



AGA GAS, INC. (216) 642-6600
6055 ROCKSIDE WOODS BLVD
P.O. BOX 94737
CLEVELAND, OH 44101-4737

MATERIAL
SAFETY
DATA SHEET

No. 37

PRODUCT NAME Hydrogen fluoride	CAS # 7664-39-3
TRADE NAME AND SYNONYMS Hydrogen fluoride, anhydrous (D.O.T.)	DOT I.D. No.: UN 1052 (RQ 100/45.4)
CHEMICAL NAME AND SYNONYMS Hydrogen Fluoride; Hydrofluoric Acid, Anhydrous	DOT Hazard Class: Class 8, Packing Group I
ISSUE DATES AND REVISIONS Revised January 1995	Formula HF
	Chemical Family: Inorganic Acid (Anhydrous)

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT

As F Ceiling Limit = 3 Molar PPM (ACGTH 1994-1995). OSHA 1993 8 Hr. TWA (as F) = 3 Molar PPM.

SYMPTOMS OF EXPOSURE

Corrosive and irritating to the upper and lower respiratory tracts, skin, and eyes. It hydrolyzes very rapidly yielding hydrofluoric acid so that skin burns and mucosal irritation are like that from exposure to that acid. Symptoms include lacrymation, cough, labored breathing and excessive salivary and sputum formation. Excessive irritation of the lungs causes acute pneumonitis and pulmonary edema which could be fatal. Hydrofluoric acid dermal burns exhibit severe pain, redness, possible swelling and early necrosis.

TOXICOLOGICAL PROPERTIES

Hydrogen fluoride's sharp, pungent odor provides a useful warning of acutely toxic levels in the atmosphere. It is irritating and corrosive to all living tissues. Toxic level exposure to dermal tissue causes hydrofluoric acid burns and skin lesions resulting in necrosis and eventual scarring. Burns are progressive while any residual active fluorides remain. Chemical pneumonitis and pulmonary edema result from exposure to the lower respiratory tract and deep lung. Residual pulmonary malfunction might also occur. Burns of the eye result in lesions and possible loss of vision. Extended low level systemic absorption of hydrogen fluoride may cause fluorosis, an abnormal calcification pattern of the skeletal system. (Continued on Page 4)

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO HYDROGEN FLUORIDE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

Inhalation: Conscious persons should be moved to an uncontaminated area and inhale fresh air. Unconscious persons should be moved to an uncontaminated area and given assisted respiration and supplemental oxygen. Keep the victim warm and quiet. 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. (Continued on Page 4)

Information contained in this material safety data sheet is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto. This information is not intended as a license to operate under or a recommendation to practice or infringe any patent of this Company or others covering any process, composition of matter or use.

Since the Company shall have no control of the use of the product described herein, the Company assumes no liability for loss or damage incurred from the proper or improper use of such product.

HYDROGEN FLUORIDE

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

Hydrogen fluoride rapidly reacts with water or water vapor to form hydrofluoric acid which reacts with most metals and organic materials with the evolution of heat. Reactions with metals liberate hydrogen, a very flammable gas.

PHYSICAL DATA

BOILING POINT 67.1°F (19.5°C)	LIQUID DENSITY AT BOILING POINT 59.7 lb/ft ³ (957 kg/m ³)
VAPOR PRESSURE @ 70°F (21.10C) = 15.6 psia (107 kPa)	GAS DENSITY AT 70°F, 1 atm 0.15 lb/ft ³ (2.4 kg/m ³)
SOLUBILITY IN WATER Reacts violently	FREEZING POINT -118.1°F (-83.4°C)
EVAPORATION RATE 99.9+% volatile	SPECIFIC GRAVITY (AIR=1) @ 70°F (21.1°C) = 2.0
APPEARANCE AND ODOR Colorless liquid with a pungent, irritating odor	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) N/A	AUTO IGNITION TEMPERATURE N/A	FLAMMABLE LIMITS % BY VOLUME (See Page 4) LEL N/A UEL N/A
EXTINGUISHING MEDIA Nonflammable	ELECTRICAL CLASSIFICATION Nonhazardous	
SPECIAL FIRE FIGHTING PROCEDURES If cylinders are involved in a fire, safely relocate or keep cool with water spray		
UNUSUAL FIRE AND EXPLOSION HAZARDS Reactions of hydrogen fluoride with metal piping and vessels generate hydrogen creating a potential explosion hazard.		

