Hydrofluoric Acid

For assistance, contact EHS 292-1284 or *http://www.ehs.ohio-state.edu/*

Purpose and Scope

Good Laboratory Practice standards put forth by the EPA in 40 CFR 160 mandate the implementation of standard operating procedures. All University staff, students and employees who work in labs using Hydrofluoric Acid should familiarize themselves with this document and be aware of the unique dangers and special precautions that need to be taken when handling Hydrofluoric Acid. This SOP covers proper and safe purchase, use, and disposal of Hydrofluoric Acid.

Definitions and Abbreviations

HF - Hydrofluoric Acid
PPM - (parts per million) - molecules of the compound per million parts of air
PEL - (Permissible Expose Limit) - 3 ppm
SOP - (Standard Operating Procedure)
TLV - (Threshold Limit Value) - A derived number for the continual exposure that should cause no irritation or toxic effect. The TLV for Hydrofluoric acid is listed as 3 ppm.
IDLH - (Immediately Dangerous to Life and Health) - At levels greater than or equal to 30 ppm HF is recognized as immediately dangerous to life and health.
CFR - (Code of Federal Regulations)
EPA - (Environmental Protection Agency)

Toxicity

Hydrofluoric Acid is an inorganic acid which is derived from dissolving hydrogen fluoride in water. HF is noncombustible, colorless, and possesses an irritating odor at or near the PEL (3 ppm). Hydrofluoric Acid is an extremely corrosive material which attacks all tissues of the body. Contact with the skin results in deep tissue burns that are extremely slow to heal. Contact with dilute (<25%) HF solutions may not be felt until a few hours has past, 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. Hydrofluoric Acid

Toxicity Continued

penetrates the skin, destroys underlying tissues and attacks the bone. Solutions as weak as 1% will still rapidly permeate the skin and severely damage underlying tissues. Hydrofluoric Acid vapor burns the eyes, ultimately leading to blindness. At concentrations of 10 ppm to 15 ppm HF vapors begin to irritate the eyes. Brief exposure (5 min) to concentrations greater than or equal to 50 ppm can be fatal. Ingestion of HF leads to severe burns of mouth and throat. HF is not a human carcinogen.

Incompatibilities

HF attacks glass, concrete, and many metals. It also attacks organic materials such as leather, natural rubber, and wood. Caution should be taken to properly store HF with other acids, always using secondary containment. Do not store HF in glass containers!

Spills/Safety

If you spill any amount of Hydrofluoric Acid vacate the lab and notify the safety office immediately. HF should be purchased in small quantities to prevent abnormal amounts in storage. A three-month supply or less is a good rule of thumb. Work with quantities that allow for quick and easy clean up by appropriate personnel if a spill occurs.

All work with HF must be performed in a chemical fume hood and handled with neoprene, nitrile or vinyl gloves. When dispensing or pouring HF, no area of the skin should be exposed. When handling solutions of HF, eye protection is mandatory. Protective equipment should be washed after each use to remove any HF build up. The locations of safety showers and eye wash stations should be clearly marked and easily accessible. A tube of calcium gluconate gel (antidote) should be readily available. All persons using HF should be aware of the location and proper application of the gel. (See below)

Accidents/Exposures

In the event of skin contact, first aid must be started within seconds. If the skin contact is local, immediately remove any contaminated clothing and wash the area with water for 15 min. Apply generous amounts of calcium gluconate gel to the area. Gently massage the gel into the contaminated areas while using appropriate gloves. White specks appearing around the burned region indicate the gel is working. Gently apply the gel for 15 minutes and reapply when the pain flares up. If larger amounts of HF are spilled, or if HF is spilled in a difficult area to wash, remove clothing and proceed immediately to the nearest safety shower. After showering apply the calcium gluconate gel. It is important to realize that calcium gluconate gel WILL NOT adequately neutralize the affect of HF on tissue alone. Rinsing with water prior to application of the gel is critical. Notify

Accidents/Exposures Continued

medical personnel of the spill location. In the event of eye contact, rinse the eyes with large amounts of water for a minimum of 5 min. and seek medical attention. Do not apply calcium gluconate gel to the eyes. If HF is ingested, contact medical help. Do not induce vomiting. If conscious, have the injured person ingest a glass of milk or milk of magnesia. If vomiting occurs naturally, help the person so they do not breathe in the vomit. If HF vapor is inhaled, move the person to fresh air and seek medical attention at once. Contact the safety office in the event of an exposure or spill. The telephone number for the Environmental Health and Safety 292 1284.

Disposal

Waste Hydrofluoric Acid should be labeled with the red hazardous waste tags provided by the safety office and filled out according to procedures. On the back of the waste tag, check off the box marked "corrosive." Place the waste container in the satellite accumulation area and in some sort of secondary containment. Make sure the waste bottle is fitted with a proper screw cap and notify the safety office for disposal.

Cradle to Grave (Purchase to Disposal)

Before purchasing do some research into substitutes for Hydrofluoric Acid. If theses substitutes can be used do so. Purchase Hydrofluoric Acid in limited quantities to avoid large inventories. Work with amounts and concentrations which, if spilled, can be easily and comfortably cleaned up by the proper individuals.

Store Hydrofluoric Acid in polyethylene bottles and in secondary containment. Do not use glass! Take specific steps to store HF away from ammonia and other bases.

Handle HF with neoprene, nitrile or vinyl gloves.

All work with HF should be done in a chemical fume hood. Always wear safety glasses and cover all exposed skin with the proper protective clothing when using HF.

Hydrofluoric acid is hazardous waste. Therefore it must be disposed according to specific procedures. Place waste HF solution in an approved container (NO GLASS) and label according to University guidelines. Contact the EH&S office for chemical pick up.