**Standard Operating Procedure**

**HYDROFLUORIC ACID**

***An SOP is required for Hydrofluoric Acid work. This template is designed to help meet the requirements, use of this template or an equivalent is required.***

***This is an SOP template and is not complete until:*** *1) lab specific information is entered into the box below 2) lab specific protocol/procedure is added to the protocol/procedure section and   
3) SOP has been signed and dated by the PI and relevant lab personnel.*

Print a copy and keep with your   
*Chemical Hygiene Plan* and/or *Lab Safety Resources Binder*

|  |  |
| --- | --- |
| **Department:** | Click here to enter text. |
| **Date SOP was approved by PI/lab supervisor:** | Click here to enter a date. |
| **Principal Investigator:** | Click here to enter text. |
| **Lab Safety Coordinator/Lab Manager:** | Click here to enter text. |
| **Lab Phone:** | Click here to enter text. |
| **Office Phone:** | Click here to enter text. |
| **Emergency Contact:** | Click here to enter text. |
| *(Name and Phone Number)* |
| **Location(s) covered by this SOP:** | Click here to enter text. |
| *(Building/Room Number)* |

**Type of SOP:** ☐ Process ☐Hazardous Chemical ☐Equipment

1. **Purpose**

This standard operating procedure outline the handling and use of hydrofluoric acid. [Identify the intended use of a process/equipment/chemical]

1. **Procedure/Scope:**

**REMEMBER!** **Always Add Acid** to water.

[Identify when the procedure is to be followed]

[Include laboratory procedure and specify hazardous stages of the procedure]

1. **Physical & Chemical Properties/Definition of Chemical Group**

CAS#: 7664-39-3

Class: highly corrosive and highly toxic

Physical Description: Colorless gas or fuming liquid (below 67°F) with a strong, irritating odor.

**Danger! May be fatal if inhaled, absorbed through the skin or swallowed. Both liquid and vapor can cause severe burns to all parts of the body.**

HF is a calcium seeker. A person can’t sense when it comes in contact with the skin. It has been shown that the most immediate effect of HF adsorption is removing Ca from the blood stream and body tissues. This in turn reduces/restricts the proper functioning of various organs and muscles resulting in cardiac arrest and other fatal afflictions. HF burns are not evident until a day later.

Specialized medical treatment is required for any exposure to HF. Absorbed fluoride can cause metabolic imbalances with irregular heartbeat, nausea, dizziness, vomiting and seizures. Long-term exposure may cause bone and joint changes. Will attack glass and any silicon-containing material. Corrosive to metal. Before using this product, make sure that personal protective equipment and engineering controls are used and operating, and also that first aid treatments and procedures are available and understood.

**Target Organs:** Lungs, teeth, eyes, skin, bone, mucous membranes

  Signal Word: **DANGER**

**Potential Health Effects**

**Eye**

Contact with liquid or vapor causes severe burns and possible irreversible eye damage. Solutions as dilute as 2% or lower may cause burns.

**Skin**

May be fatal if absorbed through the skin. Causes severe burns with delayed tissue destruction. Substance is rapidly absorbed through the skin. Penetration may continue for several days. Causes severe tissue necrosis and bone destruction. Both liquid and vapor can cause severe burns, which may not be immediately painful or visible. Solutions as dilute as 2% or lower may cause burns. Systemic fluoride toxicity from exposure to hydrofluoric acid may result in severe hypocalcemia, hypomagnesemia, hyperkalemia, metabolic acidosis, cardiac dysrhythmias, and death. Burns caused by weak hydrofluoric acid may go unnoticed for several hours. Therefore, first aid procedures must be followed if any contact is suspected.

**Ingestion**

Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. Human fatalities have been reported from acute poisoning. Systemic fluoride toxicity from exposure to hydrofluoric acid may result in severe hypocalcemia (depletion of calcium in the blood), hypomagnesemia (depletion of magnesium in the blood), hyperkalemia (depletion of potassium in the blood), metabolic acidosis, cardiac dysrhythmias, and death. Poor lab practices coupled with inadequate personal hygiene after chemical use is the most common route of ingestion exposure.

