



Chemical Standard Operating Procedure

All work involving materials classified as Particularly Hazardous requires the completion of Section 6.

Procedure Name		Hydrofluoric acid (HF)			
Procedure Author					
Name of Responsible Person					
Location to be Performed					
Creation Date			Review Date(s)		Revision Date(s)
1.	THIS STANDARD OPERATING PROCEDURE (SOP) IS FOR A:				
	<input type="checkbox"/> Specific laboratory procedure or experiment <ul style="list-style-type: none"> Examples: synthesis of chemiluminescent esters <input type="checkbox"/> Generic laboratory procedure that covers several chemicals <ul style="list-style-type: none"> Examples: distillation, chromatography <input checked="" type="checkbox"/> Generic use of a specific chemical or class of chemicals with similar hazards <ul style="list-style-type: none"> Examples: Organic azides, mineral acids, hydrofluoric acid 				
2.	DESCRIPTION: <i>Briefly describe how the chemical will be used.</i>				
	Identify how the HF will be used.				
3.	RISK IDENTIFICATION: <i>Identify potential safety hazards – refer to Section 2 of the SDS.</i>				
	<input type="checkbox"/> Explosive <input type="checkbox"/> Pyrophoric <input type="checkbox"/> Flammable (liquid, solid, gas or aerosol) <input type="checkbox"/> Self-Reactive <input type="checkbox"/> Peroxide Forming <input type="checkbox"/> Organic Peroxide <input type="checkbox"/> Oxidizing (liquid, solid or gas) <input type="checkbox"/> Water-Reactive <input type="checkbox"/> Compressed Gases <input type="checkbox"/> Cryogen <input checked="" type="checkbox"/> Corrosion to Metals <input type="checkbox"/> Radionuclides <input type="checkbox"/> Other: Click or tap here to enter text.		<input type="checkbox"/> Carcinogen <input type="checkbox"/> Sensitizer (respiratory and/or skin) <input type="checkbox"/> Irritant (skin and/or eye) <input checked="" type="checkbox"/> Corrosive (skin and/or eye damage) <input checked="" type="checkbox"/> Acute Toxicity (oral, dermal and/or inhalation) <input type="checkbox"/> Germ Cell Mutagen <input type="checkbox"/> Reproductive Toxicity <input checked="" type="checkbox"/> Target Organ Systemic Toxicity: Single Exposure <input type="checkbox"/> Target Organ Systemic Toxicity: Repeated Exposure <input type="checkbox"/> Other: Click or tap here to enter text.		
	Notes (include chemicals that will be used, additional cautions, permissible exposure limits, etc.):				



	<p>HF is very corrosive and destroys skin tissue even in dilute solutions. It readily penetrates skin to destroy tissues, decalcify bone and interfere with nerve function. Exposure to highly concentrated solutions can cause acute hypocalcemia (low level of calcium in the blood) followed by cardiac arrest and death. Exposure to eyes may result in permanent eye damage or blindness. It is highly toxic by inhalation, skin contact or ingestion. Absorption of substantial amounts of HF by any exposure route may be fatal.</p> <p>Fatal if swallowed, in contact with skin or if inhaled. Causes severe skin burns and eye damage. Causes serious eye damage. OSHA PEL: 3 ppm TWA</p>
4.	<p>WHAT ENGINEERING CONTROLS WILL BE USED TO MINIMIZE EXPOSURES TO THESE HAZARDS? <i>select all that apply</i></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Fume Hood <input type="checkbox"/> Snorkel <input type="checkbox"/> Glove Box <input type="checkbox"/> Clean Room <input type="checkbox"/> Explosion Shielding <input type="checkbox"/> Splash Shielding <input type="checkbox"/> Beta Shielding <input type="checkbox"/> Safety Storage Cabinet <input type="checkbox"/> Flammable Storage Refrigerator <input type="checkbox"/> Other: Click or tap here to enter text.
5.	<p>WHAT PERSONAL PROTECTIVE EQUIPMENT IS REQUIRED TO MINIMIZE THESE HAZARDS? <i>select all that apply</i></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Safety Glasses <input checked="" type="checkbox"/> Lab Coat <input type="checkbox"/> Fire-Resistant Lab Coat <input checked="" type="checkbox"/> Gloves - specify type: 6 mil nitrile inner gloves and 22 mil (nominal) gauge neoprene or butyl rubber gloves or SilverShield outer gloves. Nitrile gloves (6 mil) may also be used as a layer on top of SilverShield gloves for dexterity. Do not use latex gloves. <input checked="" type="checkbox"/> Acid Resistant Apron <input checked="" type="checkbox"/> Face shield <input type="checkbox"/> Other: Click or tap here to enter text.
6.	<p>STEP-BY-STEP OPERATING PROCEDURE</p> <p><i>Provide a sequential description of work, including as much detail as possible such as designated work area(s), chemical concentrations ranges and amount used (mass, volume) and when special safety equipment is to be utilized. Include temperature, pressure, and other experimental conditions if possible. Pictures and schematics are recommended for complex setups. Highlight the steps with the highest hazards.</i></p> <p>Work with HF should only be done during business hours and when there is someone else available to assist with procedures and emergencies. All staff working with HF must be</p>



