AQUABOND
Chemistry for Tomorrow

SAFETY GUIDELINES - HYDROFLUORIC ACID

Hydrofluoric acid (HF) is an extremely corrosive clear and colorless liquid with a strong irritating odour at low concentrations (3 ppm). HF is much more hazardous than other acids, since it can penetrate deeply into skin and cause severe burns, deep tissue damage, systemic toxicity, and death. HF toxicity can continue for days if left untreated. HF reacts with glass, so glass should never be used to store or transfer HF. HF is incompatible with metals, cyanides, sulfides, bases, fluorine.

WARNING

- **Hydrofluoric acid (HF) is extremely hazardous and corrosive and causes severe skin burns.**
- **Burns with HF are very serious, and can cause major tissue damage and death from fluoride toxicity.**
- **All skin, eye, or tissue contact with HF should receive immediate first aid and medical attention, even if the exposure appears minor or no pain is felt.**
- **If untreated or if improperly treated, permanent damage, disability or death may result.**
- **Calcium gluconate gel must be available if HF is being handled.**

Prevention of exposure and injury by using protective equipment and safety procedures are critically important when handling HF.

Preventative Measures for Handling HF:

- Knowledge of HF's properties and dangers;
- Training on the proper handling and safety precautions required when using HF;
- Use of safety and personal protective equipment;
- Use of appropriate engineering controls and ensuring that they are functioning properly;
- Availability of first aid and medical treatment (calcium gluconate gel, emergency eyewash/shower).

Health Hazards

Eye Contact

Eye exposure to HF may result in severe eye burns with destruction or clouding of the cornea.
Blindness or permanent eye damage may result if untreated.

Skin Contact

HF deeply penetrates skin causing severe damage by decalcification of soft tissues and bone.
Skin exposure to concentrated HF (50-100%) immediately causes serious and painful destruction of tissue with major blisters. Fluoride poisoning can spread in the body.
Skin exposure at lower concentrations (<20%) may not produce pain or burning sensation until hours after the exposure (up to 24 hours) but it is still damaging. HF can produce severe, delayed tissue damage without causing pain.

The above information, while not guaranteed, reflects our analysis and believed to be accurate. It is the end user's responsibility, prior to use of the above mentioned product to determine the suitability of the product. Aqua Bond shall not be, directly or indirectly responsible for damages of any nature whatsoever resulting from the use or reliance upon the above information.

All skin, eye, or tissue contact with HF should receive immediate first aid, even if it appears to be minor.

Inhalation
Inhalation of HF vapour can seriously damage the lungs and cause fatal pulmonary oedema (flooding of lungs with body fluids). Symptoms of exposure are coughing, choking, chest tightness, chills, fever, and blue skin. Delayed damage can occur without showing any symptoms for hours after exposure.

Ingestion
Ingestion of HF causes severe burns to the mouth, esophagus, and stomach. The ingestion of a small amount of HF has resulted in death.

Safety Precautions for HF Use

Safe Work Practices
- Never work alone when using HF.
- Always wear protective clothing, follow safety procedures and wash hands thoroughly after handling HF.
- Glass, metal, and ceramic containers are not compatible with HF.

Ventilation: HF at concentrations greater than 5% must be handled inside a certified chemical fume hood.

Eye Protection: Chemical goggles together with a face shield are required when handling HF at concentrations greater than 20%. Safety glasses with side shields do not provide enough protection.

Protective Clothing: A lab coat, a chemically-resistant apron and protective sleeves are required when handling HF at concentrations above 5%. No exposed skin is permitted. Protective clothing can be made of neoprene, fluorocarbon (viton) or other materials - consult manufacturer's chemical resistance data. Examples of protective clothing for use with 48% HF: Dupont® Tychem® QC

Gloves: Use dedicated gloves for HF only and inspect gloves before using them - even a small hole in gloves can cause leaks and dangerous HF exposure. A second pair of nitrile gloves should be worn to protect from leaks. For the use of concentrated HF solutions: use gloves that cover the hands, wrists, and forearms. Neoprene and butyl gloves are known to protect against HF, but it is important to check the manufacturer's glove selection guide. Examples of gloves for use with 48% HF: Best® Viton®, ChemMaster®, Ansell Sol-Vex®. If gloves become contaminated with HF, remove them immediately, thoroughly wash your hands, and check your hands for any sign of contamination. Contaminated gloves must be disposed of as HF waste.

Eyewash/Emergency Shower: A combination of eyewash/shower is required within 10 seconds away and must be accessible (unobstructed). The eyewash must be tested regularly.

Emergency Procedures for HF Exposure

The above information, while not guaranteed, reflects our analysis and believed to be accurate. It is the end user's responsibility, prior to use of the above mentioned product to determine the suitability of the product. Aqua Bond shall not be, directly or indirectly responsible for damages of any nature whatsoever resulting from the use or reliance upon the above information.

Calcium gluconate gel must be available if HF is being handled. Calcium gluconate is a topical antidote for HF skin exposure. All exposure or contact with HF must receive immediate first aid and subsequent medical evaluation, even if the injury appears minor and no pain is felt. Rapid treatment is important since HF can cause delayed injuries. **All accidents must be reported to your supervisor.**

Skin contact
1. Immediately use the nearest eyewash/shower and rinse the affected area thoroughly with water for a minimum of 5 minutes. Remove all contaminated clothing. Speed and thoroughness is important.
2. After washing, massage calcium gluconate gel into the affected area. Wear nitrile gloves to prevent a secondary HF burn. Apply gel frequently and massage continuously until pain and/or redness disappears.
3. Call emergency medical assistance.

Eye contact
1. Immediately use the nearest eyewash station and flush eyes for a minimum of 15 minutes. Hold eyelids open and away from the eye to allow for thorough flushing. (Do not apply calcium gluconate gel to eyes.)
2. Call emergency medical assistance. Continue to rinse affected area until medical assistance arrives.

Inhalation
1. Immediately move the victim to fresh air and obtain medical attention.
2. Call emergency medical assistance.

Ingestion
1. Drink several large glasses of water, milk or milk of magnesia. Do not induce vomiting. Do not give emetics or baking soda.
3. Call emergency medical assistance. Obtain immediate medical attention. Ingestion of HF is a life-threatening emergency.

Spills
HF spilled outside a chemical fume hood: Evacuate the area and close the doors. Call Emergency services.
HF spilled inside a chemical fume hood: The spill can be cleaned up by laboratory staff if they have the correct equipment, understand the hazards, know how to clean up the spill safely and dispose of the waste properly. Lime, soda, sodium bicarbonate, or a spill absorbent specified for HF should be used to neutralize and clean up a spill. Add neutralizers slowly as the reaction can be vigorous. Organic spill kits that contain Floor-dri, kitty litter, or sand **must not** be used because HF can react with silica to produce toxic gases.

Storage
All HF and HF waste **must** be stored in labelled and chemically compatible containers (e.g., Polyethylene or Teflon). HF should never be stored with incompatible chemicals such as ammonia or other alkaline materials. **Glass, metal, and ceramic containers are not compatible with HF.**

Waste
Waste HF should be placed in a chemically compatible container (e.g., Polyethylene or Teflon) with a sealed lid and clearly labelled.

The above information, while not guaranteed, reflects our analysis and believed to be accurate. It is the end user's responsibility, prior to use of the above mentioned product to determine the suitability of the product. Aqua Bond shall not be, directly or indirectly responsible for damages of any nature whatsoever resulting from the use or reliance upon the above information.