
Hydrofluoric Acid (HF)

Standard Operating Procedure

Revision Date 6/23/2022



Potential Safety Hazards

ALL HYDROFLUORIC ACID EXPOSURES SHOULD BE CONSIDERED A MEDICAL EMERGENCY.

Toxicity – Hydrofluoric Acid is extremely toxic (LD₅₀ oral rat = 17 mg/kg). Dermal exposures to as little as 3-5% of the Body Surface Area can be fatal. Exposure to HF often has severe consequences because it will critically lower blood serum levels of calcium and magnesium which can result in complete heart failure. Flushing exposed areas with water will remove the surface acid, but is ineffective against fluoride ions that have already penetrated the skin. Calcium gluconate gel has some effectiveness as an antidote for absorbed HF.

Corrosivity – Contact with HF can cause severe skin burns and eye damage.

Reactivity – HF will dissolve glass. HF is an acid and will react violently with strong bases. HF solutions are aqueous and will react violently with water reactive materials such as alkali metals.

Safe Work Practices

Inventory Management

- Minimize the amount of HF stored in a laboratory.
- Utilize a less dangerous product than HF if possible.

Engineering Controls

- Handle hydrofluoric acid in an exhausted enclosure, such as a chemical fume hood to prevent inhalation exposure.
- Utilize splash guards when possible to prevent dermal exposure.

Personal Protective Equipment (PPE)

- Double glove with two pairs of nitrile gloves when working with small amounts of HF. Immediately replace the gloves if they become contaminated. Working with significant amounts of hydrofluoric acid will require gloves with higher chemically resistance such as Barricade, Chemrel, Saranex, or Responder brand gloves.
- Protect the eyes and face with goggles and a face shield.
- Wear a lab coat over long pants and closed toed shoes.
- Wear an acid resistant apron when pouring significant quantities of HF.

Handling and Storage Practices

- Store HF in plastic containers since HF will dissolve silica-based containers such as glass.
- Ensure adequate stock of the HF antidote (calcium gluconate gel) is immediately available before working with HF.
- Keep HF separated from incompatible chemicals including strong bases and violently water materials.

Chemical Hygiene

- Designate specific areas for HF work and post warning signs to notify others in the area of the HF hazard.
- Keep HF containers closed as much as possible to prevent spillage.
- Change gloves frequently, even if they do not appear to be contaminated.
- Wash hands each time after removing gloves.
- Prohibit all food and beverages in labs to minimize the risk of ingestion.

Preparedness for a Hydrofluoric Acid Incident

HF Exposure

- Treat all HF exposures as a medical emergency even if signs and symptoms do not immediately appear after exposure.
- Immediately flush the affected area with water for 20 minutes while removing potentially contaminated clothing.
- Massage the HF antidote (calcium gluconate gel) onto and around the affected area.
- Seek prompt medical attention at a hospital emergency room and ensure the emergency responders are aware the incident is an HF exposure.

Spill Response

- Take appropriate measures to prevent HF exposure including restricting area access and wearing appropriate PPE when cleaning the spill.
- Neutralize spilled liquid with specialized HF neutralizer or a standard acid neutralizing material like sodium bicarbonate.
- Ensure there is no liquid remaining before collecting the spill response material for disposal via Environmental Health & Safety (EHS) and returning the area to normal use.

Unneeded Material

- Manage hydrofluoric acid, solutions containing HF, and contaminated items as hazardous waste and dispose via EHS (<https://www.isu.edu/ehs/>).