Safety Data Sheet

Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

Product Name | **Hydrofluoric Acid 35-50% Aqueous Solution**

Synonyms | Aqueous Hydrogen Fluoride

Product Code | 70431

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified use(s) | Semi-conductor etching

1.3 Details of the supplier of the safety data sheet

Manufacturer | Air Liquide

2700 Post Oak Blvd.
Houston, TX 77056
United States
www.us.airliquide.com
sds@airliquide.com

Telephone (Technical) | 713-896-2896

Telephone (Technical) | 800-819-1704

1.4 Emergency telephone number

Manufacturer | 800-424-9300 - CHEMTREC

Manufacturer | +1 703-527-3887 - Outside United States

Section 2: Hazards Identification

EU/EEC

According to Regulation (EC) No 1272/2008 (CLP)/REACH 1907/2006 [amended by 453/2010]
According to EU Directive 67/548/EEC (DSD) or 1999/45/EC (DPD)

2.1 Classification of the substance or mixture

CLP | Acute Toxicity Oral 2 - H300
Acute Toxicity Dermal 1 - H310
Skin Corrosion 1A - H314
Acute Toxicity Inhalation 2 - H330

DSD/DPD | Very Toxic (T+)
Corrosive (C)
R26/27/28, R35

2.2 Label Elements

CLP

DANGER

Hazard statements | H300 - Fatal if swallowed
H310 - Fatal in contact with skin
H314 - Causes severe skin burns and eye damage.
H330 - Fatal if inhaled

Precautionary statements

Prevention | P260 - Do not breathe mist/vapours/spray.
P262 - Do not get in eyes, on skin, or on clothing.
P264 - Wash thoroughly after handling.
P271 - Use only outdoors or in a well-ventilated area.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P284 - Wear respiratory protection.

Response | P304+P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P310 - Immediately call a POISON CENTER or doctor/physician.
P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P361 - Remove/Take off immediately all contaminated clothing.
P350 - Gently wash with plenty of soap and water.
P322 - Specific measures, see supplemental first aid information.
P363 - Wash contaminated clothing before reuse.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P331 - Do NOT induce vomiting.
P330 - Rinse mouth.

Storage/Disposal | P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P405 - Store locked up.
P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

DSD/DPD

Risk phrases | R26/27/28 - Very toxic by inhalation, in contact with skin and if swallowed.
R35 - Causes severe burns.

Safety phrases | S27 - Take off immediately all contaminated clothing.
S28 - After contact with skin, wash immediately with plenty of …
S36 - Wear suitable protective clothing.
S37 - Wear suitable gloves.
S39 - Wear eye/face protection.
S45 - In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

2.3 Other Hazards

CLP | According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

DSD/DPD | This product is considered dangerous according to the European Directive 67/548/EEC.

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture

OSHA HCS 2012 | Skin Corrosion 1B - H314
Serious Eye Damage 1 - H318
Acute Toxicity Inhalation 2 - H330

2.2 Label elements

OSHA HCS 2012

DANGER

Hazard statements | Causes severe skin burns and eye damage. - H314
Causes serious eye damage - H318
Fatal if inhaled - H330

Precautionary statements

Prevention | Do not breathe mist/vapours/spray. - P260
Wash thoroughly after handling. - P264
Use only outdoors or in a well-ventilated area. - P271
Wear protective gloves/protective clothing/eye protection/face protection. - P280
Wear respiratory protection. - P284

Response | IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. - P304+P340
Immediately call a POISON CENTER or doctor/physician. - P310
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. - P303+P361+P353
Specific treatment, see supplemental first aid information. - P321
Gently wash with plenty of soap and water. - P350
Wash contaminated clothing before reuse. - P363
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. - P305+P351+P338
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. - P301+P330+P331

Storage/Disposal | Store in a well-ventilated place. Keep container tightly closed. - P403+P233
Store locked up. - P405
Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. - P501