	<p>trained on this SOP prior to starting work. All training must be documented and maintained by the PI or their designee. The designated work area for HF is XXX. Signage must be posted indicated that HF is used in the designated area.</p> <p><u>Preparation</u></p> <ul style="list-style-type: none"> For use, transport HF from the storage area to the fume hood in a labeled, sealed non-breakable secondary container. Always remove HF from its secondary container in a fume hood in order to safely vent any accumulated vapor. All preparation of HF will be performed over plastic-backed absorbent pads in a fume hood. Pads will be disposed of as hazardous waste immediately upon contamination and after completion of tasks. Ensure compatibility of HF before mixing with other chemicals or disposing in a hazardous waste container. Review the SDS for incompatibilities. HF reacts with some metals and liberates flammable hydrogen gas. <p>[Describe how HF will be prepared.]</p> <p><u>Use</u></p> <ul style="list-style-type: none"> HF will be stored in designated areas [specify location(s)]. Store and/or label HF so it will only be handled by those trained to use it. If gloves become contaminated with HF, remove them immediately, thoroughly wash your hands, apply calcium gluconate gel as instructed below, and dispose of the gloves as a hazardous waste. Clean the fume hood upon completion of tasks with a 10% calcium carbonate solution, followed by soap and water. Clean all contaminated surfaces with a 10% calcium carbonate solution, followed by soap and water. Place all contaminated disposable items in appropriate laboratory waste for disposal. Non-disposable/re-usable utensils, containers, and other surfaces contaminated with HF must be decontaminated using a 10% calcium carbonate solution, followed by soap and water, at the end of the laboratory work session. Complete this inside the fume hood before removing any of the items. When work completed, dispose of gloves and wash hands with soap and water. <p>[Describe how HF will be used.]</p>		
<p>7.</p>	<p>TRANSPORT, RECEIVING AND STORAGE REQUIREMENTS <i>Describe transport, receiving and storage requirements. Include secondary containment, transport devices (carts, carriers, etc.), segregation requirements, any special temperature or atmospheric requirements, and container compatibility requirements. Information may be included in Section 6.</i></p> <table border="1"> <tr> <td>Chemical name</td> <td>Storage location/requirement</td> </tr> </table>	Chemical name	Storage location/requirement
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	Hydrofluoric acid	<p>Storage location</p> <p>Do not store with organic acids, strong oxidizing agents, bases or metals. Store on lower shelf. Keep away from heat, light, air, flames and sources of ignition. Never store or work with HF in glass, metal or ceramic containers. Store HF in labeled, sealed, non-breakable secondary compatible (plastic or Teflon) container within storage area.</p>						
8.	<p>WASTE DISPOSAL</p> <p>Type of waste generated by this procedure/process (<i>check all that apply</i>): <input type="checkbox"/> Solid <input type="checkbox"/> Liquid</p> <p>Waste hazard determination (<i>check all that apply</i>):</p> <table border="1"> <thead> <tr> <th>Type of Waste</th> <th>Hazard Determination</th> </tr> </thead> <tbody> <tr> <td>Solid</td> <td><input type="checkbox"/> Flammable <input type="checkbox"/> Oxidizer <input checked="" type="checkbox"/> Corrosive <input type="checkbox"/> Reactive <input checked="" type="checkbox"/> Toxic</td> </tr> <tr> <td>Liquid</td> <td><input type="checkbox"/> Flammable <input type="checkbox"/> Oxidizer <input checked="" type="checkbox"/> Corrosive <input type="checkbox"/> Reactive <input checked="" type="checkbox"/> Toxic</td> </tr> </tbody> </table> <p>Expected waste generation per experiemntal run (mass/volume): Click or tap here to enter text.</p> <p>Disposal procedure and location of Satellite Accumulation Area:</p> <ul style="list-style-type: none"> • Satellite Accumulation Area is located XX. • All HF waste (liquid and solid) must be handled as hazardous waste. • Store waste in compatible plastic containers (do not use glass or metal). • <u>Label</u> all containers appropriately. • When ready, submit a chemical waste pickup request 		Type of Waste	Hazard Determination	Solid	<input type="checkbox"/> Flammable <input type="checkbox"/> Oxidizer <input checked="" type="checkbox"/> Corrosive <input type="checkbox"/> Reactive <input checked="" type="checkbox"/> Toxic	Liquid	<input type="checkbox"/> Flammable <input type="checkbox"/> Oxidizer <input checked="" type="checkbox"/> Corrosive <input type="checkbox"/> Reactive <input checked="" type="checkbox"/> Toxic
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9.	<p>EMERGENCY PROCEDURES</p> <p><i>Indicate how spills, personnel exposure/injury, and other accidents should be handled and by whom.</i></p> <p>Life-threatening emergencies (fire, explosion, large-scale spill or release)</p> <ul style="list-style-type: none"> • ACTIVATE THE BUILDING'S FIRE ALARM SYSTEM IF THE SPILL REPRESENTS A THREAT TO HUMAN LIFE OR MAY CAUSE A FIRE OR EXPLOSION. • Notify all persons in the workspace that a spill has occurred and evacuate all personnel from the workspace to a safe location. • Isolate the work space to prevent inadvertent entry: lock any access doors, place signs on doors reading "DO NOT ENTER-CHEMICAL SPILL" 							



