 - 40
Hydrofluoric acid	7664-39-3	1 - 5

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation

Following inhalation exposure, a 2.5% calcium gluconate solution can be given by nebulizer. If breathing is difficult, give oxygen. Immediately call a poison control center or doctor for treatment advise. Move person to fresh air. If breathing has ceased, start mouth-to-mouth artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

Skin contact

Immediately remove contaminated clothing, and any extraneous chemical, if possible to do so without delay. Initiate and maintain gentle and continuous irrigation until the patient receives medical care. If medical care is not promptly available, continue to irrigate for one hour. Cover wound with sterile dressing. A physician should be consulted for all exposures. Burns covering an area greater than fifty-two square centimeters (8 square inches) require immediate treatment by a medical doctor. Remove contaminated clothing. With gloved hand apply 2.5% calcium gluconate gel to the burn area.

Eye contact

Immediately flush eyes with plenty of water for at least 15 minutes. Hold eyelids apart. Remove contact lenses, if present and easy to do. Continue rinsing. A 1.0 pct calcium gluconate gel solution can be used to irrigate the eye using a syringe or a continuous irrigation device. Get medical attention immediately.

Ingestion

Immediately call a poison control center or doctor for treatment advise. If ingested give milk or calcium gluconate by mouth. Administer several vials of 10% aqueous calcium gluconate orally. (Calcium carbonate or an antacid containing calcium carbonate or magnesium carbonate or hydroxide may also be used.) Do not give anything by mouth to an unconscious person. Do not induce vomiting. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration.

Most important symptoms/effects, acute and delayed

Inhalation: Vapor may be irritating. Eye contact: May cause eye irritation. Ingestion: Swallowing can result in nausea, vomiting, diarrhoea, abdominal pain, convulsions and loss of consciousness. Collapse and possible death may occur.

Indication of immediate medical attention and special treatment needed

Treatment : This advice is provided to the attending physician because of the specific properties of hydrogen fluoride and hydrofluoric acid. All cases of ingestion and airway exposure, and skin burns with hydrofluoric acid >20% should be regarded as potentially fatal. Patients who have burns and pain within minutes of exposure can be assumed to have been exposed to concentrated acid and are at risk of rapid clinical deterioration and death. Burns can be accompanied by absorption of fluoride through the skin with sequestration of circulating calcium leading to hypocalcemia and hyperkalemia from the release of cell contents. Fatal cardiac dysrhythmias may ensue. A person who has HF burns greater than 25 square inches or who has been burned with concentrated HF should be admitted immediately to an intensive care unit and carefully monitored by EKG for 24 to 48 hours. Blood sampling should be taken to monitor circulating fluoride, potassium and calcium levels. Hemodialysis may be necessary for fluoride removal and correction of hyperkalemia. HF inhaled in high concentrations may cause acute inflammation and edema of the airway and acute pulmonary edema. Anyone who has been exposed to HF gas or mists and experiences respiratory irritation should be admitted to and monitored in an intensive care unit. In some cases, if the eyes are exposed to HF, it may penetrate to internal structures resulting in irreversible damage. HF skin burns are usually accompanied by severe, throbbing pain, which is thought to be due to irritation of nerve endings by increased levels of potassium ions entering the extracellular space to compensate for the reduced levels of calcium ions, which have been bound to the fluoride. RELIEF OF PAIN IS AN IMPORTANT GUIDE TO THE SUCCESS OF TREATMENT.

General information

In case of shortness of breath, give oxygen. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Keep victim warm. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

5. Fire-fighting measures

Suitable extinguishing media

This product is not flammable. Use extinguishing agent suitable for type of surrounding fire.

Unsuitable extinguishing media

None known.

Specific hazards arising from the chemical

By heating and fire, toxic and corrosive vapors/gases may be formed.

Special protective equipment and precautions for firefighters

Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace. Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire-fighting equipment/instructions

Use water spray to cool unopened containers. Cool containers with flooding quantities of water until well after fire is out. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Local authorities should be advised if significant spillages cannot be contained. Ensure adequate ventilation. Avoid any exposure. Use personal protection as recommended in Section 8 of the SDS.