**Inhalation**

May be fatal if inhaled. May cause severe irritation of the upper respiratory tract with pain, burns, and inflammation. May cause pulmonary edema and severe respiratory disturbances. Depletes calcium levels in the body which can lead to hypocalcemia and death. Concentrations of hydrofluoric acid above 40% fume in air. A victims whose clothing or skin is contaminated with HF liquid solution or condensed vapor can secondarily contaminate response personnel by direct contact or through off-gassing vapor.

**Chronic**

Chronic inhalation and ingestion may cause chronic fluoride poisoning (fluorosis) characterized by weight loss, weakness, anemia, brittle bones, and stiff joints. Repeated inhalation may cause chronic bronchitis. Chronic exposure to fluoride compounds may cause systemic toxicity. Skeletal effects may include bone brittleness, joint stiffness, teeth discoloration, tendon calcification, and osterosclerosis. Chronic ingestion or inhalation may cause weight loss, malaise, anemia, leukopenia (reduction in the number of white blood cells in the blood), discoloration of the teeth and osteosclerosis (the hardening or abnormal density of bone). Repeated inhalation may cause osteofluorosis and permanent respiratory damage.

**Exposure Limits**

DOSH: CEIL: 3 ppm

OSHA: TWA: 3 ppm

NIOSH: TWA: 3 ppm; CEIL: 6 ppm [15 minute]

ACGIH: TWA: 0.5 ppm; CEIL: 2 ppm

**Toxicological Data**

INHALATION (LC50): 1,276 ppm 1 hour [Rat]; 342 ppm 1 hour [Mouse]; 1,774 ppm 1 hour [Monkey]; 4,327 ppm 0.5 hour [Guinea Pig]

\***Always refer to the Safety Data Sheet for the most detailed information**\*

1. **Safety Data Sheet (SDS) Location**

Online SDS can be accessed at (<http://oregonstate.edu/ehs/sds>). A hard copy can be found at Oak Creek Building with Environmental Health & Safety.

1. **Personal Protective Equipment (PPE)**

Laboratory personnel must always wear a lab coat when working in a lab. Closed-toed shoes are also required at all times.

**Hand Protection**

* (At a minimum, double Nitrile gloves (8 mil thick) or butyl rubber gloves are strongly recommended when working with small quantities of HF. [Silver shield gloves](http://www.northsafety.com/ClientFormsImages/NorthSafety/CorpSite/E8D15F2E-1F59-454F-B8F0-147FA2B9D81D.pdf) with inner double Nitrile gloves can be used for spill cleanup work. If dexterity of silver shield gloves impacts the handling of HF, review [chemical resistance charts](http://www.chemrest.com/) for other glove options. Neoprene gloves have good dexterity. [Ansell Brand Derma shield gloves](http://www.fishersci.com/ecomm/servlet/fsproductdetail_10652_11938500__-1_0) are rated to have good dexterity and suitable for clean room operations.)
* Outer gloves but must be changed immediately if splashed or thought to be contaminated.

**Eye Protection**

Safety goggles and face shield

**Skin and Body Protection**

Long pants, close-toed shoes and Flame and chemical-resistant lab coats (Blue Lab Coat).

**Respiratory Protection**

Where there is a risk of breathing in hydrofluoric acid vapor or spray mist, suitable respiratory protection (with Type B\* filters) should be worn. Contact EH&S for evaluation.

**Hygiene Measures**

Wash hands after handling HF.

1. **Equipment and Supplies**

[List any equipment or supplies need for the procedure above.]

1. **Engineering Controls**

Always work within a certified laboratory fume hood designated for HF use. HF should always be handled inside of a fume hood that is identified with a sign stating “Danger, Hydrofluoric Acid Used in this Area.”

1. **First Aid Procedures**

If an accident happens the following documents must be completed:

* Online OSU HR Advocate Public Incident Reporting Form within 24 hours of the incident
* If the employee’s incident resulted in the need for medical treatment, have the employee complete the worker section of the SAIF 801 Form and fax to risk management at 541-737-4855 within 24 hours.