2.3 Other hazards

OSHA HCS 2012 | Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to WHMIS

2.1 Classification of the substance or mixture

WHMIS | Very Toxic - D1A
Other Toxic Effects - D2A
Corrosive - E

2.2 Label elements

WHMIS

| Very Toxic - D1A
Other Toxic Effects - D2A
Corrosive - E

2.3 Other hazards

WHMIS | In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

2.4 Other information

NFPA

Section 3 - Composition/Information on Ingredients

3.1 Substances

Composition				
Chemical Name	**Identifiers**	**%**	**LD50/LC50**	**Classifications According to Regulation/Directive**
Hydrofluoric acid	**CAS:**7664-39-3 **EC Number:**231-634-8 **EU Index:**009-002-00-6	35% TO 50%	Inhalation-Rat LC50 • 1100 mg/m³ 60 Minute(s)	**EU DSD/DPD:** Annex I - T+; R26/27/28 C; R35 **EU CLP:** Annex VI - Acute Tox. 2, H330; Acute Tox. 1, H310; Acute Tox. 2, H300; Skin Corr. 1A, H314 **OSHA HCS 2012:** Eye Dam. 1, Skin Corr. 1A, Acute Tox. 2 (inhl)

3.2 Mixtures

- Material does not meet the criteria of a mixture in accordance with Regulation (EC) No 1272/2008.

Section 4 - First Aid Measures

4.1 Description of first aid measures

Inhalation

- If this material is inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Use of mouth cup for resuscitation must be used; do NOT use direct mouth-to-mouth resuscitation. Seek immediate medical attention.

Skin

- As quickly as possible, remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Immediately flush with lukewarm, gently flowing water. Limit flushing with water to 5 minutes if 0.13% benzalkonium chloride (Zephiran®) solution or 2.5% calcium gluconate gel is available. If these treatments are not available, continue flushing until medical treatment is available. BENZALKONIUM CHLORIDE: Begin soaking the affected area in iced 0.13% benzalkonium chloride (Zephiran®) solution. Use ice cubes, not shaved ice, to prevent frostbite. If immersion is not practical, towels should be soaked with iced 0.13% benzalkonium chloride (Zephiran®) solutions and used as compresses for the burned area. Compresses should be changed every 2-4 minutes. Benzalkonium chloride (Zephiran®) soaks or compresses should be continued until medical attention is available. CALCIUM GLUCONATE GEL: Wearing chemical protective gloves, start massaging 2.5% calcium gluconate gel into the burn site. Apply gel frequently and massage continuously until medical attention is available. Quickly transport victim to an emergency care facility. Double bag, seal, label and leave contaminated clothing, shoes and leather goods at the scene for safe disposal. NOTE: Burns caused by weak hydrofluoric acid may go unnoticed for several hours. Therefore, first aid procedures must be followed if any contact is suspected.

Eye | Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 20 minutes, while holding the eyelid(s) open. If a contact lens is present, DO NOT delay irrigation or attempt to remove the lens. Take care not to rinse contaminated water into the unaffected eye. DO NOT use benzalkonium chloride (Zephiran®) for eye contact. If sterile 1% calcium gluconate is available, limit water flushing to 5 minutes. Then, use the 1% calcium gluconate solution to repeatedly rinse the eye(s). Immediately transport victim to an emergency care facility. Continue flushing with water, neutral saline or 1% calcium gluconate during transport, if at all possible.

Ingestion | If this material is swallowed, IMMEDIATELY CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING, unless directly by medical personnel. Have victim rinse mouth with water or give several cupfuls of water, if conscious. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If vomiting occurs, lean patient forward or place on left side (headdown position, if possible) to maintain an open airway and prevent aspiration. Seek immediate medical attention.

4.2 Most important symptoms and effects, both acute and delayed

| Refer to Section 11 - Toxicological Information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to Physician | Treat symptomsand eliminate exposure. If necessary, administer eye and vision exams. Victims of overexposure by inhalation should be observed for up to 72 hours for delayed onset of pulmonary edema. The following information is for treatment of fluoride exposure. For Inhalation Exposure: Administer 100% oxygen at half-hour intervals for three to four hours for victims of minor inhalation exposure. For serious inhalation exposure, 100% oxygen administration should begin immediately, under positive pressure (< 4 cm) for half-hour periods for at least six hours until breathing is easy and the color of the skin and mucous membranes is normal. For Skin Contact: For skin contamination, all areas of exposure should be flushed with copious quantities of water, followed by an iced aqueous or alcoholic solution of 0.13% benzalkonium chloride, iced 70% alcohol, or an ice-cold saturated solution of magnesium sulfate. If the area of burn cannot be drenched or immersed in solution, apply cold compresses containing the materials of the solution. After the iced solution treatment, application of a paste of powdered magnesium oxide and glycerin should be administered. The paste should be applied daily for several days. The prevention of serious burns can be prevented by infiltration of the skin and subcutaneous tissues with a 10% calcium gluconate solution, along with a local anesthetic. Care should be taken to see that all medical personnel providing treatment wear chemically-impervious gloves. In cases of severe over-exposure (more than 160 cm2), there is a potential for hypocalcemia. Therefore, systemic administration of calcium gluconate may be necessary. Frequent monitoring of serum calcium, cardiac, renal, and hepatic functions is necessary. For Eye Contact: Exposed eyes should be flushed for 20 minutes, and the following additional treatment be provided: Treat with a continuous drip of 1 percent calcium gluconate in normal, sterile saline. No oils or ointments should be u.

