Material Safety Data Sheet
Hydrofluoric acid, 47-51%

ACC# 11171

Section 1 - Chemical Product and Company Identification

MSDS Name: Hydrofluoric acid, 47-51%
Catalog Numbers: AC223330000, AC223330250, AC223335000, AC423800000, AC423800250, AC423805000, S80040, A146-10LB, A146-1LB, A147-10LB, A147-1LB, A147J1LB, A463-1, A463-2, A463-250, A463-500, A463-500LC, A513-4, A513-500, A513-500LC, BW680503
Synonyms: Fluohydric acid; Fluoric acid; Hydrofluoric acid solution; HFA; Etching acid; Fluorohydric acid; Hydrogen fluoride in aqueous solution.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7732-18-5	Water	49-53	231-791-2
7664-39-3	Hydrofluoric acid	47-51	231-634-8

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: fuming liquid.
Danger! May be fatal if inhaled, absorbed through the skin or swallowed. Both liquid and vapor can cause severe burns to all parts of the body. Specialized medical treatment is required for any exposure to HF. Absorbed fluoride can cause metabolic imbalances with irregular heartbeat, nausea, dizziness, vomiting and seizures. Long-term exposure may cause bone and joint changes. Will attack glass and any silicon-containing material. Corrosive to metal. Before using this product, make sure that personal protective equipment and engineering controls are used and operating, and also that first aid treatments and procedures are available and understood.
Target Organs: Lungs, teeth, eyes, skin, bone, mucous membranes.

Potential Health Effects

Eye: Contact with liquid or vapor causes severe burns and possible irreversible eye damage. Solutions as dilute as 2% or lower may cause burns.
Skin: May be fatal if absorbed through the skin. Causes severe burns with delayed tissue destruction. Substance is rapidly absorbed through the skin. Penetration may continue for several days. Causes severe tissue necrosis and bone destruction. Both liquid and vapor can cause severe burns, which may not be immediately painful or visible. Solutions as dilute as 2% or lower may cause burns. Systemic fluoride toxicity from exposure to hydrofluoric acid may result in severe hypocalcemia, hypomagnesemia, hyperkalemia, metabolic acidosis, cardiac dysrhythmias, and death. Burns caused by weak hydrofluoric acid may go unnoticed for several hours. Therefore, first aid procedures must be followed if any contact is suspected.
Ingestion: Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. Human fatalities have been reported from acute poisoning. Systemic fluoride toxicity from exposure to hydrofluoric acid may result in severe hypocalcemia (depletion of calcium in the blood), hypomagnesemia, hyperkalemia, metabolic acidosis, cardiac dysrhythmias, and death.
Inhalation: May be fatal if inhaled. May cause severe irritation of the upper respiratory tract with pain, burns, and inflammation. May cause pulmonary edema and severe respiratory disturbances. Depletes calcium levels in the body which can lead to hypocalcemia and death. Concentrations of hydrofluoric acid above 40% fume in air.
Chronic: Chronic inhalation and ingestion may cause chronic fluoride poisoning (fluorosis) characterized by weight loss, weakness, anemia, brittle bones, and stiff joints. Repeated inhalation may cause chronic bronchitis. Chronic exposure to fluoride compounds may cause systemic toxicity. Skeletal effects may include bone brittleness, joint stiffness, teeth discoloration, tendon calcification, and osterosclerosis. Chronic ingestion or inhalation may cause weight loss, malaise, anemia, leukopenia (reduction in the number of white blood cells in the blood), discoloration of the teeth and osteosclerosis (the hardening or abnormal density of bone). Repeated inhalation may cause osteofluorosis and permanent respiratory damage.