HF exposure kit must be available and located in the laboratory area. The exposure kit must contain the following items:

* 2.5% calcium gluconate gel and/or Zephiran solution for potential skin exposures. Store in a cool area, and **replace before the expiration date**. Replace after one-time use. This gel must be inspected before each use of HF or at least monthly to ensure the gel has not been removed or has not reached the expiration date. If a tube of the gel has been opened, a new container must be purchased and the old container discarded. **No work with HF can be done with an expired tube of calcium gluconate gel.**
* Optional sterile 1% calcium gluconate emergency eyewash solution for potential eye exposures. Store in same location as the gel, **replace before the expiration date**. Replace after one-time use.
* 4 ea. pairs of Neoprene or Nitrile (8 mil) gloves
* 1 ea. Heavy-duty polyethylene bag to be used for items contaminated by HF.
* 1 ea. HF Hazardous Waste Label.
* 30 ea. Calcium Carbonate (Tums).
* 1 ea. Shower modesty kit available from EH&S.

Symptoms of HF exposure are often delayed for several hours. If you suspect you may have been exposed to HF but are not experiencing any immediate symptoms, apply immediate first aid nonetheless. A quick response can substantially reduce injury.

No person exposed to HF should be allowed to go home or return to work without having seen a doctor who is aware of the nature and extent of the exposure.

* Prevent cross contamination: the victim of HF exposure should perform the following actions on him/herself whenever possible.

* Anyone who provides assistance should use the proper gloves, and other personal protective equipment mentioned in this document, in order to prevent contaminating themselves. A victims whose clothing or skin is contaminated with HF liquid solution or condensed vapor can secondarily contaminate response personnel by direct contact or through off-gassing vapor.
* **Do not use latex gloves**; they do not provide an effective barrier against chemicals, especially HF.

**Skin exposure**

1. Immediately flush affected areas with cold running water (shower if available). While flushing, remove all contaminated clothing as well as jewelry that could trap HF. If using the safety shower victim should remove all clothing, shoes and jewelry while under the shower. Remove goggles last, face the water and pull over head. Wash the contaminated area with copious amounts of running water for 5 minutes. Speed and thoroughness in washing off the acid is essential. If calcium gluconate gel (2.5%) is not available, continue flushing with water for at least 15 minutes or until medical treatment is given.
2. While the victim is being rinsed with water, someone call 911 and say:
3. A person has been exposed to hydrofluoric acid.
4. The person can be found at [give location of victim].
5. Please send an ambulance.
6. Don a new pair of chemical resistant gloves (to prevent possible secondary HF burns) and massage calcium gluconate gel (2.5%) freely into the affected site. Apply the gel as soon as the washing is done. The affected area does not need to be dried first. The gel will turn white (CaF2 precipitate) upon reaction with the acid.

**OR**

Soak the affected area in, or apply compresses of, iced Zephiran solution (a 0.13% aqueous solution of benzalkonium chloride).

1. Have victim ingest 6 ea. Tums (calcium carbonate tablets)
2. After these actions have begun, re-examine the victim to ensure no exposure/burn sites have been overlooked.
3. Calcium gluconate gel (2.5%) should be re-applied, or Zephiran soaking repeated, every 15 minutes until the ambulance arrives or a physician/EMT gives medical treatment.
4. Provide the following information to the EMS team, and/or physician:
5. The concentration of the hydrofluoric acid and its MSDS.
6. Date, time of exposure, duration of exposure, and how exposure occurred.
7. Body parts affected or exposed, and the percent of body surface area affected.
8. Summary of first aid measure given, including when calcium gluconate gel or Zephiran was first applied, the body areas to which the treatment was applied, and how many times the treatment was applied in total.

**Eye exposure**

1. Immediately flush eyes with cool flowing water, preferably at an eyewash station, or sterile eyewash solution. Hold the eyelids open and away from the eye during irrigation to allow thorough flushing of the eyes. If sterile 1% calcium gluconate solution is available, start using it within the first 5 minutes (via continuous drip into eyes), and continue using it as the preferred flushing agent (Do NOT use 2.5% calcium gluconate gel on the eyes). If sterile 1% calcium gluconate solution is not available, wash with copious amounts of water for 15 minutes while holding eyelids apart.
2. While washing the eye, have someone call 911 for emergency medical assistance. Calcium gluconate solution (1%), eyewash, clean water, or ice water compresses should be used to continue to irrigate the eye(s) while transporting the victim.
3. Have victim ingest 6 ea. Tums (calcium carbonate tablets).
4. Inform Emergency Medical Personnel that calcium carbonate and calcium gluconate have been administered.