Section 5 - Firefighting Measures

5.1 Extinguishing media

Suitable Extinguishing Media | Use extinguishing agents compatible with acid and appropriate for fire surrounding hydrofluoric acid containers. Water should be used with care as Hydrofluoric Acid reacts with water to generate heat. Water spray or fog may be used. Dry agents, e.g. dry chemical powder are more recommended.

Unsuitable Extinguishing Media | Water should only be used with care.

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards | Containers may explode when heated.
A large amount of heat is generated when highly concentrated hydrofluoric acid solutions are diluted with water.
Contact of Hydrofluoric Acid (particularly in dilute aqueous solutions) with some

metals produces extremely flammable and potentially explosive hydrogen gas.

Hazardous Combustion Products | No data available

5.3 Advice for firefighters

| Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
Wear positive pressure self-contained breathing apparatus (SCBA).
SMALL FIRES: Move containers from fire area if you can do it without risk.
Water is very effective in knocking down hydrogen fluoride gas escaping from leaking containers of hydrofluoric acid. The resulting water solutions of hydrogen fluoride should be expected to be very corrosive. However, if water contacts concentrated hydrofluoric acid solutions, a large amount of heat will be generated and there is a danger of violent hydrogen fluoride splashing. DO NOT direct water at open or leaking containers and take precautions not to get water into the containers.
Dike fire control water for later disposal.

Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions | Ventilate enclosed areas. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Emergency Procedures | ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Do not get water inside container.

6.2 Environmental precautions

| Prevent entry into waterways, sewers, basements or confined areas.

6.3 Methods and material for containment and cleaning up

Containment/Clean-up Measures | Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
DO NOT USE CLAY OR OTHER SILICABASED ABSORBING MATERIALS.
Avoid contact with water.
Dike to collect large liquid spills.
A vapor suppressing foam may be used to reduce vapors.
Use water spray to reduce vapors or divert vapor cloud drift.
Neutralize residue with neutralizing agent appropriate for acidic materials. Test area with litmus paper to ensure neutralization is complete.
Spills in Hoods: Decontamination of all interior hood surfaces may be required after the above procedures for ‘All Spills’ have been followed. If the HEPA filter of a hood is contaminated, the unit must be labeled "Do not use-contaminated" and the filter must be changed and disposed of properly as soon as possible by trained personnel wearing protective equipment. Protective goggles should be cleaned with an alcohol wipe after the cleanup.
Place all spill residue in a double plastic bag or other containment and seal. Do NOT store waste in glass containers.

6.4 Reference to other sections

| Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Section 7 - Handling and Storage

7.1 Precautions for safe handling

Handling | Handle and open container with care. Use only with adequate ventilation. Use caution

when combining with water; DO NOT add water to corrosive liquid, ALWAYS add corrosive liquid to water while stirring to prevent release of heat, steam and fumes. Wear appropriate personal protective equipment, avoid direct contact. Do not breathe mist, vapours, spray. Do not get in eyes, on skin, or on clothing. All areas where this product is used should contain instant acting showers and eyewash stations in the event of contamination. Calcium gluconate gel should be readily accessible in areas where potential exposure to this product exists. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

7.2 Conditions for safe storage, including any incompatibilities

Storage

Keep container tightly closed. Store in a cool, dry, well-ventilated place. Keep away from incompatible materials. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Wood and other organic/combustible materials should not be used on floors, structural materials and ventilation systems in the storage area. Do not store in glass containers. Material should be stored in secondary containers or in a diked area.

7.3 Specific end use(s)

Refer to Section 1.2 - Relevant identified uses.

