

Standard Operating Procedure (SOP)



HYDROFLUOIC ACID

Effective Date: 8/23/2013

Revised Date: 8/23/2013

INTRODUCTION

- This SOP applies to HYDROFLUORIC ACID (HF).
- HYDROFLUORIC ACID is one of the strongest acids. It is extremely destructive to tissue and potentially fatal.
- HF causes such severe burns because it penetrates beneath the skin and dissociates into hydrogen and fluoride ions. When fluoride ions bind with calcium in the body, it can result in tissue destruction, decalcification of bone, cardiac arrhythmia, and liver and kidney damage.
- Calcium gluconate will bind to the fluoride ions and prevent further tissue destruction, but it must be applied quickly (even if burns have not been felt) to be effective.

GENERAL LAB RULES

1. No eating, drinking, smoking, handling contact lenses, or applying cosmetics in the laboratory.
2. Persons shall wear buttoned lab coat, long pants, safety glasses or goggles and appropriate gloves when working with hazardous chemicals.
3. Mouth pipetting is prohibited; mechanical pipetting devices are to be used at all times.
4. All procedures are performed carefully to minimize the creation of splashes or aerosols.
5. Wash hands
 - after handling chemicals materials,
 - after removing gloves, and
 - before leaving the laboratory.

Additional Lab Specific Rules Here

POTENTIAL HAZARDS

- Fatal if swallowed or in contact with skin
- Extremely corrosive material which attacks all tissues of the body.
- Possesses an irritating odor at or near the PEL (3 ppm).

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HEALTH HAZARDS

- Inhalation: Toxic if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
- Skin: May be fatal if absorbed through skin. Causes skin burns.
- Eyes: Causes eye burns. Causes severe eye burns.
- Ingestion: May be fatal if swallowed.
- Contact with dilute (<25%) HF solutions may not be felt until a few hours has passed, resulting in major tissue damage. Skin contact with higher concentrations of HF causes immediate and painful burns as well as massive tissue and bone destruction.
- Burns the eyes, ultimately leading to blindness. At concentrations of 10 ppm to 15 ppm HF vapors begin to irritate the eyes.
- Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause systemic toxic effects on the heart, liver, and kidneys. Ingestion of large amounts of fluoride may include salivation, nausea, vomiting, abdominal pain, fever, labored breathing. Inorganic fluorides can be harmful. Acute exposure to fluorine compounds can lead to digestive tract burns, and abdominal pain. Exposure to fluoride compounds can result in systemic toxic effects on the heart, liver, and kidneys. It may also deplete calcium levels in the body leading to hypocalcaemia and death. Contains fluoride. Human fatalities have been reported from acute poisoning. Fluoride can reduce calcium levels leading to fatal hypocalcaemia.
- 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. Prolonged or repeated exposure may cause permanent bone structure abnormalities. Chronic exposure to fluoride compounds may cause systemic toxicity.




PERSONAL PROTECTIVE EQUIPMENT

EYE PROTECTION

- Safety glasses, goggles or face shields shall be worn during operations in which HYDROFLUORIC ACID might contact the eyes (e.g., through vapors or splashes of solution).
- Ordinary (street) prescription glasses do not provide adequate protection. Adequate safety glasses must meet the requirements of the Practice for Occupational Education Eye and Face Protection (ANSI Z87.1-1989) and must be equipped with side shields.

HAND PROTECTION

- Use of SilverShield®/4H Protective Wear Gloves is recommended in conjunction with nitrile gloves for use against hydrofluoric acid. Check chemical compatibility chart for breakthrough time when using.
- Laboratory personnel should thoroughly wash hands with soap and water before and

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<p>immediately upon removal of gloves.</p> <p>LAB COATS, ETC.</p> <ul style="list-style-type: none"> • Button lab coats, closed toed shoes, long pants and long sleeved clothing shall be worn when handling HYDROFLUORIC ACID. Protective clothing shall be worn to prevent any possibility of skin contact with HYDROFLUORIC ACID. 			
WORK PRACTICES			
<ul style="list-style-type: none"> • All HYDROFLUORIC ACID work shall be done in the laboratory fume hood. • Keep an updated supply of 2.5% calcium gluconate ointment in the work area. • Hydrofluoric acid reacts violently with water so do not store under sink or in an area that may be susceptible to water intrusions. • Do not use glass, ceramic, or other incompatible containers for HF. • Once work with HF is complete, decontaminate the area by wiping it down with a 10% sodium carbonate (Na_2CO_3, also known as soda ash) solution. 			
SPECIAL HANDLING PROCEDURES AND STORAGE REQUIREMENTS			
<ul style="list-style-type: none"> • Do not store with incompatible material – Metals, Alkali metals, Strong bases. • Hydrofluoric acid reacts violently with water so do not store under sink or in an area that may be susceptible to water intrusions. • HYDROFLUORIC ACID corrodes glass. DO NOT STORE IN GLASS CONTAINER. 			
<p>Additional Lab Specific Special Handling/Storage Procedures</p>			
WASTE DISPOSAL			
<ul style="list-style-type: none"> • Chemicals shall not be drain disposed unless prior approval is given by EH&S. • Excess HYDROFLUORIC ACID and all waste material containing HF must be placed in a NON-GLASS container labeled with the following “HAZARDOUS WASTE HYDROFLUORIC ACID”. • Contact EHS at x3427 for hazardous waste removal. 			

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EMERGENCY PROCEDURES

Emergency Numbers:

Fire and Medical Emergencies	x5911 (911 on cell phone)
Environmental Health and Safety	x3427
Hillcrest Urgent Care (employees)	336-760-8999
Student Health (students only)	x5218
Poison Control	800-222-1222

FIRST AID

- Hydrofluoric (HF) acid burns require immediate and specialized first aid and medical treatment. Symptoms may be delayed up to 24 hours depending on the concentration of HF. After decontamination with water, further damage can occur due to penetration/absorption of the fluoride ion. Treatment should be directed toward binding the fluoride ion as well as the effects of exposure. Skin exposures can be treated with a 2.5% calcium gluconate gel repeated until burning ceases. More serious skin exposures may require subcutaneous calcium gluconate except for digital areas unless the physician is experienced in this technique, due to the potential for tissue injury from increased pressure. Absorption can readily occur through the subungual areas and should be considered when undergoing decontamination. Prevention of absorption of the fluoride ion in cases of ingestion can be obtained by giving milk, chewable calcium carbonate tablets or Milk of Magnesia to conscious victims. Conditions such as hypocalcemia, hypomagnesemia and cardiac arrhythmias should be monitored for, since they can occur after exposure. Consult a physician. Show this safety data sheet to the doctor in attendance.
- If inhaled: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Call x5911 for medical assistance.
- In case of skin contact: Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.
- In case of eye contact: Rinse thoroughly with plenty of water for at least 15 minutes and call x5911 for medical assistance.
- If swallowed: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Call x5911 for medical assistance.
- Call x5911 and describe the extent of injuries.
- Report all accidental exposures to EHS and Human Resources (employees) or Student Health (students).
- Complete an [online injury/illness report](#) if there is an over-exposure to the chemical or if there is an accident involving the chemical.

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SPILL AND ACCIDENT PROCEDURES			
<ul style="list-style-type: none"> • If HYDROFLUORIC ACID is spilled, contact x3427 and evacuate area immediately, regardless of spill amount. • Do <u>NOT</u> use organic spill kits that contain Floor-Dri, kitty litter, or sand because HF reacts with silica to produce silicon tetrafluoride (a toxic gas). • Neutralize with sodium carbonate or lime. 			