

PRODUCT NAME: HYDROGEN FLUORIDE
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1. Chemical Product and Company Identification

**BOC Gases,
Division of,
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974**

**TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE
NUMBER: CHEMTREC (800) 424-9300**

**BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6**

**TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE
NUMBER: (905) 501-0802
EMERGENCY RESPONSE PLAN NO: 2-0101**

**PRODUCT NAME: HYDROGEN FLUORIDE
CHEMICAL NAME: Hydrogen fluoride
COMMON NAMES/SYNONYMS: Hydrofluoric acid, anhydrous
TDG (Canada) CLASSIFICATION: 8 (6.1)
WHMIS CLASSIFICATION: A, E, D2B, D1A**

**PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/1/99**

2. Composition, Information on Ingredients

EXPOSURE LIMITS¹:

INGREDIENT	% VOLUME	PEL-OSHA ²	TLV-ACGIH ³	LD ₅₀ or LC ₅₀ Route/Species
Hydrogen Fluoride FORMULA: HFI CAS: 7664-39-3 RTECS #: MW7875000	> 99.9	3 ppm TWA	3 ppm Ceiling	LC ₅₀ : 1300ppm Inhalation/rat (1H average – CGA P-20, 1995)

¹ Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.

² As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

³ As stated in the ACGIH 1998-1999 Threshold Limit Values for Chemical Substances and Physical Agents.

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.
IDLH: 30 ppm

3. Hazards Identification

EMERGENCY OVERVIEW

Colorless liquid and gas with pungent irritating odor. Poison. Corrosive and irritating to the eyes, skin, and mucous membranes. Can cause severe tissue damage. Inhalation may result in chemical pneumonitis, pulmonary edema, and death. Contents under pressure. Use and store below 125 °F.

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ROUTE OF ENTRY:

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion Yes
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HEALTH EFFECTS:

Exposure Limits Yes	Irritant Yes	Sensitization No
Teratogen No	Reproductive Hazard No	Mutagen No
Synergistic Effects None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:

Corrosive and irritating to the eyes. Contact with the liquid or vapor causes painful burns and ulcerations. Burns to the eyes result in lesions and possible loss of vision.

SKIN EFFECTS:

Corrosive and irritating to the skin and all living tissue. Reacts with water yielding hydrofluoric acid so that skin burns and mucosal irritation are like that from exposure to that acid. Toxic level exposure to dermal tissue causes acid-like burns and skin lesions resulting in early necrosis and scarring. Burns are progressive while any residual active fluorides remain. Hydrofluoric acid burns exhibit severe pain, redness, possible swelling, and early necrosis.

INGESTION:

Corrosive and irritating to the gastrointestinal system. Reacts with water yielding hydrofluoric acid so that skin burns and mucosal irritation are like that from exposure to that acid.

INHALATION EFFECTS:

Corrosive and irritating to the upper and lower respiratory tract and all mucosal tissue. Symptoms include lacrimation, cough, labored breathing, and excessive salivary and sputum formation. Excessive irritation causes chemical pneumonitis and pulmonary edema which could be fatal.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: May aggravate pre-existing eye, skin, and respiratory conditions.

NFPA HAZARD CODES

Health: 4
Flammability: 0
Instability: 1

HMIS HAZARD CODES

Health: 3
Flammability: 0
Reactivity: 1

RATINGS SYSTEM

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

4. First Aid Measures

EYES:

PERSONS WITH POTENTIAL EXPOSURE SHOULD NOT WEAR CONTACT LENSES. Immediately flush contaminated eyes with copious quantities of water. Part eyelids to assure complete flushing. Continue for a minimum of 30 minutes. Seek immediate medical attention.

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Revised: 6/1/99

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SKIN:

Remove contaminated clothing as rapidly as possible while flushing affected area with copious quantities of water. Seek immediate medical attention. Dermal burns may be treated with a calcium gluconate gel or slurry in water or glycerine. This compound binds the active fluorides in an insoluble form and limits burn extension and relieves pain.

INGESTION:

Not specified. Seek immediate medical attention.

INHALATION:

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing is difficult, administer oxygen. If breathing has stopped administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive. Assure that mucous or vomited material does not obstruct the airway by use of positional drainage. Delayed pulmonary edema may occur. Keep patient under medical observation for at least 24 hours.

5. Fire Fighting Measures

Conditions of Flammability: Not flammable		
Flash point: None	Method: Not Applicable	Autoignition Temperature: None
LEL(%): None	UEL(%): None	
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

FIRE AND EXPLOSION HAZARDS:

Reactions of hydrogen fluoride with metal piping and vessels generates hydrogen creating a potential explosion. Not combustible but evolves heat on contact with water. Will produce corrosive hydrofluoric acid in water. Cylinder may rupture violently from pressure when involved in a fire situation.

EXTINGUISHING MEDIA:

Use media appropriate for surrounding fire. Use water spray in flooding quantities. Nonflammable.

FIRE FIGHTING INSTRUCTIONS:

Approach fire from upwind. Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear with additional chemical protective clothing as necessary to prevent exposure. Continue to cool fire-exposed cylinders until well after flames are extinguished. Use water spray to absorb hydrogen fluoride fumes from leaking containers. Prevent runoff of corrosive waters into waterways and sewers.

6. Accidental Release Measures

Immediately evacuate all personnel from affected area. Use appropriate protective equipment. Deny entry to all unauthorized or unprotected individuals. Use water fog or spray to knock down and absorb vapors. CLEAN-UP WATERS ARE CORROSIVE. Contact with dilute solutions (< 20%) may produce pain or visible damage within 24 hours following exposure. Dike cleanup waters for later disposal. Absorb small amounts in noncombustible material for disposal. Do not put even dilute solutions in glass containers. Consult a Hazmat specialist and the appropriate emergency telephone number in Section 1 or your closest BOC location. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs.