**Inhalation of Vapors**

1. Immediately move affected person to fresh air and call 911 for medical assistance.
2. Have victim ingest 6 ea. Tums (calcium carbonate tablets)
3. Keep victim warm, comfortable and quiet.
4. Inform Emergency Medical Personnel that Calcium Carbonate has been administered.

**Ingestion**

1. Do not induce vomiting. Never give anything by mouth to an unconscious person.
2. Call 911 for medical assistance.
3. Have the victim drink large amounts of room temperature water as quickly as possible to dilute the acid.
4. Have victim ingest 6 ea. Tums (calcium carbonate tablets).
5. Inform Emergency Medical Personnel that calcium carbonate has been administered.
6. **Special Storage & Handling Requirements**

**Handling**

* Wash thoroughly after handling.
* Remove contaminated clothing and wash before reuse. Discard contaminated shoes.
* Do not get in eyes, on skin, or on clothing.
* Keep container tightly closed. Use caution when opening.
* Do not breathe vapor or mist.
* Use only with adequate ventilation or respiratory protection.
* Do not put even dilute solutions of hydrofluoric acid in glass containers.
* Always add the acid to water, never the reverse. Never work alone with this chemical.

**Designated Area**

* HF should always be handled inside of a fume hood that is identified with a sign stating “Danger, Hydrofluoric Acid Used in this Area.”
* The SOP should be posted or readily available near the designated area.
* HF exposure kit must be readily available near the designated area.
* HF spill kit must be nearby.
* Ensure you have ready access to a good supply of running water and know the location of the safety shower and eyewash.

**Preparation**

Before any uses HF, they should do the following:

* Read an SDS for HF.
* Review the specific lab Standard Operating Procedure (SOP) for the process in which HF is used, incorporating information contained in this document.
* Obtain a HF Spill Kit. The spill kit must be available and located in the laboratory area. The spill kit must contain the following items:
* 4 ea. pairs of Nitrile gloves (8 mil)
* 1 ea. Safety goggles
* 1 ea. Heavy-duty polyethylene bag to be used for items contaminated by HF.
* 1 ea. HF Hazardous Waste Label.
* 4 ea. Pink absorbent pads
* Obtain an HF exposure kit must be available and located in the laboratory area. The exposure kit must contain the following items:
  + 2.5% calcium gluconate gel and/or Zephiran solution for potential skin exposures. Store in a cool area, and **replace before the expiration date**. Replace after one-time use. This gel must be inspected before each use of HF or at least monthly to ensure the gel has not been removed or has not reached the expiration date. If a tube of the gel has been opened, a new container must be purchased and the old container discarded. **No work with HF can be done with an expired tube of calcium gluconate gel.**
  + Optional sterile 1% calcium gluconate emergency eyewash solution for potential eye exposures. Store in same location as the gel, **replace before the expiration date**. Replace after one-time use.
  + 4 ea. pairs of Neoprene or Nitrile (8 mil) gloves
  + 1 ea. Heavy-duty polyethylene bag to be used for items contaminated by HF.
  + 1 ea. HF Hazardous Waste Label.
  + 30 ea. Calcium Carbonate (Tums).
  + 1 ea. Shower modesty kit available from EH&S.