- Call EHS at 392-8400. If the emergency occurs outside of normal work hours, contact the University Police Department at 392-1111.

Small Spills

Clean up only small spills (less than 100 ml) of dilute HF (less than 1%) that spill in a fume hood using universal spill pads found in the Spill Kit.

- Wear goggles, and a face shield.
- Double glove using a nitrile inner glove and a SilverShield, butyl rubber or neoprene outer glove.
- Wear a Tyvek suit or a chemical splash apron of natural rubber, neoprene or Viton.
- Use Tyvek sleeve covers if the apron doesn't cover the arms.
- After absorbing the spill, decontaminate surfaces and equipment with a 10% calcium carbonate solution, followed by soap and water.

Larger Spills

HF spills inside or outside of a fume hood that are greater than 1% in concentration, or greater than 100 ml are very dangerous.

- Evacuate the area, close all doors to the area and post signs to prevent others from entering.
- Call EHS during business hours at 352-392-8400 to arrange for a contractor to clean up the spill.
- Call 911* after business hours.

Personnel Exposure

- Skin contact: Use the safety shower for 5 minutes. Remove clothing while in the shower being careful not to spread contamination to other skin areas. Double glove using SilverShield and nitrile gloves. Then, apply 2.5% calcium gluconate gel (Calgonate Corp.) to the affected area. Massage it into the skin. White specks in the contaminated area indicate that the reaction of calcium and fluoride is taking place. If the gel clouds or separates, then reapply the gel. Call 911* as soon as possible. Reapply calcium gluconate gel every 10 to 15 minutes and continue to massage into the skin until medical assistance arrives. If calcium gluconate gel isn't available, wash area with water for at least 15 minutes and call 911*.
- Eye contact: Rinse the eyes in the safety eyewash for 5 minutes, then apply a sterile 1% calcium gluconate Emergency Eyewash Solution (Calgonate Corp.). If you don't have the Calgonate Emergency Eyewash Solution, rinse the eyes in the safety eyewash for 15 minutes. Do not apply calcium gluconate gel in the eyes. Call 911*.
- Inhalation: Call 911*. Move the exposed person to fresh air and wait for medical assistance.
- Ingestion: Rinse mouth with water (do not swallow). Never make an unconscious person vomit or drink fluids. Call 911*.

*In all cases, give written information about HF to emergency personnel, such as an SDS or SOP. HF is not a common chemical and can be easily confused with other acids that are not



	<p>as hazardous. Follow up with Worker's Compensation and submit an incident report to EHS via the Incident Report in Gator TRACS.</p> <p>Emergency contact numbers:</p> <table><tr><td>Lab manager</td><td>xxx-xxx-xxxx</td></tr><tr><td>Building Manager</td><td>xxx-xxx-xxxx</td></tr><tr><td>Principal Investigator</td><td>xxx-xxx-xxxx</td></tr><tr><td>Poison Control Center</td><td>800-222-1222</td></tr><tr><td>Emergency</td><td>911</td></tr><tr><td>EHS</td><td>352-392-1591</td></tr></table>	Lab manager	xxx-xxx-xxxx	Building Manager	xxx-xxx-xxxx	Principal Investigator	xxx-xxx-xxxx	Poison Control Center	800-222-1222	Emergency	911	EHS	352-392-1591
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