Section 8 - Exposure Controls/Personal Protection

8.1 Control parameters

Exposure Limits/Guidelines

	Result	ACGIH	Canada Ontario	Canada Quebec	China	China Highly Toxic Goods
Hydrofluoric acid (7664-39-3)	Ceilings	2 ppm Ceiling (as F)	2 ppm Ceiling (as F)	3 ppm Ceiling (as F); 2.6 mg/m3 Ceiling (as F)	2 mg/m3 Ceiling [MAC] (as F)	2 mg/m3 Ceiling
	TWAs	0.5 ppm TWA (as F)	0.5 ppm TWA (as F)	Not established	Not established	Not established

Exposure Limits/Guidelines (Con't.)

	Result	France	Germany DFG	Germany TRGS	Ireland	Israel
Hydrofluoric acid (7664-39-3)	STELs	3 ppm STEL [VLCT] (restrictive limit); 2.5 mg/m3 STEL [VLCT] (restrictive limit)	Not established	Not established	3 ppm STEL (as F); 2.5 mg/m3 STEL (as F)	Not established
	TWAs	1.8 ppm TWA [VME] (restrictive limit); 1.5 mg/m3 TWA [VME] (restrictive limit)	Not established	1 ppm TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed, exposure factor 2); 0.83 mg/m3 TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed, exposure factor 2)	1.8 ppm TWA (as F); 1.5 mg/m3 TWA (as F)	0.5 ppm TWA (as F)
	Ceilings	Not established	2 ppm Peak; 1.66 mg/m3 Peak	Not established	Not established	2 ppm Ceiling (as F)
	MAKs	Not established	1 ppm TWA MAK; 0.83 mg/m3 TWA MAK	Not established	Not established	Not established

Exposure Limits/Guidelines (Con't.)						
	Result	Italy	NIOSH	OSHA	OSHA Vacated	Portugal
Hydrofluoric acid (7664-39-3)	Ceilings	Not established	6 ppm Ceiling (15 min); 5 mg/m3 Ceiling (15 min)	Not established	Not established	2 ppm Ceiling [VLE-CM] (as F)
	TWAs	1.8 ppm TWA; 1.5 mg/m3 TWA	3 ppm TWA; 2.5 mg/m3 TWA	3 ppm TWA (as F)	3 ppm TWA (as F)	0.5 ppm TWA [VLE-MP] (as F)
	STELs	3 ppm STEL; 2.5 mg/m3 STEL	Not established	Not established	6 ppm STEL (as F)	Not established

Exposure Limits/Guidelines (Con't.)			
	Result	Spain	Sweden
Hydrofluoric acid (7664-39-3)	STELs	3 ppm STEL [VLA-EC]; 2.5 mg/m3 STEL [VLA-EC]	Not established
	TWAs	1.8 ppm TWA [VLA-ED] (indicative limit value); 1.5 mg/m3 TWA [VLA-ED] (indicative limit value)	Not established
	Biological Limit Values (BLV)	8 mg/L urine end of shift Fluorides (2,F,I)	Not established
	Ceilings	Not established	2 ppm CLV; 1.7 mg/m3 CLV

8.2 Exposure controls

Engineering Measures/Controls

Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

Respiratory

In case of insufficient ventilation, wear suitable respiratory equipment. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face

Wear face shield and eye protection. Wear chemical splash safety goggles.

Skin/Body

Gloves should cover the end of sleeve; do not have exposed skin. Use butyl rubber, Viton(TM), Saranex(TM), Barricade(TM), CPF 3(TM), Trellchem HPS(TM), Tychem 10000(TM), Neoprene, Polyethylene, 4H(TM), (polyethylene/ethylene vinyl alcohol), or Responder(TM) gloves when handling this product. Polyvinyl Chloride should be used for short periods only. Natural rubber, Nitrile rubber, Polyvinyl alcohol are NOT recommended when using this product. Do NOT use leather gloves when handling this product. When chemical contact is possible, use splash apron, work uniform, and shoes or coverlets to prevent skin contact. Full-body chemical protective clothing is recommended for emergency response procedures. Protective clothing used specifically for Hydrofluoric Acid operations should be clearly marked, preferably with a distinctive color, to differentiate it from other protective clothing.

