

Hydrofluoric Acid Fact Sheet

Substance: Hydrofluoric Acid

Formula: HF

Physical Properties: Colorless, clear, fuming liquid, miscible with water

Odor: Acrid, irritating odor

Vapor Pressure: 400 mmHg (34°F)

Flashpoint: Noncombustible

Exposure Limits:	PEL (OSHA)	3ppm (as fluoride)
	TLV (ACGIH)	3ppm

Hazards: Poison! Extremely corrosive liquid and vapor that can cause severe injury via skin and eye contact, inhalation or ingestion.

Toxicity: Anhydrous hydrogen fluoride and hydrofluoric acid are extremely corrosive to all tissues of the body. Skin contact results in deep, painful burns that are slow to heal. Burns from dilute (<50%) HF do not usually become apparent until several hours after exposure; more concentrated solutions and anhydrous HF cause immediate painful burns and tissue destruction. HF damages underlying tissues through the release of fluoride ions leading to the decalcification of bones and potentially cardiac arrhythmias or cardiac arrest. HF liquid and vapor exposures to the eyes can lead to severe burns, permanent damage and blindness. Exposure to concentrations of HF above 10ppm can seriously damage the lungs and lead to the onset of pulmonary edema after several hours. Brief exposure (5 minutes) to 50-250ppm of HF can be fatal to humans.

Reactivity: HF reacts with glass, ceramics, glazes and some metals. Reactions with metals may generate potentially explosive hydrogen gas. On heating to decomposition, HF can yield toxic fumes from fluorides. Reactions with silica produce silicon tetrafluoride, a hazardous colorless gas. HF is also incompatible with acetic anhydride, alkalis, ammonia, arsenic trioxide, calcium oxide, carbonates, concrete, cyanides, ethylenediamine, fluorine, leather, organic materials, phosphorus pentoxide, rubber, strong bases, sulfides, sulfuric acid, and vinyl acetate. HF will also react with steam or water to produce toxic fumes.

Handling & Storage: All work with hydrofluoric acid should be conducted in fumehoods to prevent exposure through inhalation. Splash goggles, face-shields, lab coats, long-sleeved shirts, close-toed footwear and chemical-resistant splash aprons should be worn at all times to prevent eye or skin contact. In most cases, medium or heavyweight neoprene, nitrile or viton gloves should be worn when handling HF. Wearing two pairs of gloves is highly recommended. *However, always consult the manufacturer's glove selection guide when choosing a glove for HF.* Tubes of 2.5% calcium gluconate gel should be present in the lab and inspected prior to each use of HF to ensure the gels have not exceeded their expiration dates. Previously opened/expired tubes of calcium gluconate should be discarded through EH&S.

Researchers should never work alone or after hours with HF. *Glass containers should never be used to store or transfer HF.* Instead HF should be stored in chemically-compatible containers made of polyethylene or Teflon and separated from incompatible materials. Use of aluminum, steel, galvanized or tin-plated containers or secondary containers should also be avoided. All containers of HF should be clearly labeled and kept in tightly-sealed containers to minimize exposure and prevent the etching of fume hood glass from HF vapors. Empty containers of HF should be handled carefully and may still be hazardous since they can retain product residues (vapors, liquid). Work with anhydrous HF should only be undertaken using special equipment and by well-trained personnel familiar with first-aid procedures.

First Aid: Laboratory personnel should be familiar with first aid procedures before beginning work with HF; calcium gluconate gel should be readily accessible in areas where potential HF exposures exist. *First aid should be started within seconds of HF exposure.*

In the event of skin contact with HF, immediately place the contaminated skin under an emergency shower, drench hose or faucet (depending on the size of the exposure area). Have another person in the lab call **911** for emergency medical assistance. Rinse the affected area with water for 5 minutes. While the water is running, remove contaminated clothing using clean neoprene gloves and have another person from the lab place all contaminated objects in a leak-proof, polyethylene container. If available, rub calcium gluconate gel into the affected area using clean neoprene gloves. If the gel is not available, continue rinsing the contaminated area with water. Continue applying the calcium gluconate gel or rinsing the area with water until emergency medical personnel arrive at the lab. Make sure to inform the attending physician/technician that the injury involved HF as opposed to other acids.

In the case of eye contact with HF, remove contact lenses if applicable. Forcibly hold the eyelids open and flush the eyes thoroughly with water using an emergency eyewash for at least 15 minutes. Tubes of 2.5% calcium gluconate gels should **NOT** be applied to the eyes. Have someone from the lab call **911** to initiate an emergency medical response while the victim's eyes are being irrigated.

If HF is inhaled, move the person to fresh air and call **911** for medical assistance. Keep the patient warm and resting until emergency personnel arrive. If breathing stops, begin cardiopulmonary resuscitation or use an inhalator. If HF is ingested, do **NOT** induce vomiting. Give large quantities of room temperature water and call **911** for immediate medical assistance.

Accidents: In the event of a spill of hydrofluoric acid, evacuate the lab, close all doors, post "**DO NOT ENTER**" signs on the doors and call **911** to alert the UConn Fire Department. For major spills/releases, pull the fire alarm, evacuate the building and report to the lab's designated meeting place.

Disposal: Excess hydrofluoric acid and waste materials containing the substance should be placed in tightly-sealed plastic containers and appropriately labeled with the words "Hazardous Waste" and "Hydrofluoric Acid." Waste pick-up request forms can be submitted to EH&S at <http://ehs.uconn.edu/cwc/request.php>.