

HYDROFLUORIC ACID SAFETY



Environmental Energy Technologies Division
SAFETY TOPICS

January 13, 2012

Hydrofluoric Acid Hazards

- Hydrofluoric Acid (called "HF")
- Corrosive acid and contact poison
- Considered a weak acid with pH of 3
- HF penetrates skin quickly
- Dilute solutions can interfere with nerve function. This can result in un-noticed exposures that are not initially painful.
- HF contains fluoride ions. Fluoride ions have an affinity for the calcium in our bones. Serious exposures can result in decalcification of bone material and fluoride poisoning.



Hydrofluoric Acid Hazards



HF Burn on Fingers



HF Burn on Legs
(note excised flesh)

Exposure Symptoms

- Solutions of 14.5% or higher immediately produce symptoms
- Solutions up to 12% may take up to an hour to produce symptoms
- Solutions of less than 7% may take several hours before on-set of symptoms, resulting in delayed detection and deeper penetration of acid through skin.
- Concentrated solutions produce immediate symptoms while dilute do not!
 - Pain is deep burning or throbbing.
 - Visible symptoms include white burn mark or blisters

Hydrofluoric Acid, aqueous

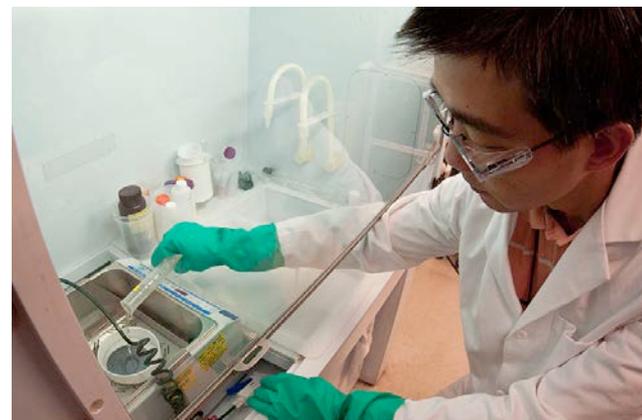


Clear, colorless liquid. Corrosive, causes severe burns to eyes/skin/respiratory tract. Toxic! Pain may not be immediate, but begins as hydrogen fluoride penetrates deep to the bone. Chronic exposure can cause irreversible bone damage.

CAS No. 7664-39-3

Protection from HF Exposures

- ALWAYS wear proper personal protective equipment when handling HF.
- Gloves
 - Chemical Gloves (Neoprene, nitrile, or butyl rubber) of adequate thickness
 - Thin disposable nitrile gloves DO NOT provide adequate protection! See the CHSP for more information on this important topic!
- Safety glasses with side shields
- Lab coat
- Closed-toe shoes
- Long pants to cover legs
- Potential splashing- Chemical apron and face shield



Chemical Glove Care

- Gloves must be inspected for signs of degradation and punctures prior to each use.
 - Contaminated gloves must not be reused
 - Wash and properly store gloves when not in use
 - Regularly dispose of gloves- do not wait for breakthrough!
- Always wear BOTH gloves
- Remove jewelry and other sharp objects
- DO NOT touch other items outside hood while wearing gloves (keyboards, microscopes, door knobs, phones, etc.)