REACTIVITY DATA

STABILITY Unstable		CONDITIONS TO AVOID None
Stable	X	
INCOMPATIBILITY (Materials to avoid) Water, organic materials and metals		
HAZARDOUS DECOMPOSITION PRODUCTS Hydrogen and toxic fluoride compounds in certain reactions		
HAZARDOUS POLYMERIZATION May Occur		CONDITIONS TO AVOID None
Will Not Occur	X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact your closest supplier location or call the emergency telephone number listed herein.
WASTE DISPOSAL METHOD Do not attempt to dispose of waste or unused quantities. Return in the shipping container properly labeled, with any valve outlet plugs or caps secured and valve protection in place to your supplier. For emergency disposal assistance, contact your closest supplier location or call the emergency telephone number listed herein.

HYDROGEN FLUORIDE

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)		Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.	
VENTILATION Hood with forced ventilation	LOCAL EXHAUST To prevent accumulation above the Ceiling Limit	SPECIAL	N/A
	MECHANICAL (Gen.)		N/A
PROTECTIVE GLOVES Plastic or rubber			
EYE PROTECTION Safety goggles or glasses plus a face shield			
OTHER PROTECTIVE EQUIPMENT Safety shoes, safety shower, eyewash "fountain," and protective apron.			

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION	
DOT Shipping Name: Hydrogen fluoride, anhydrous DOT Shipping Label: Corrosive Toxic	DOT Hazard Class: Class 8 Pack. Group I I.D. No.: UN 1052 (RQ 100/45.4)
SPECIAL HANDLING RECOMMENDATIONS	
<p>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. Do not heat cylinder by any means to increase the discharge rate of oroduct from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.</p> <p>For additional handling recommendations, consult Compressed Gas Association's Pamphlet P-1.</p>	
SPECIAL STORAGE RECOMMENDATIONS	
<p>Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125F (52C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. use a "first in - first out" inventory system to prevent full cylinders being stored for excessive periods of time.</p> <p>For additional storage recommendations, cnsult Compressed Gac Association's Pamphlet I P-1.</p>	
SPECIAL PACKAGING RECOMMENDATIONS	
<p>Carbon steel (without non-metallic inclusions) is the preferred material for handling hydrogen fluoride up to approximately 150°F (65°C). For higher temperatures Monel®, Inconel®, nickel or copper should be used. Cast iron or malleable fittings should not be used. Polyethylene, copper (sott), Kel-F® or Teflon® are the preferred gasket or "packing" material. Most metals form a passive fluoride film which protects the metal from further corrosion.</p>	
OTHER RECOMMENDATIONS OR PRECAUTIONS	
<p>Equipment used in handling hydrogen flucride should be kept scrupulously dry. Compressed gas cylinders should not be refilled except by qualified producers of compresse eases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a vio1ation of Federal Law (49CFR). (Continued on Page 4)</p>	

*Various Government Agencies (i.e. Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which will not be reflected in this data sheet. The customer should review these regulations to ensure that he is in full compliance.

HYDROGEN FLUORIDE

HEALTH HAZARD DATA

TOXICOLOGICAL PROPERTIES: (Continued)

Hydrogen fluoride is not listed in the IARC, NTP or by GSHA as a carcinogen or potential carcinogen.

Persons in ill health where such illness would be aggravated by exposure to hydrogen fluoride should not be allowed to work with or handle this product.

RECOMMENDED FIRST AID TREATMENT: (Continued)

Eye Contact: PERSONS WITH POTENTIAL EXPOSURE TO HYDROGEN FLUORIDE SHOULD NOT WEAR CONTACT LENSES.

Flush contaminated eye(s) with copious quantities of water. Part eyelids with fingers to assure complete flushing. Continue for minimum of 30 minutes.

Skin Contact: Flush affected area with copious quantities of water. Remove affected clothing as rapidly as possible. 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

SPECIAL PRECAUTIONS

OTHER RECOMMENDATIONS OR PRECAUTIONS: (Continued)

Always secure cylinders in an upright position before transporting them. transport cylinders in trunks of vehicles, enclosed vans, truck cabs or in passenger compartments. Transport cylinders secured in open flatbed or in open pick-up type vehicles

Hydrogen fluoride is considered a toxic chemical and is subject to the reporting requirements of SARA, Title III, Section 313.

NFPA 704 NO. for hydrogen fluoride = 4 0 1 None