



Hydrofluoric Acid (HF)

REFERENCE GUIDE

Issued: January 2025

Hydrofluoric acid (HF) has several chemical, physical, and toxicological properties that make it particularly hazardous. HF solutions are clear, colorless, and highly corrosive liquids. When exposed to air, anhydrous HF and concentrated solutions produce pungent noxious fumes. HF shares the corrosive properties common to mineral acids, but possesses the unique ability to cause deep tissue damage and systemic toxicity. If working with HF, it is imperative to be aware of the hazards, risk mitigation strategies, and appropriate emergency response procedures as outlined in this reference guide.

The following key aspects will be addressed:



Routes of Exposure / Symptoms



Workplace Precautions



Personal Protective Equipment



Emergency Responses



Routes of Exposure / Symptoms

- **Skin Contact:** Both the liquid and vapor can cause severe burns that may not be immediately painful or visible. The fluoride ion readily penetrates the skin, causing deep destruction of the tissue. Burns over the body totaling 25 square inches of surface area (approximately the size of the palm of your hand) may also cause hypocalcemia and other fatal toxic effects such as fluoride poisoning. Concentrations over 50% will cause immediate, severe, burning pain, and white discoloration of the skin preceding blister formation. Concentrations between 20-50% will not result in symptoms until 1 to 8 hours after exposure. Concentrations between 0 and 20% will not result in symptoms until up to 24 hours post exposure.
- **Eye Contact:** Contact of liquid or vapor HF can cause irritation, eye burns, and destruction of the cornea.
- **Ingestion:** HF ingestion causes severe mouth, throat, and stomach burns. Ingestion of small, dilute quantities of HF has caused profound and fatal hypocalcemia and systematic toxicity if not immediately treated.
- **Inhalation:** Mild exposure to HF may result in delayed symptoms such as nose, throat, and respiratory system irritation. Severe exposure (LC50 = 5,100 ppm/5 min in rats) causes nose and throat burns, lung inflammation, pulmonary edema, hypocalcemia, and systemic toxicity.



Workplace Precautions

- Regardless of the concentration of the stock solution, an in-date (1 year expiration) 2.5% calcium gluconate gel must be readily available in the HF working area.
- All personnel must be made aware of the hazards associated with HF, appropriate work procedures, and exposure/emergency response (including location of 2.5% calcium gluconate gel, safety shower, and eye wash).
- The SDS for HF must be printed off and easily located in the HF work area. The SDS must be less than 5 years old.
- SOPs must be created for all procedures involving HF.
- Work must be conducted within a properly functioning chemical fume hood.
- Work must be conducted during normal working hours while other personnel are available.
- All HF solutions must be stored in polyethylene, Teflon, or other compatible materials (no glass or metal).
- HF must be stored in a compatible secondary containment tray.



Personal Protective Equipment

- Chemical Splash Goggles
- Full Face Shield
- Laboratory Coat
- Chemical Resistant Apron (made of natural rubber, neoprene, or viton)
- 2 pairs of gloves
 - Pair 1: Standard laboratory nitrile or neoprene gloves
 - Pair 2: Medium or heavyweight viton, nitrile, neoprene, or viton gloves that are 22 mil thick OR other HF resistant gloves (see manufacturer selection guide)
 - When working with diluted solutions of HF for brief use, 2 pairs of nitrile or neoprene laboratory gloves may be worn with the above PPE



Emergency Responses

For all potential and known exposures to HF, immediate medical attention must be sought.

- **Skin:** Remove victim from contaminated area and rinse effected area with copious quantities of water for 5 minutes while removing all effected clothing. Immediately apply 2.5% calcium gluconate gel via continuous massage into the area until medical personnel arrive. Work with hydrofluoric acid is NOT permitted without a readily available supply of 2.5% calcium gluconate gel in the immediate area of use. Immediate medical attention must be sought after exposure or potential exposure.
- **Eyes:** Irrigate eyes in eyewash station for a minimum of 15 minutes. Medical attention must be sought.
- **Ingestion:** Drink large amounts of water, milk, or milk of magnesia. Do NOT induce vomiting. Seek immediate medical attention.
- **Inhalation:** Move victim to fresh air and keep calm while awaiting immediate medical attention. If breathing has stopped, start artificial respiration at once.
- **Spills:** For any HF spills, the area must be evacuated and the spill immediately reported to EH&S or MSU Police (after hours).