

Guidelines for Transporting Hydrofluoric Acid (HF) Waste

Strong acid concentrations (over 50%) “cause immediate, severe, burning pain and a whitish discoloration of the skin which usually proceeds to blister formation.” In contrast, the effects of more dilute solutions may be delayed. **The latency period for symptoms (redness, swelling, and blistering) to appear after exposure to aqueous Hydrofluoric Acid (HF) solutions in the 20-50% range may be up to eight hours.** Solutions less than 20% may not produce symptoms for up to twenty-four hours.

Preparation

Before starting to transport make sure that the following items are available to the crew:

1. SDS for HF and reviewed with Eric.
2. Completed the review of this document
3. Create a Standard Operating Procedure (SOP) for the process, incorporating information contained in this document.
4. Obtain a first aid kit
5. Obtain a spill kit

Personal Protective Clothing

When using HF, you must wear protective clothing:

- Gloves: Heavy neoprene or nitrile rubber gloves are the best for working with HF; but the thickness may reduce agility. Wear two pairs of nitrile exam gloves and change them often instead. When working with larger quantities of HF in procedures that do not require as much agility, wear heavy nitrile or neoprene rubber gloves, with a nitrile exam glove underneath. Check the gloves for leaks by inflating the glove and then closing the cuff. An intact glove should hold air (you may also submerged in water and look for bubbles).
- Body Protection: long-sleeved shirt, long pants, and closed-toe shoes. Always wear a lab coat, chemical-resistant apron and sleeves.
- Eye Protection: Goggles, along with a face shield
- Never work alone with HF and limit all HF manipulations to regular office hours. Only trained personnel are allowed to work with HF

Transporting HF

If an HF containing solution must be transported:

- Place the object in a clean, chemically compatible container (plastic) and close the lid. Keep the container inside another container with absorbent (3M's Universal Sorbent is recommended, as it does not react with HF)
- Never walk out the lab with gloves on to avoid contamination of door knobs
- Another option is to keep one hand free of glove to open the door.

Emergency Procedures

ALL HYDROFLUORIC ACID EXPOSURES ARE A MEDICAL EMERGENCY! IMMEDIATELY ARRANGE FOR MEDICAL HELP. MEDICAL PERSONNEL SHOULD BE WARNED ABOUT HF AND A COPY OF SDS MUST BE PROVIDED TO THEM.

HF Exposure Kit:

Before beginning work involving HF an exposure kit must be available and located in the area. The exposure kit must contain the following items:

- Container of calcium gluconate gel.
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.
- 2 pairs of Neoprene or Nitrile (22mil) gloves.
- Copy of these procedures and MSDS to take to the emergency room.
- Emergency Response Procedures:

All exposure to or contact with HF shall receive immediate first aid and medical evaluation even if the injury appears minor or there is no sense of pain. HF can produce delayed effects and serious tissue damage without necessarily producing pain. In the event of an HF exposure, immediately start the first aid procedures described below to avoid HF burns or other permanent damage. **Call 911 immediately for assistance**

Skin Exposure or Burn

In the event of a burn caused from HF, the following steps must be immediately taken:

- The skin must be copiously washed with water, beginning immediately after exposure.
- Remove all clothing while in the shower (remove goggles last; double-bag contaminated clothes, When removing shirts or pullover sweaters, be careful not to contaminate the eyes. Cutting off such clothing will help prevent spreading the contamination. Do not put contaminated cloths back; they may still contain chemical residue. Wash contaminated clothing separately or discard.). while you are in the shower let someone call 911
- If 2.5% calcium gluconate gel or 0.13% benzalkonium chloride is available, washing can be stopped after 5 minutes and start applying the ointment. 5 minutes of washing will effectively remove all the HF from the body and extra washing will only delay the treatment. If the neutralizing agents are not available keep rinsing until medical help arrive.

- Apply calcium gluconate gel (2.5%) while wearing gloves. Massage the gel promptly and repeatedly into burned area. Always follow the manufacturers directions supplied with the HF burn ointment/solution if they differ from these.
- Seek immediate medical attention.

Ingestion of HF

- Call emergency help **immediately by dialing 911**
- Drink large amounts of water. Do not induce vomiting.
- If the injured person is unconscious, turn his/her head or entire body onto the left side. Be cautious about performing CPR. This could potentially poison you from the mouth-to-mouth contact. If available, use a mouth-to-mouth resuscitator.

Inhalation of HF

- Evacuate the area and move the victim to fresh air.
- Immediately **call emergency- 911.**
- Breathe 100% oxygen (10 to 12 L/min flow rate) as soon as possible.
- Trained personnel should provide calcium gluconate (2.5%) by nebulizer.
- Get medical attention
- Treat the person for chemical burns of the eyes and skin.

Contamination on clothing,

- Immediately remove all contaminated clothing, including shoes, undergarments and jewelry, while standing under running water or the safety shower.
- When removing shirts or pullover sweaters, be careful not to contaminate the eyes. Cutting off such clothing will help prevent spreading the contamination.
- Do not put contaminated clothing back on, they still contain chemicals
- Wash contaminated clothing separately or discard.
- Call **emergency by dialing 911** to have the victim taken to the emergency room for medical attention.

Spill Management

All areas where HF is used must have a commercial spill control kit. Small spills can be neutralized by covering with acid neutralizer/sodium bicarbonate, and absorbed with spill control pads/absorbents.

Universal Spill Absorbent- 1:1:1 mixture of Flor-Dri (or unscented kitty litter), sodium bicarbonate, and sand or a 1:1 mixture of sodium bicarbonate and clay. This all purpose absorbent is good for most chemical spills including solvents, acids (not good on hydrofluoric acid), and bases.

Proper PPE must be worn before starting the cleanup.

If greater than 500 ml of HF is spilled outside of a chemical hood:

- Evacuate the area;
- Close the doors;
- Post the area with a sign to prevent others from entering; and
- Notify the emergency by dialing 911

Can clean up spills of up to 500ml of HF (everyone using HF must have a spill kit) by containing the spillage and carefully neutralizing the spill with:

- Spill-X-C caustic neutralizer
- Caustic soda;
- Powdered calcium carbonate
- Calcium hydroxide; or
- Using a commercial HF spill kit.