

**STANDARD OPERATING PROCEDURE TEMPLATE**

**HYDROFLUORIC ACID**

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| #1 | **CONTACT INFORMATION**  |

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| **Procedure Title** | **[Specify** – Note: All guidance text in brackets may be deleted**]** |
| **Procedure Author** | **[Specify]** |
| **Creation/Revision Date** | **[Specify]** |
| **Responsible Person**  | [Name of PI, Lab Supervisor, or Autonomous Researcher, as appropriate] |
| **Location of Procedure** | [Building and room number] |
| **Approval Signature** | [Obtain prior approval, as appropriate. See section #10 of this template.] |
| #2 | **THIS STANDARD OPERATING PROCEDURE (SOP) IS FOR A:**  |
| [ ]  **Specific laboratory procedure or experiment** **[Examples: synthesis of chemiluminescent esters, folate functionalization of polymeric micelles, etc.]**[ ]  **Generic laboratory procedure that covers several chemicals [Examples: distillation, chromatography, etc.]**[ ]  **Generic use of specific chemical or class of chemicals with similar hazards [Examples: organic azides, mineral acids, etc.]** |
| #3 | **PROCESS OR EXPERIMENT DESCRIPTION** |
| [Provide a brief description of your process or experiment, including its purpose. Do not provide a detailed sequential description as this will be covered by section #6 of this template. Indicate the frequency and duration below.]

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| **Frequency:** |  [ ]  one time [ ]  daily [ ]  weekly [ ]  monthly [ ]  other: \_\_\_\_\_\_\_ |
| **Duration per Expt:** | \_\_\_\_\_\_\_ minutes; or \_\_\_\_\_\_\_hours |

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| #4 | **SAFETY LITERATURE REVIEW & HAZARD SUMMARY** |
| 1. Hazardous Substances

**Hydrofluoric acid (HF)**HF is acutely toxic by ingestion, inhalation, and skin/eye exposure. Exposure by any of these routes may be fatal. It is corrosive and causes severe burns and eye damage on exposure. 1. Other Hazards

[List nonchemical hazards, e.g., biological hazards, electrical hazards, mechanical hazards, nonionizing radiation, or ionizing radiation.]1. References

[List all references you are using for the safe and effective design of your process or experiment, including safety literature and peer-reviewed journal articles. Safety resources are available at <http://web.stanford.edu/dept/EHS/cgi-bin/lcst/creating-standard-operating-procedures/>.] Stanford University Information on Hydrofluoric Acid<https://ehs.stanford.edu/reference/information-hydrofluoric-acid>  |
| #5 | **STORAGE REQUIREMENTS** |
| Hydrofluoric acid solutions must not be stored in glass, ceramic, or other incompatible containers as it will dissolve them. Store in closed, compatible containers made of materials such as Teflon and polypropylene.  |
| #6 | **STEP-BY-STEP OPERATING PROCEDURE** |
| [For each step’s description, include any step-specific hazard, personal protective equipment, engineering controls, and designated work areas in the left hand column.1. **Guidance on Engineering and Ventilation Controls – Review safety literature and peer-reviewed journal articles to determine appropriate engineering and ventilation controls for your process or experiment. Guidance is available from health and safety specialists at Stanford EH&S and online in the General Use SOPs and Laboratory Safety Sheets in the Laboratory Chemical Safety Toolkit (**<http://chemtoolkit.stanford.edu/>**)**
2. **Guidance on Personal Protective Equipment - To assist with your PPE selection, refer to** <http://chemtoolkit.stanford.edu/LabPPE>**. Respiratory protection is generally not required for lab research, provided the appropriate engineering controls are employed. For additional guidance on respiratory protection, consult with EH&S, 723-0448.**
3. **D*e*signated work area(s)** - Required whenever carcinogens, highly acutely toxic materials, or reproductive toxins are used. The intent of a designated work area is to limit and minimize possible sources of exposure to these materials. The entire laboratory, a portion of the laboratory, or a laboratory fume hood or bench may be considered a designated area. See the Chemical Safety Toolkit for more information*.*

Describe the possible risks involved with failure to follow a step in the SOP in the right hand column.]