7. Handling and Storage

Electrical classification:

Non-hazardous.

Most metals corrode rapidly with wet hydrogen fluoride. Copper-nickel alloys and copper-tin alloys as well as stainless steel and nickel-chromium alloys offer best resistance to HF corrosion. Kel-F ® and Teflon ® are best for gasketing materials. Do not use Buna S ®, Buna N ®, or Neoprene. **USE ONLY RECOMMENDED FITTINGS FOR HYDROGEN FLUORIDE SYSTEM TO AVOID FORMATION OF HYDROGEN GAS.**

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<400 psig) piping or systems. Do not heat cylinder by any means to increase rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent Hazardous back flow into cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated areas of non-combustible construction away from heavily trafficked areas and emergency exits. Store away from incompatible materials. May evolve gas on contact with certain materials. Do not allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full & empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

For additional storage recommendations, consult Compressed Gas Association Pamphlet P-1.

8. Exposure Controls, Personal Protection

ENGINEERING CONTROLS:

Hood with forced ventilation. Local exhaust ventilation used in combination with enclosed processes as necessary to control air contaminants to at or below acceptable exposure guidelines.

EYE/FACE PROTECTION:

Gas tight safety goggles with full face shield or full facepiece respirator.

SKIN PROTECTION:

Protection is dependent upon the magnitude of exposure. Wear gloves, apron, fully encapsulated vapor protective clothing as necessary to prevent exposure. (Responder™ or Tychem 10,000™ are effective for exposures greater than 8 hours.)

RESPIRATORY PROTECTION:

Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:

Safety shoes, safety shower, eyewash "fountain"

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure at °F	: 15.6	psia
Vapor density at STP (%) (Air = 1)	: 2.0	
Evaporation point	: Not Available	
Boiling point	: 67.1	°F
	: 19.5	°C
Freezing point	: -118.1	°F
	: -83.4	°C
pH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H ₂ O)	: Not Available	
Odor threshold	: Not Available	
Odor and appearance	: Pungent irritating odor; colorless liquid	

10. Stability and Reactivity

STABILITY:

Stable

CONDITIONS TO AVOID (STABILITY):

Keep product and equipment dry. Incompatible with most metals, water, and alkali materials.

INCOMPATIBLE MATERIALS:

Incompatible with a variety of chemicals under certain conditions including organic and alkali materials. Forms hydrofluoric acid with evolution of heat on contact with water. Reacts to form hydrogen gas on contact with most metals. Etches glass. Liquid hydrogen fluoride reacts incandescently with oxides.

HAZARDOUS DECOMPOSITION PRODUCTS:

Hydrogen and toxic fluoride compounds in certain reactions.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. Toxicological Information

INHALATION:

Inhalation of 300 ppm for 2 hours or more caused death in guinea pigs and rabbits. A one hour LC₅₀ (rat) of 966 ppm is given for hydrogen fluoride.

SKIN AND EYE:

Hydrogen fluoride is a primary irritant of the skin and eyes. Solutions can cause severe and painful burns.

SUBCHRONIC:

In animals, repeated inhalation of 17 ppm hydrogen fluoride has resulted in damage to the lungs, liver and kidneys. Similar inhalations at 8.6 ppm failed to cause significant pathological changes in these tissues.

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CHRONIC:

Extended low level systemic absorption of hydrogen fluoride may cause fluorosis, an abnormal calcification pattern of the skeletal system. Prolonged repeated exposure may cause changes in the bone and chronic irritation and congestion of the nose, throat and bronchial tubes.

OTHER:

Experimental data indicates the possibility of teratogenic, mutagenic, or reproductive effects.

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Hydrogen Fluoride, Anhydrous	Hydrogen Fluoride, Anhydrous
HAZARD CLASS:	8	8 (6.1)
IDENTIFICATION NUMBER:	UN 1052	UN 1052
SHIPPING LABEL:	CORROSIVE, POISON	CORROSIVE, POISON

Additional Marking Requirement: "Inhalation Hazard"

If net weight of product \geq 100 pounds, the container must be also marked with the letters "RQ".

Additional Shipping Paper Description Requirement: "Poison Inhalation Hazard, Zone C"

If net weight of product \geq 100 pounds, the shipping papers must be also marked with the letters "RQ".

Packing Group: I

15. Regulatory Information

SARA TITLE III NOTIFICATIONS AND INFORMATION

Hydrogen fluoride is listed as an extremely hazardous substance (EHS) subject to state and local reporting under Section 304 of SARA Title III (EPCRA). The presence of hydrogen fluoride in quantities in excess of the threshold planning quantity (TPQ) of 100 pounds requires certain emergency planning activities to be conducted.

Releases of hydrogen fluoride in quantities equal to or greater than the reportable quantity (RQ) of 100 pounds are subject to reporting to the National Response Center under CERCLA, Section 304 SARA Title III.

SARA TITLE III - HAZARD CLASSES:

Acute Health Hazard

Chronic Health Hazard

Fire Hazard

Sudden Release of Pressure Hazard

Reactivity Hazard

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Revised: 6/1/99

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SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER	INGREDIENT NAME	PERCENT BY VOLUME
7664-39-3	HYDROGEN FLUORIDE	> 99.9

This information must be included on all MSDSs that are copied and distributed for this material.

16. Other Information

ACGIH	American Conference of Governmental Industrial Hygienists
DOT	Department of Transportation
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
STEL	Short Term Exposure Limit
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value
WHMIS	Workplace Hazardous Materials Information System

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

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