**Safe Laboratory Practices**

* Never work with HF alone or after hours.
* Recognize and avoid touching face and other equipment.
* Never eat or drink in the lab.
* All HF work must be done in the fume hood.
* Wash hands thoroughly after handling HF
* All preparation of HF will be performed over plastic-backed absorbent pad (or Pink Pig Pads) in a fume hood and in a secondary container. Sash on fume hood should be as low as possible. Pink Pig Pads will be disposed of as hazardous waste immediately upon contamination and after completion of tasks.
* If you do not have time to do things correctly and safely, with adequate time for thought, please reschedule your HF work when you can slowly and safety concentrate on your HF work.
* Avoid distracting HF workers
* All employees handling HF must receive documented training from the PI or his/her representative on the hazards of HF and what to do in the event of an exposure or spill.  Training records are to be retained in the lab.  A Safety Data Sheet (SDS) on HF must be kept in the immediate work area.
* Carefully carry the stock bottle in a rubber maid bottle carrier/Nalgene secondary container to the chemical fume hood and pour out desired amount into a smaller container that is correctly labeled.
* No other procedures should be done in the fume hood until all HF work is complete, the waste has been collected, and equipment and materials have been cleaned, properly discarded, or removed from the area.
* Laboratories which keep Hydrofluoric Acid must have an operational safety shower and eye wash in their laboratory.
* All lab personnel, not just those who will be using Hydrofluoric Acid, should be informed of the dangers of this chemical and the emergency procedures necessary in case of an accident. A sign must be posted to alert people that work with Hydrofluoric Acid is in progress.
* HF reacts with glass, which should never be used to store or transfer it. Use chemically compatible containers, such as those made from polyethylene or Teflon.
* Ensure all containers of HF are clearly labeled.
* Always work with a chemically compatible secondary containment tray.
* Ensure HF containing vials and flasks are securely supported and not likely to tip over.
* Keep containers closed to minimize exposure and prevent etching of fume hood glass from HF vapors.

**Storage**

* Store in a cool, dry, well-ventilated area away from incompatible substances such as metals, organic materials, strong bases, strong acids, oxidizing agents, amines, metal salts, silicon compounds, water, or steam.
* Do not store in metal or glass containers.
* Store in a polyethylene or polypropylene container.
* Corrosive to metals. Will attack glass and concrete.
* Store in a corrosives area within a secondary containment tray or tub made of polyethylene or polypropylene.
* Keep container tightly closed. Inspect periodically for damage or evidence of leaks or corrosion.

**Transporting**

If an HF containing solution must be transported from one lab area to another:

* Place the object in a clean, chemically compatible container and close the lid.
* Remove your gloves before transporting the container to avoid the possibility of chemical contamination on your gloves spreading to door handles and other objects.
  + Or consider putting on a single clean glove with which to carry the container, leaving an ungloved hand to open doors and handle other objects.
  + Or have a lab partner open doors and handle objects for you.

1. **Chemical Spill**

**IF A SPILL OCCURS, THE FOLLOWING DOCUMENT MUST BE COMPLETED**:

Complete a [HR Advocate Public Incident Reporting Form](https://oregonstate2-gme-advocate.symplicity.com/public_report/index.php/pid698757?) for any incidents on campus and fax to Risk Management at 541-737-4855 within **24 hours** of the incident.

**All HF spills of must be reported to EH&S at 541-737-2273 to ensure contamination has been removed.**

**General Guidelines**

**For spills less than 50 ml in size and dilute (less than 1%) spills that occur in a fume hood:**

Preparation: Ensure employees have adequate Personal Protective Equipment and spill control materials before attempting to clean up a spill

1. Assess the magnitude of the spill and the associated hazards (broken glass, toxic fumes, risk of fire, etc.).

2. If the hazards can be safely mitigated with available personal protective equipment (PPE), do so. This includes informing co-workers of the spill, removing ignition sources, and moving equipment that may be damaged by the spilled chemicals. (Note: If the spill is more than 50 ml of liquid, contact Public Safety at 541-737-7000 and ask them to notify EH&S.)

3. Once all hazards have been assessed, put on appropriate PPE (respiratory protection, goggles, body protection, gloves, impervious shoes/boots, etc.).

4. Apply the Pig Pads to the spill and give the pads time to absorb the chemical.

1. DO NOT use Potassium or Sodium Hydroxide that is found in many acid-neutralizing kits. These will release gaseous HF.
2. DO NOT use Silicon-based absorbent materials (common in most solvent spill kits) reacts with HF to generate a toxic and corrosive gas.
3. Use gloves and cardboard to move the used Pig Pads to a garbage bag. 6. Seal the garbage bag with a zip tie and label the bag with a Hazardous Waste Label.
4. Place the garbage bag in secondary containment (a cardboard box or plastic tote/bin) labeled “Hazardous Waste.” Place the box in a location in the laboratory where EH&S personnel will easily find it.
5. Request a Hazardous Waste Pickup (<http://oregonstate.edu/ehs/waste>).
6. Replenish you spill kit’s contents immediately.