Methods and materials for containment and cleaning up

Should not be released into the environment. Stop the flow of material, if this is without risk. Dike far ahead of liquid spill for later disposal. Prevent entry into waterways, sewers, basements or confined areas.

Large Spills: Absorb spill with inert material (e.g., dry sand or earth), then place in a chemical waste container. Collect in containers and seal securely.

Small Spills: Absorb spillage with suitable absorbent material. Clean contaminated surface thoroughly. After removal flush contaminated area thoroughly with water.

Never return spills in original containers for re-use.

Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not contaminate water.

7. Handling and storage

Precautions for safe handling

Use only with adequate ventilation. Avoid any exposure. Wash thoroughly after handling. Handle and open container with care. Use Personal Protective Equipment recommended in section 8 of the SDS. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep this material away from food, drink and animal feed. Use care in handling/storage. Protect from sunlight. Store away from incompatible materials.

8. Exposure controls/personal protection

Occupational exposure limits

U.S. - OSHA

Components	Type	Value
Hydrofluoric acid (CAS 7664-39-3)	Ceiling	6 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Ammonium fluoride (CAS 12125-01-8)	PEL	2.5 mg/m3
Hydrofluoric acid (CAS 7664-39-3)	PEL	2.5 mg/m3

US. OSHA Table Z-2 (29 CFR 1910.1000)

Components	Type	Value	Form
Ammonium fluoride (CAS 12125-01-8)	TWA	2.5 mg/m3	Dust.
Hydrofluoric acid (CAS 7664-39-3)	TWA	3 ppm	

US. ACGIH Threshold Limit Values

Components	Type	Value
Ammonium fluoride (CAS 12125-01-8)	TWA	2.5 mg/m3
Hydrofluoric acid (CAS 7664-39-3)	Ceiling	2 ppm
	TWA	2.5 mg/m3 0.5 ppm

US NIOSH Pocket Guide to Chemical Hazards: Ceiling Limit Value and Time Period (if specified)

Components	Type	Value
Hydrofluoric acid (CAS 7664-39-3)	Ceiling	5 mg/m3 6 ppm

US NIOSH Pocket Guide to Chemical Hazards: Recommended exposure limit (REL)

Components	Type	Value
Ammonium fluoride (CAS 12125-01-8)	TWA	2.5 mg/m3

US NIOSH Pocket Guide to Chemical Hazards: Recommended exposure limit (REL)

Components	Type	Value
Hydrofluoric acid (CAS 7664-39-3)	TWA	2.5 mg/m3
		3 ppm

Biological limit values**ACGIH Biological Exposure Indices**

Components	Value	Determinant	Specimen	Sampling Time
Ammonium fluoride (CAS 12125-01-8)	3 mg/l	Fluoride	Urine	*
	2 mg/l	Fluoride	Urine	*
Hydrofluoric acid (CAS 7664-39-3)	3 mg/l	Fluoride	Urine	*
	2 mg/l	Fluoride	Urine	*

* - For sampling details, please see the source document.

Exposure guidelines**US - California OELs: Skin designation**

Hydrofluoric acid (CAS 7664-39-3) Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

Hydrofluoric acid (CAS 7664-39-3) Can be absorbed through the skin.

Appropriate engineering controls Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

Individual protection measures, such as personal protective equipment

Eye/face protection Do not get this material in contact with eyes. Wear approved safety glasses or goggles. Wear face shield if there is risk of splashes. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin protection

Hand protection Wear protective gloves. Be aware that the liquid may penetrate the gloves. Frequent change is advisable. Suitable gloves can be recommended by the glove supplier.

Other Wear appropriate chemical resistant gloves. Wear appropriate chemical resistant clothing. Protective shoes or boots. Structural firefighters protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations. Do not get this material in contact with skin. Do not get this material on clothing. Wear chemical protective equipment that is specifically recommended by the Personal Protective Equipment manufacturer.