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| **Step-by-Step Description of YourProcess or Experiment** | **Potential Risks if Step is Not Done or Done Incorrectly (if any)** |
| 1. Don personal protective equipment. [x]  appropriate street clothing (long pants, closed-toed shoes)[x]  gloves; indicate type: \_\_\_\_\_\_\_[x]  safety goggles [ ]  safety glasses [x]  face shield [x]  lab coat [ ]  flame-resistant lab coat[ ]  other: \_\_\_\_\_\_\_ |  |
| 2. Check the location/accessibility/certification of the safety equipment that serves your lab:

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| **Item** | **Status** |
| **Laboratory Fume Hood/Glove Box or other Ventilation Control** | Location: \_\_\_\_\_\_\_*Check sticker to ensure that hood was certified within last 12 months.* |
| **Eyewash/Safety Shower** | Location: \_\_\_\_\_\_\_*Ensure that it is accessible, not blocked.**Check tag that it has been tested within last month.* |
| **Calcium gluconate** | Location: Attached to HF Exposure Response Poster at safety showerExpiration date: 3/31/2022 |
| **First Aid Kit**  | Location: \_\_\_\_\_\_\_ |
| **Chemical Spill Kit**  | Location: \_\_\_\_\_\_\_ |
| **Fire Extinguisher** | Location: \_\_\_\_\_\_\_ |
| **Telephone** | Location: \_\_\_\_\_\_\_ |
| **Fire Alarm Manual Pull Station** | Location: \_\_\_\_\_\_\_ |

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| 3. Find a buddy in lab and notify them of your work with HF. Ask the buddy to stay in the lab until you’ve completed your work. Provide HF‑appropriate PPE, the HF fact sheet, and your SOP to the buddy. | HF work should not be done alone. Having a buddy in lab reduces response time in an incident/exposure. |
| 3. [Describe the next step in the procedure.] |  |
| 4. [Describe the next step in the procedure. Insert additional rows in table, as needed.] |  |
| 5. Dispose of hazardous solvents, solutions, mixtures, and reaction residues as hazardous waste. Use a high-density polyethylene or teflon waste container, not glass. |  |
| 6. Clean up work area and lab equipment.[Describe specific cleanup procedures for work areas and lab equipment that must be performed after completion of your process or experiment. For carcinogens and reproductive toxins, designated areas must be immediately wiped down following each use.]  |  |
| 7. Remove PPE and wash hands. |  |

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| #7 | **EMERGENCY PROCEDURES**  |
| 1. **Health-Threatening Emergencies**
2. **Fire, explosion, health-threatening hazardous material spill or release, compressed gas leak, or valve failure, etc.**
3. Call 911.
4. Alert people in the vicinity and activate the local alarm systems.
5. Evacuate the area and go to your Emergency Assembly Point (EAP): [Indicate EAP location]
6. Remain nearby to advise emergency responders.
7. Once personal safety is established, call EH&S at 650-725-9999.
	1. In SOM, if possible, notify Security at 650-723-7222 after calling 650-725-9999.
8. Provide local notifications (local notifications are listed at the end of this section).

Note: For compressed gas leaks, shut off gas supply only if this can be done safely, without risk to personnel.1. **Injuries and Exposures:**

**SKIN EXPOSURE**1. Immediately (within seconds) flush affected area with water for 5 minutes under emergency shower station. Remove all contaminated clothing while flushing with water.
2. After flushing, apply calcium gluconate to burn site with clean, gloved hand. Continue massaging gel into the burned area of skin every 15 minutes and massaged continuously until pain disappears.
3. Immediately seek emergency medical assistance Call:

**INHALATION**1. Remove the injured/exposed individual from the area, unless it is unsafe to do so because of the medical condition of the victim or the potential hazard to rescuers.
2. Immediately seek emergency medical assistance.

**EYE EXPOSURE**1. Immediately flush eyes with water for at least 15 minutes under emergency eyewash. If only one eye is affected, be careful not to flush contaminated water into the other eye. Keep the contaminated eye lower than the uncontaminated eye when flushing.
2. Immediately seek emergency medical assistance.

**INGESTION**1. Rinse mouth with cold water. Do not induce vomiting.
2. If the victim is conscious, have them drink lots of water to dilute the acid.
3. Immediately seek emergency medical assistance.

*For emergency medical assistance, call:*9-911 from SU phones911 from non-SU phonesIn SOM, if possible, notify Security at 650-723-7222 after calling 911Or, take victim to seek medical evaluation at Stanford Hospital Emergency Room.1. **Non-Health-Threatening Emergencies**
2. **Injuries and Exposures**

All exposures to HF or fluoride-containing chemicals is potentially health-threatening. See above for exposure guidance. 1. **Spills**

For spills occurring outside of a fume hood or wet bench, evacuate the area.Immediately call EH&S to report an HF spill that is health threatening, is outside of the fume hood, is greater than 30 mLs, or will take longer than 15 minutes to clean up. 1. Notify Stanford EH&S responders by calling 650-725-9999.These services are available 24 hours a day, 7 days a week.
	1. In SOM, if possible, notify Security at 650-723-7222 after calling 650-725-9999.
2. Provide local notifications (local notifications are listed at the end of this section).
3. **Local Cleanup of Small Spills**