**For spills greater than 50 ml in size than 50 ml in size more than 1% concentration and/or spills that occur outside of a fume hood:**

1. In general, if a chemical spill is greater than 50 ml in volume, more than 1% concentration and/or spills that occur outside of a fume hood, call Public Safety (541-737-7000), and tell them to contact the on-call EH&S personnel to respond to the spill.

2. Provide the following information:

* Your name and contact phone number.
* Location of the spill (Building and room number).
* Approximate volume of spilled liquid.
* Name of chemical.

3. Do not attempt to clean up large and/or hazardous chemical spills.

4. Notify all other workers who could be affected by the spill and vacate the laboratory/floor/building, particularly if the chemical produces hazardous fumes or poses other potential health hazards.

5. Wait at the building entrance for EH&S personnel.

6. Serve as a point of contact and provide information about the spill, as requested by EH&S personnel.

**Personal precautions**

**Hand Protection**

* (At a minimum, double Nitrile gloves (8 mil thick) or butyl rubber gloves are strongly recommended when working with small quantities of HF. [Silver shield gloves](http://www.northsafety.com/ClientFormsImages/NorthSafety/CorpSite/E8D15F2E-1F59-454F-B8F0-147FA2B9D81D.pdf) with inner double Nitrile gloves can be used for spill cleanup work. If dexterity of silver shield gloves impacts the handling of HF, review [chemical resistance charts](http://www.chemrest.com/) for other glove options. Neoprene gloves have good dexterity. [Ansell Brand Derma shield gloves](http://www.fishersci.com/ecomm/servlet/fsproductdetail_10652_11938500__-1_0) are rated to have good dexterity and suitable for clean room operations.)
* Outer gloves but must be changed immediately if splashed or thought to be contaminated.

**Eye Protection**

Safety goggles and face shield

**Skin and Body Protection**

Long pants, close-toed shoes and Flame and chemical-resistant lab coats (Blue Lab Coat).

**Environmental precautions**

Prevent any liquid from entering any drain.

**Methods and materials for containment and cleaning up**

 A hard copy of this SOP

 A hard copy of the Pink Pig Absorbent Pad Chemical Compatibility Chart <http://www.newpig.com/wcsstore/NewPigUSCatalogAssetStore/Attachment/documents/ccg/HAZMAT.pdf>

 6 Pink Pig Absorbent Pads (Item number MAT301 at [www.newpig.com](http://www.newpig.com))

 Heavy duty plastic garbage size bags

 Zip ties (to seal heavy duty plastic garbage size bags)

 Hazardous Waste Labels (available at <http://oregonstate.edu/ehs/waste>)

 Cardboard rectangles/squares for handling used Pig Pads, if necessary

 Appropriate lab-specific PPE, such as lab coats, goggles, gloves, etc., should be available in each laboratory

1. **Other Emergencies**

**Medical Emergency Dial 911**

1. **Decontamination/Waste Disposal Procedure**

**Waste Disposal**

Hydrofluoric Acidshould be collected in an approved plastic container obtained with appropriate cap. The container should be stored away from incompatible materials such as metals, organic materials, strong bases, strong acids, oxidizing agents, amines, metal salts, silicon compounds, water, or steam.

If Kim wipes, bench paper, or any other items contaminated with HF are used in the process, these also are considered Hazardous Waste. Collect this type of waste in a plastic zip bag and label with Hazardous waste label.

A completed Hazardous Waste label should be attached when waste is first added to the container. When container is full or no longer being used complete and submit a Hazardous Waste Pickup Request Form.

**Equipment Decontamination**

Decontaminate face shield, googles for re-use by rinsing with a large amount of water then rinsed with a 10% sodium carbonate solution followed by rinsing with water again.

**Surface decontamination**

* Pour solid sodium bicarbonate (soda ash) or solid calcium oxide (lime), starting around the edges working inwards on the spill.
* Let sit for 30 minutes.
* Sweep solid material into a plastic dust pan.
* Place all contaminated items for disposal in the clear poly bag.
* Wipe down area with water.
* Seal the poly bag with a zip tie and label the bag with a Hazardous Waste Label.
* If Pink Pig Pads are used, these will be disposed of as hazardous waste immediately upon contamination and after completion of tasks.