Respiratory protection In case of inadequate ventilation use suitable respirator. Wear approved respiratory protection when working with this material unless ventilation or other engineering controls are adequate to keep airborne concentrations below recommended exposure standards. Follow respirator protection program requirements (OSHA 1910.134 or CSA-Z94.4-02(R2008), and ANSI / AIHA Z88.6) for all respirator use.

Thermal hazards When material is heated, wear gloves to protect against thermal burns.

General hygiene considerations When using, do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product. Remove and isolate contaminated clothing and shoes. Handle in accordance with good industrial hygiene and safety practice. Launder contaminated clothing before reuse.

9. Physical and chemical properties

Appearance	Colorless liquid.
Physical state	Liquid.
Form	Liquid.
Color	Colorless.
Odor	Pungent.
Odor threshold	Not available.
pH	Acidic
Melting point/freezing point	Not available.
Initial boiling point and boiling range	> 212 °F (> 100 °C)
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.

Vapor pressure	10.02 mmHg
Vapor density	2.21 (Air=1)
Relative density	Not available.
Solubility(ies)	Completely soluble
Partition coefficient (n-octanol/water)	No data available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	1.20 g/cm3 (74.851 lb/ft3)

10. Stability and reactivity

Reactivity	Stable at normal conditions.
Chemical stability	Stable under normal temperature conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	High temperatures.
Incompatible materials	Oxidizing materials. Strong bases. Strong acids. Metals. Chlorine trifluoride.
Hazardous decomposition products	Ammonia. Hydrogen fluoride. Nitrogen oxides (NOx).

11. Toxicological information**Information on likely routes of exposure**

Ingestion	Fatal if swallowed. Causes digestive tract burns.
Inhalation	Fatal if inhaled. Causes respiratory tract burns.
Skin contact	Fatal in contact with skin. Causes severe skin burns. Causes permanent skin damage (scarring).
Eye contact	Causes severe eye burns. May cause blindness.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation: May cause damage to mucous membranes in nose, throat, lungs and bronchial system. Be aware that symptoms of lung edema (shortness of breath) may develop up to 24 hours after exposure. Eye contact: Corrosive. Prolonged contact causes serious eye and tissue damage. May cause blindness. Skin contact: May cause serious chemical burns to the skin. Direct contact: May cause burns in mucous membranes, throat, esophagus and stomach.

Information on toxicological effects

Acute toxicity Fatal if swallowed. Fatal in contact with skin. Fatal if inhaled.

Components	Species	Test Results
Ammonium fluoride (CAS 12125-01-8)		
Acute		
<i>Oral</i>		
LD50	Rat	50 mg/kg
Hydrofluoric acid (CAS 7664-39-3)		
Acute		
<i>Inhalation</i>		
LC50	Rat	4970 mg/l, 5 Minutes 2689 mg/l, 15 Minutes 2042 mg/l, 30 Minutes 1278 mg/l, 1 Hours

Skin corrosion/irritation Causes severe skin burns.

Serious eye damage/eye irritation	Causes severe eye burns.
Respiratory sensitization	Not classified.
Skin sensitization	Not a skin sensitizer.
Germ cell mutagenicity	Not classified.
Carcinogenicity	Not classified by IARC, ACGIH, NTP or OSHA.
IARC Monographs. Overall Evaluation of Carcinogenicity	
Ammonium fluoride (CAS 12125-01-8)	3 Not classifiable as to carcinogenicity to humans.
Hydrofluoric acid (CAS 7664-39-3)	3 Not classifiable as to carcinogenicity to humans.
Reproductive toxicity	Not classified.
Specific target organ toxicity - single exposure	May cause respiratory irritation.
Specific target organ toxicity - repeated exposure	Causes damage to the following organs through prolonged or repeated exposure: Kidneys. Liver Lung. Bone. Tooth.
Aspiration hazard	Not classified.
Chronic effects	High concentrations: Risk of hypocalcemia with nervous problems (tetany) and cardiac arrhythmia.
Further information	Absorbed fluoride can cause metabolic imbalances with irregular heartbeat, nausea, dizziness, vomiting and seizures. Prolonged overexposure to fluorides may increase fluoride content of bones and teeth, and may result in fluorosis, and brittleness of bones. Erosion of exposed teeth. High concentrations: Risk of hypocalcemia with nervous problems (tetany) and cardiac arrhythmia.

