

Hydrofluoric Acid

Chemical and Physical Properties

Hydrofluoric acid (HF) is a strongly corrosive chemical. HF easily penetrates the skin and mucous membranes, and can cause deep tissue damage. Severity and timing of these effects depends on the concentration, duration of exposure, and penetrability of the exposed tissue. Symptoms may start immediately or pain may be delayed due to HF's ability to interfere with nerve function. Life threatening systemic toxicity may follow dermal exposure with minimal external tissue damage. A seemingly minimal exposure can lead to severe medical consequences including death.

Health Hazards

Acute Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to HF:

- Severe eye irritation and burns with possible permanent damage
- Nose and throat irritation
- Contact with skin can cause irritation and severe deep tissue burns. The burn may occur hours after contact, even if no pain is felt at the time of exposure.
- Inhalation can irritate the lungs causing coughing and shortness of breath. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema).

Chronic Effects

The following chronic (long-term) health effects can occur at some time after exposure to HF and can last for months or years:

- Repeated inhalation of HF may cause bronchitis with coughing, phlegm, and/or shortness of breath.
- HF may damage the liver and kidneys
- Long term exposure to very high concentrations can cause deposits of Fluoride in the bones and teeth, a condition called "Fluorosis" (changes in bone structure). This can cause bone pain, fractures, disability, and mottling of the teeth.

Safe Work Practices

- All work must be performed in a fume hood
- Fresh antidote gel (2.5% calcium gluconate) must be available prior to any experiment being conducted.
- Brief use of dilute solutions workers must wear, at a minimum, 8 mil nitrile gloves, lab coat, and goggles.
- When working with strong concentrations (30-70%), large quantities, or possibility of splash workers must also wear a face shield, and Butyl or Neoprene gloves.
- The fume hood where HF is used and the cabinet where HF is stored must be labeled to indicate that work with HF is done in that area.
- HF is a corrosive, inorganic acid and must be stored in an acid cabinet in secondary containment, isolated from bases and organic acids. Do not store excess amounts of HF in the laboratory.
- HF can dissolve glass so collect any HF waste or unused HF in a polyethylene or Teflon container.

Hydrofluoric Acid (cont.)

Accidental Exposure

Any exposure to HF requires immediate medical attention—Dial 911 immediately.

- **Exposure to Eyes:** Rinse eyes for 15 minutes in the eyewash.
- **Exposure to Skin:** Remove contaminated clothing as soon as possible. If the chemical contacts exposed skin, gently wash with running water and non-abrasive soap. Using appropriate protective gloves, apply a generous amount of 2.5% calcium gluconate gel to the exposed area and continue applying until medical help arrives. The antidote is available through Boynton Health services or most well known chemical supply companies.
- **Accidental Ingestion:** Do not induce vomiting.
- **Accidental Injection:** Await instruction from medical personnel.

Spill Response

All HF spills should be treated as an emergency. In the event of an HF spill, follow emergency chemical spill response procedures outlined in the [Chemical Spills Fact Sheet](#). Review this fact sheet prior to work with chemicals in the lab and annually thereafter.

Waste Disposal

Dispose of both excess HF and HF solutions as hazardous waste. For more information consult the UHS [Chemical Waste Disposal Procedures](#) page.

Remember: HF can dissolve glass so collect any HF waste or unused HF in a polyethylene or Teflon container.

Additional Information

For general information regarding the safe use of HF, please contact UHS at uhs@umn.edu or (612) 626-6002.

If you have any concerns regarding the stability or testing of a chemical, contact the Hazardous Waste Program at hazwaste@umn.edu or (612) 624-1604.

Resources

[Hydrofluoric Acid Burns Treatment & Management](#)

[PubChem Compound Summary Hydrofluoric Acid](#)