In the event of a minor spill or release (<30 mL, inside a chemical fume hood or wet bench) that can be safely cleaned up by local personnel using readily available equipment (absorbent available from EH&S in Small Spill Kit) and laboratory PPE: 1. Notify personnel in the area and restrict access. Eliminate all sources of ignition.
2. Review the SDS for the spilled material, or use your knowledge of the hazards of the material to determine the appropriate level of protection (do not clean up spills requiring respiratory protection locally).
3. Wearing appropriate personal protective equipment, clean up spill. Collect spill cleanup materials in a tightly closed container. Manage spill cleanup debris as hazardous waste.
4. Submit online [waste pickup request](http://www.stanford.edu/dept/EHS/prod/enviro/waste/pickup/WastePickup_form.htm) to EH&S.
5. Reporting Requirements: All spills cleaned up locally must be reported if they occur outside of secondary containment. A spill that occurs within secondary containment (a laboratory hood is considered secondary containment) must be reported if it is greater than 30 ml or if it takes longer than 15 minutes to clean up. To report a spill, call EH&S at 650-725-9999 as soon as possible.

**Do not** use spill kits with kitty litter or sand because HF reacts with silica to produce silicon tetrafluoride, a toxic gas.1. **Lab-Specific Procedures**

[This section is for any emergency procedures different from standard responses, or for additional emergency information due to the nature of materials or task. Include information on gas leaks, chemical spills, and personal exposure/medical emergency as appropriate.]1. **Building Maintenance Emergencies**

Call Facilities Operations at 650-723-2281 (or 650-721-2146 in the School of Medicine) for building maintenance emergencies (e.g., power outages, plumbing leaks).1. **Local Notifications**

[Identify the area management staff that must be contacted and include their work and after-hours numbers. This must include the principal investigator and may include the lab safety coordinator, facilities manager, and/or business manager.] |
| #8 | **WASTE DISPOSAL**  |
| Use a high-density polyethylene or teflon waste container, not glass. [Describe the quantities of waste you anticipate generating and appropriate waste disposal procedures. Include any special handling or storage requirements for your waste. Contact EH&S at 650-723-0448 for questions and additional guidance.]  |
| #9 | **TRAINING REQUIREMENTS** |
| **General Training** ***(check all that apply):***[x]  General Safety & Emergency Preparedness (EHS-4200)[x]  Chemical Safety for Laboratories (EHS-1900)[ ]  Compressed Gas Safety (EHS-2200)[ ]  Biosafety (EHS-1500)[ ]  Life Sciences Research Laboratory Safety Training (EHS-4875)**[**In the School of Medicine, EHS-4875 is required for laboratory personnel in lieu of EHS-1900, 2200, and 1500.] [ ]  Other: \_\_\_\_\_\_\_[Depending on the hazardous materials and processes you will be working with in this SOP, additional safety training may be required by the University. To evaluate if additional safety training is required, go to<http://web.stanford.edu/dept/EHS/prod/training/index.html>.]

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| **Location Where Records Maintained:** |  |

**Laboratory-specific training** ***(check all that apply):***[x]  Review of SDS for chemicals involved in process/experiment[x]  Review of this SOP[x]  Other: [Stanford University Information on Hydrofluoric Acid](https://ehs.stanford.edu/reference/information-hydrofluoric-acid)\_\_\_\_\_\_\_

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| **Location Where Records Maintained:** |  |

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| #10 | **PRIOR APPROVALS**  |
| [You **must** seek prior approval from your principal investigator (PI) or lab supervisor if you plan to use **restricted chemicals** (dimethylmercury and [toxic gases regulated by Santa Clara County](http://www.stanford.edu/dept/EHS/prod/researchlab/lab/tgo/tgodata.html)). You should also consult your PI or lab supervisor if your experiments involve **high-risk chemicals and operations,** as special safety precautions may need to be taken. High-risk chemicals and operations may involve chemicals with a high level of acute toxicity, carcinogens, reproductive toxins, and highly reactive materials. For additional guidance, see section 5.3 of the [Chemical Hygiene Plan](http://www.stanford.edu/dept/EHS/cgi-bin/lcst/docs/Chemical_Hygiene_Plan.pdf). Your PI or lab supervisor’s prior approval may be documented by his/her signature in the Approval Signature section of this document. For granting prior approval to individuals other than the procedure author, use one of the methods described at <http://web.stanford.edu/dept/EHS/cgi-bin/lcst/restricted-chemicals-high-risk-procedures/>.]**Prior Approval *(check if applicable):***[x]  Prior approval from the PI or lab supervisor is required for this procedure  |