Section 4 - First Aid Measures

Eyes: Do NOT allow victim to rub eyes or keep eyes closed. Spills of HF sho uld be flushed until medical attention arrives. SPEEDY ACTION IS CRIT ICAL! GET MEDICAL ATTENTION IMMEDIATELY! If a physician is not immedi ately available, apply one or two drops of 0.5% tetracaine hydrochlori de solution followed by a second irrigation until medical attention ar rives. Tetracaine hydrochloride will provide ocular anesthesia for 20 min. to an hour.
Skin: Discard contaminated clothing in a manner which limits further exposure. Destroy contaminated shoes. Spills of HF should be flushed until medical attention arrives. SPEEDY ACTION IS CRITICAL! GET MEDICAL ATTENTION IMMEDIATELY. If available, after thorough washing (PREFERRED METHOD), a 2.5% calcium gluconate gel should be continuously massaged into the burned area, or the burned area should be immersed in a solution of 0.2% iced aqueous benzethonium chloride. Immersion may also be done with 0.13% iced aqueous Benzalkonium chloride. If immersion is not practical, towels should be soaked with one of the aforementioned solutions and used as compresses for the burned area. Ideally compresses should be changed every two minutes. It is suggested that a certain quantity of either prepared solution or the calcium gluconate be kept on hand at all times. These should be replaced annually if not previously used.

Before using HF, make sure the solutions, gels and first aid attendant are available in case of exposure.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. SPEED IS ESSENTIAL. A DOCTOR MUST BE NOTIFIED AT ONCE.
Inhalation: SPEED IS ESSENTIAL, OBTAIN MEDICAL AID IMMEDIATELY. POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Calcium gluconate, 2.5% in normal saline may be given by nebulizer with oxygen.
Notes to Physician: Due to delayed and persistent symptoms, observe patient closely for 48 hours. Prompt action is essential in all cases of contact. Irrigate eyes with 1% calcium gluconate in normal saline for 1 to 2 hours to prevent or lessen corneal damage. For burns of large skin areas, for ingestion & inhalation exposure, severe systemic effects may occur. Monitor & correct for hypocalcemia, cardiac arrhythmias, hypomagnesemia & hyperkalemia. For inhalation exposures, treat as chemical pneumonia.
Antidote: Always have calcium gluconate gel on hand. The use of infilitration therapy and intraarterial therapy for hydrofluoric acid burns resulting from concentrations greater than 20% should be made by qualified medical personnel. Calcium gluconate may be administered intravenously slowly to bind to the fluoride ion. This administration needs to be monitored under the supervision of a physician.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Reacts with most metals to form highly flammable hydrogen gas which can form explosive mixtures with air. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products.
Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.
Flash Point: Not applicable.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 4; Flammability: 0; Instability: 1

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Provide ventilation. Evacuate unnecessary personnel. Approach spill from upwind. Remove ignition sources since flammable hydrogen gas may be generated by reactions with metals. Spills may produce white fumes of HF gas. Rapid dilution of the spill with water will reduce the amount of fumes given off. Carefully neutralize the dilute spill with lime slurry, soda ash, limestone, caustic soda or other alkaline material.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Discard contaminated shoes. Use caution when opening. Do not breathe vapor or mist. Use only with adequate ventilation or respiratory protection. Do not put even dilute solutions of hydrofluoric acid in glass containers. Always add the acid to water, never the reverse. Never work alone with this chemical.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store in metal or glass containers. Inspect periodically for damage or evidence of leaks or corrosion. Store in approved containers only. Diking of storage containers is recommended.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use a corrosion-resistant ventilation system. If closed handling systems are not feasible, use local exhaust ventilation such as a fumehood (sash should not be glass). Keep the fumehood sash as low as possible.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Water	none listed	none listed	none listed
Hydrofluoric acid	0.5 ppm TWA (as F); 2 ppm Ceiling (as F)	3 ppm TWA; 2.5 mg/m3 TWA 30 ppm IDLH	3 ppm TWA

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Hydrofluoric acid: 3 ppm TWA (as F)
Personal Protective Equipment
Eyes: Wear chemical splash goggles and face shield.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: 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 if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless - fuming