**Label Waste**

* Affix an EH&S hazardous waste label on all waste containers (<http://ehs.oregonstate.edu/sites/ehs.oregonstate.edu/files/pdf/hwlabelfull.pdf>) as soon as the first drop of waste is added to the container.

**Store Waste**

* Store hazardous waste in closed containers, in secondary containment and in a designated location. (<http://ehs.oregonstate.edu/sites/ehs.oregonstate.edu/files/pdf/si/waste_hazardous_disposal_si.pdf)>.
* Double-bag dry waste using transparent bags
* Waste must be under the control of the person generating & disposing of it

**Dispose of Waste**

* Dispose of regularly generated chemical waste within 90 days
* Put in a waste request at: <http://ehs.oregonstate.edu/waste>

1. **References**

Recommended Medial Treatment for HF Exposure by Honeywell.[**https://www.honeywell-hfacid.com/document/hf-medical-book/?download=1**](https://www.honeywell-hfacid.com/document/hf-medical-book/?download=1)

1. **Training Requirements**

All individuals working with chemicals in OSU laboratories must take EH&S’s Lab Safety, Hazardous Waste, Hazard Communication/SDS, lab-specific training, this SOP. The use of HF must warrant additional safety per PI, and/or EH&S. Additional training requirement are listed below:

Specific lab-specific training such as:

* Trainee has reviewed the process specific standard operating procedure (SOP).
* Trainer discussed the injury and illness prevention measures including first aid supplies and emergency/treatment.
* Trainee was shown the location of HF exposure kit and spill response supplies.
* Trainee was shown HF specific waste collection and storage method(s).
* Trainee was provided appropriate process specific Blue lab coat, gloves, face shield and chemical splash goggle to protect against chemical splash/splatter.
* Trainee was shown HF storage location and safe transport of HF in a rubber bottle carrier.
* Trainee satisfactorily transported HF bottle from storage cabinet to fume hood and then returned to storage.
* Trainee satisfactorily demonstrated the dispensation and process handling techniques, and waste collection and storage in a polyethylene/polypropylene container.
* Trainee satisfactorily demonstrated the correct fume hood sash height and able to recognize acceptable face velocity range.
* Trainee understand the procedures for an exposure to HF happens in the lab.

Trainee must complete an HF Awareness Training online or in person. Call EH&S.

**Documentation of Training**

* Prior to conducting any work with HF designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
* The Principal Investigator must provide this SOP, a copy of the SDS (can be available online) and a copy of “advice to Medial Staff for dealing with HF Burns and Exposure” available to all laboratory personnel.
* Lab personnel working with HF must complete HF Awareness training online and pass the required test.
* EH&S will maintain documentation on HF Awareness training.
* The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training.

**Principal Investigator SOP Approval**

By signing and dating here the designee certifies that the Standard Operating Procedure (SOP) for *Hydrofluoric Acid* is accurate and effectively provides standard operating procedures for laboratory personnel.

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Signature Printed Name/Title Date

I have read and understand the content of this SOP:

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| --- | --- | --- |
| **Name** | **Signature** | **Date** |
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Emergency Procedures for HF Exposure

Post these procedures in work areas where HF is used

**All exposure to or contact with HF should receive immediate first aid and medical evaluation, even if the injury appears minor or no pain is felt. HF can produce delayed effects and serious tissue damage without necessarily producing pain.**

**First Aid for Skin:**

* Immediately (within seconds) proceed to the nearest eyewash/shower and wash affected area for a minimum of 15 minutes flushing the affected area.
* While washing the affected area, have someone call 911 for emergency medical assistance.
* Remove all contaminated clothing, shoes and jewelry while in the shower.
* Remove goggles/safety glasses last – look up into the water and pull over head.
* After flushing with water, put on nitrile gloves then massage calcium gluconate gel into the affected area.
* Have victim ingest 6 TUMS (Calcium Carbonate Tablets).
* Reapply calcium gluconate gel and massage affected area every 15 minutes until assistance arrives.