12. Ecological information

Ecotoxicity	The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	No data available.
Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Mobility in general	The product is miscible with water. May spread in water systems.
Other adverse effects	No data available.

13. Disposal considerations

Disposal instructions	Dispose of this material and its container at hazardous or special waste collection point. Do not allow this material to drain into sewers/water supplies. Dispose in accordance with all applicable regulations.
Local disposal regulations	Dispose of in accordance with local regulations.
Hazardous waste code	Waste codes should be assigned by the user based on the application for which the product was used.

US RCRA Hazardous Waste U List: Reference

Hydrofluoric acid (CAS 7664-39-3)	U134
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Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number	UN2922
UN proper shipping name	Corrosive liquids, toxic, n.o.s. (hydrofluoric acid, ammonium fluoride)
Transport hazard class(es)	8
Subsidiary class(es)	6.1
Packing group	II
Environmental hazards	
Marine pollutant	No
Special precautions for user	Not available.
Special provisions	IB3, T7, TP1, TP28
Packaging exceptions	154
Packaging non bulk	203
Packaging bulk	241
ERG number	154

IATA

UN number UN2922
UN proper shipping name Corrosive liquids, toxic, n.o.s. (hydrofluoric acid, ammonium fluoride)
Transport hazard class(es) 8
Subsidiary class(es) 6.1
Packaging group II
Environmental hazards No
Labels required 8, 6.1
ERG Code 8P
Special precautions for user Not available.

IMDG

UN number UN2922
UN proper shipping name Corrosive liquids, toxic, n.o.s. (hydrofluoric acid, ammonium fluoride)
Transport hazard class(es) 8
Subsidiary class(es) 6.1
Packaging group II
Environmental hazards
Marine pollutant No
Labels required 8, 6.1
EmS F-A, S-B
Special precautions for user Read safety instructions, MSDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Ammonium fluoride (CAS 12125-01-8)	LISTED
Hydrofluoric acid (CAS 7664-39-3)	LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance No

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Ammonium fluoride	12125-01-8	30 - 40
Hydrofluoric acid	7664-39-3	1 - 5

Other federal regulations**Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**

Hydrofluoric acid (CAS 7664-39-3)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Hydrofluoric acid (CAS 7664-39-3)

Safe Drinking Water Act (SDWA) Not regulated.

Food and Drug Administration (FDA) Not regulated.

US state regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US. Massachusetts RTK - Substance List

Ammonium fluoride (CAS 12125-01-8)

Hydrofluoric acid (CAS 7664-39-3)

US. New Jersey Worker and Community Right-to-Know Act

Hydrofluoric acid (CAS 7664-39-3) 100 lbs

US. Pennsylvania RTK - Hazardous Substances

Ammonium fluoride (CAS 12125-01-8)

Hydrofluoric acid (CAS 7664-39-3)

US. Rhode Island RTK

Hydrofluoric acid (CAS 7664-39-3)

US. California Proposition 65**US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance**

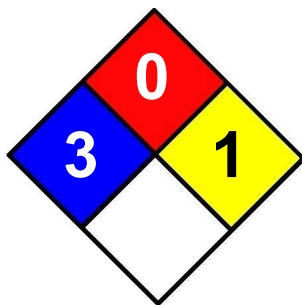
Not listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision**Issue date** 23-September-2013**Revision date** -**Version #** 01**NFPA Ratings****List of abbreviations**

LD50: Lethal Dose, 50%.

Disclaimer

This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.