Odor: strong, pungent - irritating odor - penetrating odor
pH: < 2.0
Vapor Pressure: 27 mm Hg @ 21 deg C (49%)
Vapor Density: 2.21 (Air=1).
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 105 deg C
Freezing/Melting Point:-35 deg C
Decomposition Temperature: Not available.
Solubility: Soluble.
Specific Gravity/Density:1.175 @ 15.5°C
Molecular Formula:HF
Molecular Weight:20.01

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions. Hydrogen fluoride tends to associate by means of hydrogen bonds to form polymers in both the liquid and gaseous states, but this polymerization is not hazardous.
Conditions to Avoid: Excess heat, confined spaces.
Incompatibilities with Other Materials: Metals, strong oxidizing agents, strong bases, acetic anhydride, alcohols, amines, Glass, concrete and other silicon-bearing materials will yield silicon tetrafluoride gas in contact with HFA. Pressure build up from this process has been known to blow up glass containers., Carbonates, sulfides, and cyanides will yield toxic gases such as carbon dioxide, hydrogen sulfide, and hydrogen cyanide..
Hazardous Decomposition Products: Hydrogen fluoride gas.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 7732-18-5: ZC0110000
CAS# 7664-39-3: MW7875000
LD50/LC50:
CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg;
.

CAS# 7664-39-3:
Inhalation, mouse: LC50 = 342 ppm/1H;
Inhalation, mouse: LC50 = 5000 mg/m3/5M;
Inhalation, mouse: LC50 = 270 mg/m3/60M;
Inhalation, rat: LC50 = 1276 ppm/1H;
Inhalation, rat: LC50 = 1100 mg/m3/60M;
.
Human LCLo inhalation: 50 ppm/30M. ation LC50 (mouse): 170 ppm/4H.
Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7664-39-3: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Epidemiological study by Derryberry et al. indicates a threshold for minimal increases(Grade I) in bone density caused by fluoride (fluorosis) is below 3.38 mg/m3 of fluoride (4.3 ppm HF). Grade I fluorosis results in no medically recognized dysfunction.Well-defined incidents of fluorosis are associated with intake levels of 20 mg/d in adults. In children, 4 mg fluoride/d can produce mottling of the teeth.
Teratogenicity: No information available.
Reproductive Effects: See actual entry in RTECS for complete information.
Mutagenicity: See actual entry in RTECS for complete information.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Fish (fresh water) 60 ppm lethal (time period not specified).
Environmental: No information available.
Physical: No information available.
Other: Log P (oct) = 0.23 (estimated)

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 7664-39-3: waste number U134 (Corrosive waste, Toxic waste).

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	HYDROFLUORIC ACID	HYDROFLUORIC ACID
Hazard Class:	8	8(6.1)(9.2)
UN Number:	UN1790	UN1790
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7664-39-3 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 7664-39-3: 100 lb final RQ; 45.4 kg final RQ
SARA Section 302 Extremely Hazardous Substances
CAS# 7664-39-3: 100 lb TPQ
SARA Codes
CAS # 7664-39-3: immediate, delayed.
Section 313
This material contains Hydrofluoric acid (CAS# 7664-39-3, 47-51%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 7664-39-3 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7664-39-3 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
CAS# 7664-39-3 is considered highly hazardous by OSHA.
STATE
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7664-39-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
T+ C
Risk Phrases:
R 26/27/28 Very toxic by inhalation, in contact with skin and if swallowed.
R 35 Causes severe burns.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36/37 Wear suitable protective clothing and gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 7/9 Keep container tightly closed and in a well-ventilated place.

WGK (Water Danger/Protection)
CAS# 7732-18-5: No information available.
CAS# 7664-39-3: 1
Canada - DSL/NDSL
CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7664-39-3 is listed on Canada's DSL List.
Canada - WHMIS
This product has a WHMIS classification of D1A, E, D2A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
Canadian Ingredient Disclosure List
CAS# 7664-39-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 2/12/1999
Revision #12 Date: 11/04/2004

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.