

Principal Investigator: _____

Date Approved: _____

Hydrofluoric Acid

Hydrofluoric acid (HF) is a mineral acid which is highly toxic due to its fluoride ion. HF solutions are clear and colorless with a density similar to that of water. The most widely known property of HF is its ability to dissolve glass. It will also attack glazes, enamels, pottery, concrete, rubber, leather, many metals (especially cast iron), and organic compounds. Upon reaction with metals, explosive hydrogen gas may be formed.

HF is a lipid-soluble molecule that penetrates tissue more rapidly than typical mineral acids. As a result, poisoning can occur readily through exposure of skin, eyes, or when inhaled or swallowed. Symptoms of exposure to HF may not be immediately evident, since HF interferes with nerve function. HF is also a calcium-seeker; it dissolves the calcium in the bone. Accidental exposures can go unnoticed, delaying treatment and increasing the extent and seriousness of the injury. Skin saturation with HF may be relatively painless, yet ultimately fatal. **A solution of only 1-2% HF exposed to greater than 10% of your body can be fatal without medical attention.** High concentrations of HF and HF gas can also quickly destroy the corneas of the eyes.

This standard operating procedure encompasses both pure hydrofluoric acid as well as chemicals such as hexafluorophosphoric acid (HPF6), glass etching solutions, and other compounds that include HF as an ingredient.

If you work with hydrofluoric acid, you **must have calcium gluconate gel available** and a protocol in place to regularly check for an adequate, unexpired supply.



Personal Protective Equipment & Personnel Monitoring

Lab Coat	Gloves	Eye Protection
		
Traditional lab coat AND natural rubber apron over the top.	Small volume (<100 ml), <52% HF, AND incidental contact: Double disposable neoprene gloves; 12" gauntlet-style recommended. <i>Avoid skin contact when removing gloves.</i> Large volume, >52% HF, OR contact expected: Gauntlet-style, heavy duty butyl rubber or neoprene gloves. <i>Avoid skin contact when removing gloves.</i>	ANSI Z87.1-compliant safety goggles and face shield.

Labeling & Storage

HF easily dissolves glass; therefore, HF must always be stored in its original container and placed in Nalgene/polypropylene secondary containment. HF solutions must be stored in plastic bottles and placed in Nalgene/polypropylene secondary containment. Do not store above eye level. Do not store with oxides, organic chemicals, bases, or metals. Labels identifying the material as Hydrofluoric Acid/Acute Toxicant must appear on the bottles and secondary containers. Also, if not plainly visible (e.g. through a cabinet window), labeling must be applied to storage locations where these are stored to avoid an inadvertent encounter.

Engineering Controls, Equipment, & Materials

Fume Hood

Use a fume hood to mitigate inhalation exposure to HF. If your protocol does not permit the handling of such materials in a fume hood, contact EH&S to determine whether additional respiratory protection is warranted.

Notify EH&S if there will be a change in equipment, process, control, etc. that may result in additional potential exposure to HF or its compounds.

Administrative Controls

Lab members involved with HF or its compounds must receive hands-on training before working with it, including safe handling procedures, storage, personal protective equipment, emergency response procedures, reporting, etc. This training should be documented and kept on file.

Lab personnel working in the lab, but not specifically with these compounds, should be made aware of the dangers and emergency response procedures in case of an incident. ***Never use HF or its compounds alone after hours.***

Processes to ensure that the proper controls (such as routine inspections of the presence and usability of calcium gluconate gel) should be in place.

Housekeeping

Spills

Treat ***ALL*** spills of these materials as a major spill. Immediately notify others in the area of the spill, including your supervisor. Evacuate the location where the spill occurred. Call TWU DPS (940-898-2911 in Denton; 214-689-6666 in Dallas; 832-870-6128 in Houston). Report any spill to EH&S at 940-898-4001. Remain on-site (at a safe distance) to provide detailed information to first responders. ***All HF spills require emergency response.***

Waste

HF waste is considered Extremely Hazardous. Empty containers of HF and gloves/PPE that come in contact with HF must be disposed as hazardous waste with an appropriate waste label affixed. See TWU's [Hazardous/Regulated Waste](https://twu.edu/health-safety/) webpage for more information.

First Aid & Emergencies

All labs working with or storing HF, or any other compound that emits HF or where the SDS states treatment includes calcium gluconate (e.g., HPF6 and HBF4), **are required to include calcium gluconate gel** in their first-aid kit. The location of the first-aid kit must be readily apparent, all lab members trained on its usage, and its availability and usability (i.e., items not expired/missing) verified before beginning an experiment.

In the event of **any type of exposure** to HF, call **911** and alert TWU DPS (940-898-2911 in Denton; 214-689-6666 in Dallas; 832-870-6128 in Houston). Report any exposure to EH&S at 940-898-4001.

Skin Contact

Immediately begin flushing the affected area with water. While flushing with water, remove all contaminated clothing and continue for at least 15 minutes if calcium gluconate gel is not available. Rinsing may be limited to 5 minutes if calcium gluconate is available. Wearing compatible gloves, massage calcium gluconate gel into the affected area. Re-apply every 15 minutes or until medical help arrives.

Eye Contact

Check for and remove contact lenses. Flush eyes in an eyewash and seek medical attention immediately.

Inhalation

Move affected individual(s) into fresh air. Seek medical attention immediately.

Ingestion

Seek medical attention immediately.



Standard Operating Procedure

Hydrofluoric Acid

[illegible]