Principal Investigator: Date Approved:

This document covers basic chemical safety information for hydrofluoric acid. The use of hydrofluoric acid is subject to pre-approval by the Principal Investigator (PI) and/or Supervisor. DO NOT USE HYDROFLUORIC ACID UNTIL YOU HAVE OBTAINED THE NECESSARY PRE-APPROVAL.

Hydrofluoric Acid (HF)

Hydrofluoric acid is a mineral acid which is highly toxic due to the fluoride ion. 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, 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.

Personal Protective Equipment & Personnel Monitoring

Lab Coat

Traditional lab coat (or NRF cleanroom gown) **AND** natural rubber apron over the top

Gloves

Arm-length natural rubber or heavy duty nitrile gloves over inner Butyl Viton gloves or disposable nitrile gloves
Note: Avoid skin contact when removing gloves

Eye Protection

Face Shield

ANSI Z87.1-compliant safety goggles **AND** face shield. Face shield is required any time there is a risk of explosion, large splash hazard or a highly exothermic reaction

Labeling & Storage

HF easily dissolves glass; therefore, HF must be 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 Acute Toxicant must appear on the bottles and secondary containers. Also, if not plainly visible (e.g., through a cabinet window), labelling must be applied to storage locations (e.g. cabinet doors & secondary containment) where these are stored, to avoid an inadvertent encounter.

Engineering Controls, Equipment & Materials

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

Housekeeping

Spills	Immediately notify others in the area of the spill, including your supervisor. If the spill is small, in a fume hood, and it is safe to do so, applying HF neutralizing absorbant can reduce risk of spread or exposure. **Do not use vermiculite or other silica based absorbents.** Evacuate the location where the spill occurred. Call 911 from any campus phone (or (951) 827-5222 from a cell phone) and EH&S 951-827-5528 for emergency assistance if necessary. Remain on-site (at a safe distance) to provide detailed information to first responders.

Waste	HF waste is considered Extremely Hazardous. Note: Empty containers of HF and gloves/PPE that come in contact with HF must be disposed as hazardous waste with an on-line WASTe tag affixed. Use WASTe to request a pickup. Carefully package and label all wastes to alert the hazardous waste team of the specific hazard.

First Aid & Emergencies

All labs working with or storing HF must include in their first-aid kit a **Calcium gluconate gel** and **Calgonate** eyewash solution. In the event of exposure, call 911 from a campus phone (or (951) 827-5222 from a cell phone) for emergency assistance if necessary.

Skin Contact	Immediately (within seconds) flush affected area for at least 15 minutes. Remove all contaminated clothing. Wearing compatible gloves, massage calcium gluconate gel into the affected area. Re-apply every 15 minutes until medical help arrives.
Eye Contact	Immediately apply the entire 120 mL Calgonate eyewash solution. **Note:** Do not open the Calgonate eyewash solution container seal unless it needs to be used.
Inhalation	Move person into fresh air. Get medical attention immediately.
Ingestion	Get medical attention immediately.

Detailed Protocol

[Insert or attach a copy of your specific laboratory procedures for this process, hazardous chemical, or hazard class. If laboratory procedures are subject to frequent change as in a basic research environment, the paragraphs below may be sufficient to define the process for this hazardous chemical]

All lab workers who will be using Hydrofluoric Acid must review this SOP and sign the associated training sheet. Lab workers must have specific training on the proper handling of and understand the hazards.

Lab workers using a hydrofluoric acid must demonstrate competence to the Principal Investigator or designee by being able to 1) identify the hazards and list any particularly hazardous handling techniques (use of a Schlenk line, rotary evaporation, cannula transfer, extremes of pressure or temperature, etc.), 2) list the foreseeable emergency situations, 3) describe the proper response to the emergency situations, and 4) know the control measures to minimize the risks.

The research laboratory requires variation in reaction conditions to develop and optimize new chemical or biological transformations. The researcher must seek literature precedent for reaction conditions that have reasonable similarities to new chemistry that is planned with a hydrofluoric acid described in this SOP. The researcher must also consult the PI or designated, experienced research coworker for approval to proceed with chemical or biological transformations that have little literature or local research group precedent. PI approval must also be obtained for significant scale-up of new chemistry or biological transformations.

When working in the lab, a laboratory worker must:

- Not work alone
- Be cognizant of all of the SDS and safety information presented in this document
- Follow all related SOPs in the laboratory SOP bank (PPE, syringe techniques, waste disposal, etc. as appropriately modified by any specific information in the SDS information presented in this document)
- Employ (< quantity) of hydrofluoric acid or solid in any given reaction (larger quantities **REQUIRE** the approval of PI or designee)
- Discuss ALL issues or concerns regarding hydrofluoric acid with the PI prior to its use.

If there is an unusual or unexpected occurrence when using this material(s), the occurrence must be documented and discussed with the Principal Investigator or Lab Supervisor and others who might be using hydrofluoric acid. Unusual or unexpected occurrences might include a fire, explosion, sudden rise or drop in temperature, increased rate of gas evolution, color change, phase change, or separation into layers.

Acknowledgement

Title: Hydrofluoric Acid SOP

By my signature I acknowledge the contents, requirements, and responsibilities outlined in this Standard Operating Procedure (SOP):

Name	Identification*	Signature	Date

***Identification:** Enter your Student ID, Employee ID, UCR NetID, or UCR Email.*