Environmental Exposure Controls

Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways. Follow best practice for site management and disposal of waste.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene

LLV = Limit Level Value is the exposure limit for 8-hour work day

OSHA = Occupational Safety and Health Administration

STEL = Short Term Exposure Limits are based on 15-minute exposures

MAK = Maximale Arbeitsplatz Konzentration is the maximum permissible concentration

NIOSH = National Institute of Occupational Safety and Health

TWAEV = Time-Weighted Average Exposure Value

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

Section 9 - Physical and Chemical Properties

9.1 Information on Physical and Chemical Properties

Material Description			
Physical Form	Liquid	Appearance/Description	Clear, colorless, corrosive liquid with an acrid odor.
Color	Clear, colorless.	Odor	Acrid or pungent odor.
Odor Threshold	0.04 to 0.14 ppm		
General Properties			
Boiling Point	106 C(222.8 F) 49% concentration	Melting Point	-37 C(-34.6 F) 49% concentration
Decomposition Temperature	Data lacking	pH	0.9 to 1
Specific Gravity/Relative Density	1.18 Water=1 50% concentration (calculated)	Density	Data lacking
Water Solubility	Soluble	Viscosity	0.61 Centipoise (cPs, cP) or mPas @ 25 C(77 F)
Explosive Properties	Data lacking	Oxidizing Properties:	Not an oxidizer.
Volatility			
Vapor Pressure	27 mmHg (torr)	Vapor Density	1.86 Air=1
Evaporation Rate	Data lacking		
Flammability			
Flash Point	Data lacking	UEL	Data lacking
LEL	Data lacking	Autoignition	Data lacking
Flammability (solid, gas)	Data lacking		
Environmental			
Octanol/Water Partition coefficient	Data lacking		

9.2 Other Information

- No additional physical and chemical parameters noted.

Section 10: Stability and Reactivity

10.1 Reactivity

- Hydrofluoric Acid is highly reactive and reacts with many other substances, some explosively. The reaction with water can be violent, causing spattering and can generate considerable heat. Contact with iron and steel, particularly in the presence of water, results in the formation of highly flammable hydrogen. Contact with glass and other silicates can result in formation of silicon tetrafluoride gas.

10.2 Chemical stability

- Stable

10.3 Possibility of hazardous reactions

- Hazardous polymerization will not occur.

10.4 Conditions to avoid

- Excess heat. Do not store in glass or silicate-based material containers, incompatible

plastics or metal containers.

10.5 Incompatible materials

Hydrofluoric Acid is incompatible with water, antimony or arsenic containing metal alloys, cyanides, cyanogen fluoride, sulfides, silicon-bearing materials (e.g. sand, concrete, glass and ceramics), bismuthic acid, methanesulfonic acid, fluorine gas (reacts vigorously with a 50% hydrofluoric acid solution and may burst into flame), nitric acid and lactic acid, propylene glycol and silver nitrate, sodium, strong bases (e.g. ammonium hydroxide, sodium hydroxide or calcium oxide), sulfuric acid, arsenic trioxide or phosphorous pentoxide (tetraphosphorus decaoxide. Hydrofluoric Acid is corrosive to aluminum alloy 3003 and carbon steel alloys 1010 and 1020, at any concentration and any temperature; to stainless steel (types 301 and 17-4PH), gray cast iron, nickel-base alloy, Incoloy 800, tantalum, titanium and zirconium at any temperature. It is corrosive to stainless steel (e.g. types 304, 347 and 400-series), metals containing silica (like cast iron, high silicon cast iron (Duriron), silicon bronze and silicon copper), ductile cast iron, 3% nickel cast iron and high nickel cast iron (Ni-resist), nickel-base alloys, Inconel and Incoloy 825, brass, naval brass, admiralty brass, aluminum bronze, and alloys containing appreciable amounts of tantalum, titanium and zirconium at 21.1°C (70°F). Concentrated solutions (50% and above) are corrosive to copper, bronze, and lead, but not dilute solutions (40% and lower). Hydrofluoric Acid attacks plastics, like as acrylonitrile-butadiene-styrene (ABS), chlorinated polyvinyl chloride (CPVC), acetal copolymer, nylon, polyetherether ketone (PEEK), polybutylene and polyethylene terephthalate; bisphenol A polyester; and polyurethane; elastomers, like ethylenepropylene terpolymer (EPT), nitrile Buna-N (NBR), polyurethane, ethylene vinyl acetate and silicone rubbers; coatings, like coal tar epoxy, epoxy polyamide, polyester and vinyl; and glass and silicate ceramics, and leather.