**First Aid for Eye Contact:**

* Immediately (within seconds) proceed to the nearest eyewash station and thoroughly flush eyes with water for at least 15 minutes while holding eyelids open.
* DO NOT apply calcium gluconate gel to eyes. If available flush eyes with sterile 1% calcium gluconate emergency eyewash solution
* While washing the affected area, have someone call 911 for emergency medical assistance.
* Have victim ingest 6 TUMS (Calcium Carbonate Tablets).

**First Aid for inhalation:**

* Immediately move to area with fresh air.
* Call 911 for emergency medical assistance.
* Have victim ingest 6 TUMS (Calcium Carbonate Tablets).

**First Aid for Ingestion:**

* Call 911 for emergency medical assistance.
* DO NOT induce vomiting.
* Have victim drink lots of water.
* Have victim ingest 6 TUMS (Calcium Carbonate Tablets).
* Take by mouth, and chew 30 ea. tablets of Tums

Sign for fume hood and work area.

**HYDROFLUORIC ACID** **HAZARDOUS LIQUID USED IN THIS AREA**

**Causes SEVERE BURNS**

**Which may not be IMMEDIATELY PAINFUL or VISIBLE**

**AVOID CONTACT**

**WITH EYES, SKIN**

**AND CLOTHING.**

**Advice to Medical Staff for dealing with HF Burns and Exposure**

**Place this in the HF Exposure Kit. This must accompany lab personnel seeking medical assistance in an event of exposure to HF**

Hydrogen fluoride in aqueous solution is usually referred to as hydrofluoric acid

The damage caused by exposure to this product is far more extensive than that caused by hydrochloric acid and other acids. First aid and medical treatment appropriate to hydrochloric acid is not beneficial with hydrofluoric acid burns. Hydrofluoric acid penetrates rapidly and deeply below fat layers binding and depleting tissue calcium. Failure to commence the correct medical treatment promptly may be fatal.

There is a major risk of systemic toxicity following inhalation, ingestion or skin burns. Calcium depletion (hyperkalaemia) and electrolyte disorders may be fatal. A skin burn involving more than 1 % of body area with 50 % or more concentration of hydrofluoric acid or more than 5 % of body area with any lesser concentrations may be associated with systemic effects. Treatment with intravenous calcium gluconate should commence immediately.

Intensive care unit facilities are likely to be needed. Serum calcium and magnesium determinations should be performed frequently and correction of electrolyte balance may be necessary. ECGs should be monitored routinely for prolonged Q- T interval or bradycardia. Hepatic and renal function should be monitored. IV corticosteroids may be necessary.

Inhalation may lead to chemical pneumonitis, hemorrhagic pulmonary oedema or laryngeal oedema and may be fatal. Be prepared to intubate or perform a tracheotomy. The use of nebulized calcium gluconate in a 2.5 % solution should be considered.

Skin burns may become necrotic and gangrenous and damaged area may spread. Infiltration of calcium gluconate into the surrounding tissue may be required for severe burns; this can be performed by the injection of 5 % calcium gluconate solution. Injection should be performed with care on the hands, feet and face.

For fingers and toes and less severe burns, continue the application of 2.5 % calcium gluconate gel four to six times daily for up to three to four days. Wear gloves while applying gel. If calcium gluconate solution is injected into the fingers or toes great care should be exercised and no more than 0.5 ml should be used. Pain not relieved by use of gel is best managed by intra-arterial infusion of calcium gluconate solution in a unit that is experienced in the technique. Surgical debridement of affected area may be necessary in larger burns to control hypocalcaemia. Delayed pulmonary oedema is likely with burns to the face or neck. Local anesthesia is contra-indicated, so that the splitting of finger and toe nails should be performed under general anesthesia.

Following contact of this product with the eyes, ensure first aid treatment has been carried out. Instill 1 % calcium gluconate solution every two to three hours for as long as considered necessary. Topical anesthetic and corticosteroid drops may be useful. An ophthalmologist should always be consulted, as severe corneal damage is possible. Long term monitoring may be necessary.

**Reference:**

**Recommended Medial Treatment for HF Exposure by Honeywell.** [**https://www.honeywell-hfacid.com/document/hf-medical-book/?download=1**](https://www.honeywell-hfacid.com/document/hf-medical-book/?download=1)