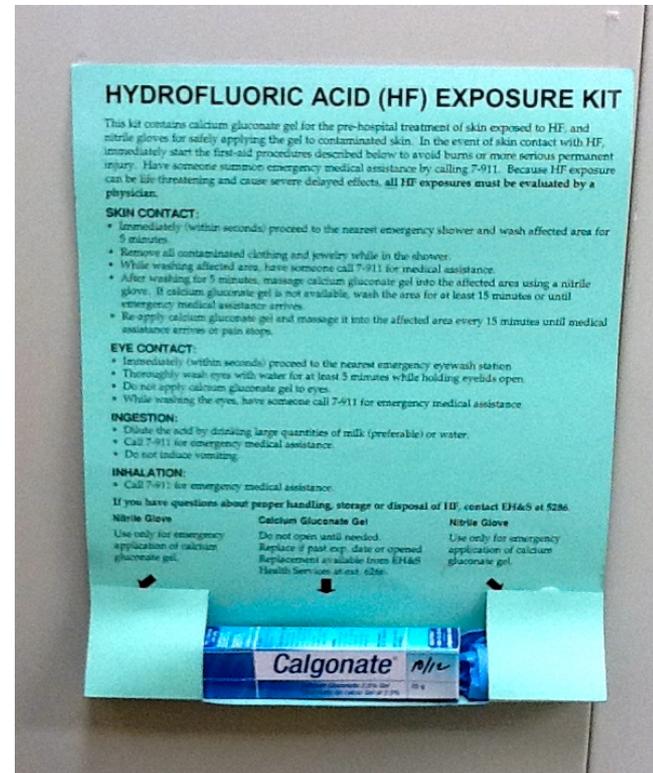
Protection from HF Exposures

- Always use HF inside a fully functional chemical fume hood
- Do not store or use in glass containers. HF reacts with glass.
- AAA- Always assume acid for unknown liquids
 - Check unknowns with pH paper. Dilute solutions may not have low pH!
 - Don't touch!
 - Immediately clean up small drips and spills using special HF cleanup kit. See CHSP.
- A safety shower/eyewash must be immediately available in the event of contact



HF Exposure Kit

- Each lab area that uses HF has a “Hydrofluoric Acid Exposure Kit”
- The kit contains a tube of Calcium Gluconate gel and a pair of nitrile gloves
- Instructions for using the Calcium Gluconate gel are posted on the kit.
- The Calcium Gluconate gel and gloves have a shelf-life.
- Report any expired or missing gel to the Division Safety Manager X8137.



HF Exposure First Aid

- Immediate care is needed for any suspected exposures to HF. Burns or pain may not be immediately evident, so always assume the worse case and treat as real.
- Rinse affected area for 5 minutes.
- Remove all contaminated clothing and jewelry.
- Apply Calcium Gluconate gel to the affected area as soon as possible.
- Obtain assistance by calling X7911 or X9-911.
- Report incident to Health Services X6266 and obtain medical assistance



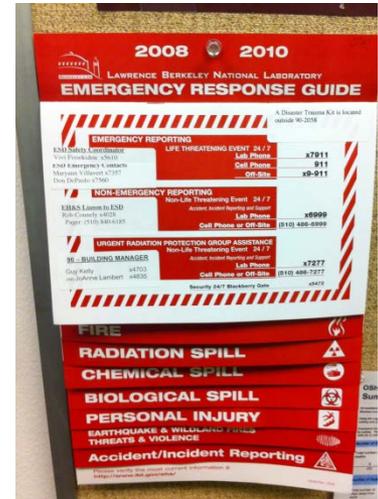
Purolyte Electrolyte Solution

- Novolyte Technologies
- Commonly used in EETD battery labs
- Organic solvent (Flammable) containing 16% *Lithium Hexafluorophosphate*
- Reacts with Water to form Hydrofluoric Acid
- Avoid contact with Acids, Bases, *Humid Air, Water*
- No pH
- Use HF first aid procedures and Calcium Gluconate gel if in contact with moist skin
- Used in glove boxes- no moisture in atmosphere and gloves provide protection
- Read the Material Safety Data Sheet (MSDS)
- Fluorine gas behaves in a similar fashion!



Procedures and Training

- Refer to the “Emergency Response Guide” posted in all lab areas for spill and injury procedures.
- For further requirements regarding storage and use of acids at LBNL, go to Pub-5341 “Chemical Hygiene and Safety Plan- Control Procedures for Acids and Bases”.
- All personnel who handle hazardous materials must complete EHS0348 “Chemical Hygiene and Safety” training.
- All personnel who handle Hydrofluoric Acid must also receive on-the-job training from their supervisor or Area Safety Lead.



Summary



- ALWAYS HANDLE HF products CAREFULLY!
- Read and understand Material Safety Data Sheets
- Read and understand chemical labels
- Use proper personal protective equipment, including chemical gloves
- Clean-up spills immediately
- Immediately rinse off suspected contact and treat as a HF exposure
- Use the Calcium Gluconate gel in the HF Exposure Kit to treat exposures.
- Report any suspected contact with HF to your Supervisor immediately.
- Always seek medical attention at Health Services regardless of the degree of exposure.