10.6 Hazardous decomposition products

Combustion: Hydrogen fluoride. Hydrolysis: Heat.

Section 11 - Toxicological Information

11.1 Information on toxicological effects

Components		
Impurities, Stabilizers, etc...		
Hydrofluoric acid (35% TO 50%)	7664-39-3	**Acute Toxicity:** Inhalation-Rat LC50 • 1276 ppm; **Irritation:** Eye-Human • 50 mg • Severe irritation; Skin-Rat • 50 % 3 Minute(s) • Severe irritation; **Reproductive:** Inhalation-Rat TCLo • 470 µg/m³ 4 Hour(s)(1-22D preg); *Reproductive Effects:Effects on Fertility*:**Pre-implantation mortality**; *Reproductive Effects:Effects on Fertility*:**Post-implantation mortality**

GHS Properties	Classification
Acute toxicity	**EU/CLP** • Acute Toxicity - Dermal 1; Acute Toxicity - Inhalation 2; Acute Toxicity - Oral 2 **OSHA HCS 2012** • Acute Toxicity - Inhalation 2
Aspiration Hazard	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Carcinogenicity	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Germ Cell Mutagenicity	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Skin corrosion/Irritation	**EU/CLP** • Skin Corrosion 1A **OSHA HCS 2012** • Skin Corrosion 1B

Skin sensitization	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
STOT-RE	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
STOT-SE	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Toxicity for Reproduction	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Respiratory sensitization	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Serious eye damage/Irritation	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Serious Eye Damage 1

Potential Health Effects

Inhalation

Acute (Immediate) | Fatal if inhaled. May cause corrosive burns - irreversible damage.

Chronic (Delayed) | Repeated or prolonged exposure to corrosive fumes may cause bronchial irritation with chronic cough.

Skin

Acute (Immediate) | Fatal in contact with skin. Causes severe skin burns and eye damage.

Chronic (Delayed) | Repeated or prolonged exposure to corrosive materials will cause dermatitis.

Eye

Acute (Immediate) | Causes serious eye damage.

Chronic (Delayed) | Repeated or prolonged exposure to corrosive materials or fumes may cause conjunctivitis.

Ingestion

Acute (Immediate) | Fatal if swallowed. May cause irreversible damage to mucous membranes.

Chronic (Delayed) | Repeated or prolonged exposure to corrosive materials or fumes may cause gastrointestinal distrubances.

Key to abbreviations

LC = Lethal Concentration

TC = Toxic Concentration

Section 12 - Ecological Information

12.1 Toxicity

| Material data lacking.

12.2 Persistence and degradability

| Material data lacking.

12.3 Bioaccumulative potential

| Material data lacking.

12.4 Mobility in Soil

| Material data lacking.

12.5 Results of PBT and vPvB assessment

| No PBT and vPvB assessment has been conducted.

12.6 Other adverse effects

No studies have been found.

Section 13 - Disposal Considerations

13.1 Waste treatment methods

Product waste Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	UN1790	Hydrofluoric acid, with not more than 60 percent strength	6.1,8	II	NDA
TDG	UN1790	HYDROFLUORIC ACID, solution, with not more than 60 per cent hydrofluoric acid	6.1,8	II	NDA
IMO/IMDG	UN1790	HYDROFLUORIC ACID solution, with not more than 60% hydrogen fluoride	6.1,8	II	NDA
IATA/ICAO	UN1790	Hydrofluoric acid 60% or less strength	6.1,8	II	NDA

14.6 Special precautions for user None known.

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

Section 15 - Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications Acute

State Right To Know				
Component	**CAS**	**MA**	**NJ**	**PA**
Hydrofluoric acid	7664-39-3	Yes	Yes	Yes

Inventory						
Component	**CAS**	**Canada DSL**	**Canada NDSL**	**China**	**EU EINECS**	**EU ELNICS**
Hydrofluoric acid	7664-39-3	Yes	No	Yes	Yes	No

Inventory (Con't.)		
Component	**CAS**	**TSCA**
Hydrofluoric acid	7664-39-3	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

• Hydrofluoric acid	7664-39-3	D1A, D2A, E; D1B, D2A, E (40%, 50%, 70%, listed under Hydrofluoric acid)

