

CORCO CHEMICAL CORPORATION

Manufacturers of ACS Reagents and Semiconductor Grade Chemicals

SAFETY DATA SHEET

HYDROFLUORIC ACID

1. IDENTIFICATION

Product identifier: Hydrofluoric Acid, 49%

Product Code Number: HF200

Company Identification:

Corco Chemical Corporation

299 Cedar Lane

Fairless Hills, PA 19030

Phone: 215-295-5006

Fax: 215-295-0781

**24 Hour Emergency Telephone
Number:**

CHEMTREC (U.S.): 1-800-424-9300

CHEMTREC (Outside U.S. 1-703-527-3887

Trade Name:

Hydrofluoric Acid

Synonyms:

Fluorohydric Acid, Fluoric Acid,

Hydrogen Fluoride Solution

Chemical Formula:

HF in Aqueous Solution

Product Use:

Process chemical, Laboratory and
scientific research and development

2. HAZARD(S) IDENTIFICATION

Classification of the Substance or Mixture:

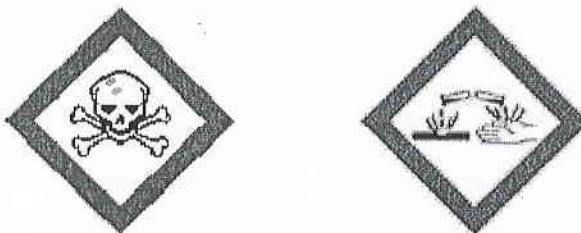
Acute toxicity, Oral	Category 2
Acute toxicity, Inhalation	Category 2
Acute toxicity, Dermal	Category 1
Skin corrosion	Category 1A
Serious eye damage	Category 1

Risk Phrases:

Very toxic by inhalation, in contact with skin and if swallowed.
Causes severe burns.

Label Elements:

Signal Word: **Danger**



Hazard statement: Causes severe skin burns and eye damage. Causes serious eye damage. Causes damage to organs (respiratory system). Causes damage to organs (respiratory system, tooth) through prolonged or repeated exposure.

Precautionary Statements: Do not breathe dust/ fume/ gas/ mist/ vapors / spray. Wash hands thoroughly after handling. Wear protective gloves / protective clothing / eye protection/ face protection. Wear respiratory protection. **IF ON SKIN:** Gently wash with plenty of soap and water. **IF IN EYES:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. **P310:** Immediately call a POISON CENTER or doctor / physician.

Storage: Store locked up. Store in corrosive resistant container with a resistant inner liner.

3. Composition/information on ingredients

CAS Number: 7664-39-3
EC Number: 231-634-8

Index Number: 009-003-00-1
Molecular Weight: 20.01 g/mol

<u>Ingredient</u>	<u>CAS Number</u>	<u>EC Number</u>	<u>Percent</u>	<u>Hazardous</u>	<u>Chemical Characterization</u>
Hydrogen Fluoride	7664-39-3	231-634-8	1 - 60%	Yes	Substance
Water	7732-18-5	231-791-2	40 - 99%	No	Mixture

4. First-aid measures

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

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

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

Skin Contact:

- 1) Remove the victim from the contaminated area and immediately place him under a safety shower or wash him with a water hose, whichever is available.
- 2) Remove all contaminated clothing. Handle all HF-contaminated material with gloves made of appropriate material, such as PVC or neoprene.
- 3) Keep washing with large amounts of water for a minimum of 15 minutes.
- 4) Have someone make arrangements for medical attention while you continue flushing the affected area with water.
- 5) If the following materials are available, limit the washing to five minutes and immerse the burned area in a solution of 0.2% iced aqueous *Hyamine 1622 or 0.13% iced aqueous **Zephiran Chloride. If immersion is not practical, towels should be soaked with one of the above solutions and used as compresses for the burn area. Ideally compresses should be changed every 2 minutes. Alternately, 2.5% calcium gluconate gel should be massaged into the affected area.
- 6) Seek medical attention as soon as possible for all burns regardless of how minor they may appear initially. * Hyamine 1622 is a trade name for Tetracaine Benzethonium Chloride, Merck Index Monograph 1078, a quaternary ammonium compound sold by Rohm & Haas, Philadelphia. ** Zephiran Chloride is a trade name for Benzalkonium Chloride, Merck Index Monograph 1059, also a quaternary ammonium compound, sold by Sanofi-Synthelabo Inc., New York, NY.

Eye Contact:

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

Note to Physician:

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

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

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

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

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

An Alternative First Aid Procedure:

Hydrofluoric Acid (HF) is a highly corrosive and toxic acid, even in a dilute form. It can severely damage the skin and eyes causing severe burns which are extremely painful. Additionally, the vapor from anhydrous HF or its concentrated solutions can cause damage to skin, eyes and the respiratory system. HF differs from other

strong acids in that it not only causes surface burns but rapidly penetrates the skin, even in dilute solution, and causes destruction of underlying tissue and even bone by the extraction of Calcium. For this reason, washing the burn with water is not sufficient. A neutralizing agent which will also penetrate the skin is required. The effect of HF, i.e. onset of pain, particularly in dilute solutions, may not be felt for up to 24 hours. It is important, therefore, that persons using HF have immediate access to an effective antidote even when they are away from their work place in order that first aid treatment can be commenced immediately. It has been conclusively shown (references 1,2,3 and 4 below) that flushing the affected area with water for one minute and then massaging HF Antidote Gel into the wound until there is a cessation of pain is the most effective first aid treatment available. HF Antidote Gel contains Calcium Gluconate which combines with HF to form insoluble Calcium Fluoride, thus preventing the extraction of Calcium from the body tissue and bones. HF Antidote Gel is available in 25g tubes. Since the effects of the dilute acid may not be apparent for some hours, we recommend that any person in contact with HF should carry, or have access to a tube of HF Antidote Gel at all times; ideally with one tube at the work place, one on the person and one at home. It is imperative that any person who has been contaminated by HF should seek medical advice when the treatment by HF Antidote Gel has been applied. For safety's sake, we believe that HF Antidote Gel should be issued to all employees who may come into contact with HF.

