WAKE FOREST UNIVERSITY	**Standard Operating Procedure (SOP)**	

HYDROFLUORIC ACID

Effective Date:	**8/23/2013**	**Revised Date:**	**10/6/2022**

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.

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).

Health Hazards

HEALTH HAZARD INFORMATION

Signal word:	Danger
Hazard statement(s):	**H300** Fatal if swallowed. **H310** Fatal in contact with skin. **H330** Fatal if inhaled. **H314** Causes severe skin burns and eye damage. **H317** May cause an allergic skin reaction. **H341** Suspected of causing genetic defects.

Personal Protective Equipment

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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 immediately upon removal of gloves.

LAB COATS, ETC.

- 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

- 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

- 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.**

Waste Disposal

- 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.

Emergency Numbers

Emergency Numbers:

Fire and Medical Emergencies	x5911 (911 on cell phone)
Environmental Health and Safety	x3427
FastMed Urgent Care (employees)	(336) 714-4616
Student Health (students only)	x5218
Poison Control	800-222-1222

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First Aid

INGESTION

- For advice, contact a Poisons Information Centre or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- If swallowed do **NOT** induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Transport to hospital or doctor without delay.

If patient is conscious, give six calcium gluconate or calcium carbonate tablets dissolved in water, by mouth.

EYE CONTACT

If this product comes in contact with the eyes:

- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN CONTACT

If there is evidence of severe skin irritation or skin burns:

- Avoid further contact. Immediately remove contaminated clothing, including footwear.
- Flush skin under running water for 15 minutes.
- Avoiding contamination of the hands, massage calcium gluconate gel into affected areas, pay particular attention to creases in skin.
- Contact the Poisons Information Centre.
- Continue gel application for at least 15 minutes after burning sensation ceases.
- If pain recurs, repeat application of calcium gluconate gel or apply every 20 minutes.
- If no gel is available, continue washing for at least 15 minutes, using soap if available. If patient is conscious, give six calcium gluconate or calcium carbonate tablets in water by mouth.
- Transport to hospital, or doctor, urgently.

INHALATION

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.
- Inhalation of vapours or aerosols (mists, fumes) may cause lung oedema.
- Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs).
- As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete rest (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested.
- Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered.

Spill and Accident Procedure

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MINOR SPILLS

- Ensure all areas where hydrofluoric acid (HF) is used are equipped with proper spill response equipment.
- Neutralize small spills (100 mL or less) by covering with magnesium sulfate (dry) and absorb with spill control pads or other absorbent materials.
- Add sodium bicarbonate or magnesium oxide to any absorbent and place in a plastic container for disposal.
- Wash the spill site with a sodium bicarbonate solution.
- Use sorbents that do not react with HF. Do not use spill sorbents that contain silicon, such as vermiculite or sand, as this can produce silicon tetrafluoride, an odorless toxic gas.
- If the spill is large, in a confined space, or in an area where there is not adequate ventilation, evacuate the room.
- Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.
- Check regularly for spills and leaks.