Canada - WHMIS - Ingredient Disclosure List

• Hydrofluoric acid	7664-39-3	1 %

Environment

Canada - CEPA - Priority Substances List

• Hydrofluoric acid	7664-39-3	Not Listed

China

Environment

China - Ozone Depleting Substances - First Schedule

• Hydrofluoric acid	7664-39-3	Not Listed

China - Ozone Depleting Substances - Second Schedule

• Hydrofluoric acid	7664-39-3	Not Listed

China - Ozone Depleting Substances - Third Schedule

• Hydrofluoric acid	7664-39-3	Not Listed

Other

China - Annex I & II - Controlled Chemicals Lists

• Hydrofluoric acid	7664-39-3	Not Listed

China - Dangerous Goods List

• Hydrofluoric acid	7664-39-3	(anhydrous or solution, with >60% Hydrofluoric acid; solution, with not >60% Hydrofluoric acid)

China - Export Control List - Part I Chemicals

• Hydrofluoric acid	7664-39-3	

Europe

Other

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Classification

• Hydrofluoric acid	7664-39-3	T+; R26/27/28 C; R35

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Concentration Limits

• Hydrofluoric acid	7664-39-3	Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Labelling

• Hydrofluoric acid	7664-39-3	T+ C R:26/27/28-35 S:(1/2)-7/9-26-36/37/39-45

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Notes - Substances and Preparations

• Hydrofluoric acid	7664-39-3	Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Safety Phrases

• Hydrofluoric acid	7664-39-3	S:(1/2)-7/9-26-36/37/39-45

Germany

Environment

Germany - TA Luft - Types and Classes

• Hydrofluoric acid	7664-39-3	Not Listed

Germany - Water Classification (VwVwS) - Annex 1

• Hydrofluoric acid	7664-39-3	Not Listed

Germany - Water Classification (VwVwS) - Annex 2 - Water Hazard Classes

• Hydrofluoric acid	7664-39-3	Not Listed

Germany - Water Classification (VwVwS) - Annex 3

• Hydrofluoric acid	7664-39-3	ID Number 254, hazard class 2 - hazard to waters

Other

Germany - Specifically Regulated Chemicals in TRGS

• Hydrofluoric acid	7664-39-3	Not Listed

Portugal

Other

Portugal - Prohibited Substances

• Hydrofluoric acid	7664-39-3	Not Listed

United Kingdom

Environment

United Kingdom - Pollution Inventory - Schedule 1 - Thresholds for Releases to Air

• Hydrofluoric acid	7664-39-3	Not Listed

Other

United Kingdom - Workplace Exposure Limits (WELs) - Substances in Review

• Hydrofluoric acid	7664-39-3	Not Listed

United Kingdom - List of Dangerous Substances in Water

• Hydrofluoric acid	7664-39-3	Not Listed

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

• Hydrofluoric acid	7664-39-3	1000 lb TQ; 1000 lb TQ (anhydrous)

U.S. - OSHA - Specifically Regulated Chemicals

• Hydrofluoric acid	7664-39-3	Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

• Hydrofluoric acid	7664-39-3	

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Hydrofluoric acid	7664-39-3	100 lb final RQ; 45.4 kg final RQ

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

• Hydrofluoric acid	7664-39-3	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

• Hydrofluoric acid	7664-39-3	100 lb EPCRA RQ

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

• Hydrofluoric acid	7664-39-3	100 lb TPQ

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Hydrofluoric acid	7664-39-3	1.0 % de minimis concentration

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

• Hydrofluoric acid	7664-39-3	Not Listed

U.S. - RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261

• Hydrofluoric acid	7664-39-3	waste number U134

U.S. - RCRA (Resource Conservation & Recovery Act) - U Series Wastes - Acutely Toxic Wastes & Other Hazardous Characteristics

• Hydrofluoric acid	7664-39-3	waste number U134 (Corrosive waste, Toxic waste)

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Hydrofluoric acid	7664-39-3	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Hydrofluoric acid	7664-39-3	Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

• Hydrofluoric acid	7664-39-3	Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)

• Hydrofluoric acid	7664-39-3	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

• Hydrofluoric acid	7664-39-3	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

• Hydrofluoric acid	7664-39-3	Not Listed

United States - Pennsylvania

Labor

U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List

• Hydrofluoric acid	7664-39-3	

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances

• Hydrofluoric acid	7664-39-3	Not Listed

15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out.

Section 16 - Other Information

Last Revision Date	09/December/2014
Preparation Date	09/December/2014
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Key to abbreviations

NDA = No data available