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

References:

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

HF ANTIDOTE GEL:

Distributed by Pharmascience Inc.

8400 Darnley Rd. Montreal, Canada. H4T 1M4

Phone: (514) 340 - 1114

Fax: (514) 342 - 7764

U.S. (Buffalo, NY) distributor: 1-800-207-4477

5. Fire-fighting measures

Fire: Not considered to be a fire hazard. Fire may produce poisonous or irritating gases.

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

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

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

6. Accidental release measures

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

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

7. Handling and storage

Precautions for Safe Handling and Conditions for Safe Storage, Including Any Incompatibilities: Keep in tightly closed polyethylene containers. Store in a cool, dry

place with adequate ventilation separated from other chemicals. Protect from physical damage. Storage facilities should be constructed for containment and neutralization of spills. Handling and storage of HF requires special materials and technology for containers, pipes, valves, etc., which is available from suppliers. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do not get this material in contact with skin. Do not get this material on clothing. Avoid prolonged exposure. Wash hands thoroughly after handling. Avoid release to the environment.

8. Exposure controls/personal protection

Airborne Exposure Limits:

For Hydrogen Fluoride:

**OSHA Permissible Exposure Limit (PEL) - 3 ppm (TWA)
ACGIH Threshold Limit Value (TLV) - 3 ppm Ceiling as F.**

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

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

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

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

9. Physical and chemical properties

Appearance:	Colorless, fuming liquid
Odor:	Acrid odor - do not breathe fumes
Odor Threshold:	No information found
pH:	1.0 (0.1M solution)
% Volatiles by volume @ 21C (70F):	100 (as water and acid)
Melting Point:	< -36C (< -33F)
Boiling Point / Boiling Range:	108C (226F)
Flash Point:	Not applicable
Evaporation Rate (BuAC=1):	Not determined
Flammability:	Not applicable
Upper / Lower Flammability or Explosive Limits:	Not applicable
Vapor Pressure (mm Hg):	25 @ 20C (68F)
Vapor Density (Air=1):	1.97
Relative Density:	1.153 g/cc for 49 - 50% Hydrofluoric Acid solution
Solubility:	Infinitely soluble
Partition Coefficient: n-octanol / water:	No data available
Auto-ignition Temperature:	No data available
Decomposition Temperature:	No data available
Viscosity:	1.4 cPs

10. Stability and reactivity

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

Possibility of Hazardous Reactions and Conditions to Avoid: Moisture and incompatibles.

Incompatible Materials: Hydrofluoric Acid is incompatible with Arsenic Trioxide, Phosphorus Pentoxide, Ammonia, Calcium Oxide, Sodium Hydroxide, Sulfuric Acid, Vinyl Acetate, Ethylenediamine, Acetic Anhydride, alkalis, organic materials, most common metals, rubber, leather, water, strong bases, carbonates, sulfides, cyanides, oxides of silicon, especially glass, concrete, silica, Fluorine. Will also react with steam or water to produce toxic fumes.

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

11. Toxicological information

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

Potential Health Effects:

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

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

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

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

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

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

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

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

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

Numerical Measures of Toxicity: Cancer Lists: NTP Carcinogen

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

Acute Toxicity:

Highly Toxic:

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

Inhalation, Rat LC50: 1278 ppm/1hr

Inhalation, Mouse LC50: 500 ppm/1hr

Inhalation, Guinea Pig LC50: 4327 ppm/15 min

Inhalation, Monkey 1780 ppm/1 hr

12. Ecological information

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

Persistence and Degradability: Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Bioaccumulative Potential: No further relevant information available.

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

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

13. Disposal considerations

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

14. Transportation Information

UN Number: UN1790

UN Proper Shipping Name: HYDROFLUORIC ACID, 49%

Packing Group: II

DOT / IMDG / IATA



Land Transport ADR/RID and GGVs/GGVE (Cross Border / Domestic)
Transport Hazard Class(es): 8, 6.1

Maritime Transport IMDG/GGVSea
Transport Hazard Class(es): 8, 6.1

Marine Pollutant: No

Air Transport ICAO-TI and IATA-DGR
Transport Hazard Class(es): 8, 6.1

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

Special Precautions for User: Warning: Corrosive Substances

15. Regulatory information

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)

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

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 - Yes
SARA 311/312 Hazardous chemical - Yes

SARA 313 (TRI reporting)

<u>Chemical name</u>	<u>CAS number</u>	<u>% by wt.</u>
Hydrofluoric acid	7664-39-3	49

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)
Clean Water Act (CWA) Section 112(r) (40 CFR 68.130)
Hazardous substance
Safe Drinking Water Act (SDWA)
4.0 mg/l
4.0 mg/l
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
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
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:

<u>Country(s) or region</u>	<u>Inventory name</u>	<u>On inventory (yes/no)*</u>
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)

16. Other information

Disclaimer - The information in the sheet was written based on the best knowledge and experience currently available. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Created: 8/1/14