Fluorine Gas Management Guidelines

Overview

Fluorine is a highly toxic, pale yellow gas about 1.3 times as heavy as air at atmospheric temperature and pressure. Fluorine gas is the most powerful oxidizing agent known, reacting with practically all organic and inorganic substances. Fluorine gas is corrosive to exposed tissues and to the upper and lower respiratory tract. It can penetrate deeply into body tissues and will continue to exert toxic and tissue damaging effects unless neutralized.

Fluorine reacts violently and decomposes to hydrofluoric acid on contact with moisture. Fluorine ignites on contact with ammonia, phosphorus, sulfur, copper wire, acetone and many unsaturated organic and inorganic compounds.

Emergency Procedures

In case of skin contact

In the event unprotected skin should come in contact with fluorine gas, flush affected area with large amounts of water for at least 15 minutes. Remove contaminated clothing as rapidly as possible. Apply 2.5% calcium gluconate gel to the affected area and continue to apply the calcium gluconate gel every 15 minutes while seeking immediate medical attention.

In case of eye contact

Fluorine is corrosive and irritating to the eyes. Flush contaminated eye(s) immediately with copious quantities of water. Continue for a minimum of 30 minutes. Seek medical attention immediately.

In case of inhalation: Even very low concentrations may irritate the respiratory tract and brief exposure to 50 ppm can be intolerable. High concentrations can cause severe damage to the respiratory system and can be fatal. PROMPT MEDICAL ATTENTION IS NECESSARY IN ALL CASES OF OVEREXPOSURE. Conscious persons should be assisted to an area with fresh, uncontaminated air.

In case of ingestion:

Not a likely route of exposure.
**Personal Protective Equipment**

While working with fluorine persons should wear ventless goggles, laboratory coats, gloves resistant to hydrofluoric acid, long pants, and closed toes shoes.

**Handling**

Teflon is the preferred gasket material when working with fluorine gas. Keep equipment dry. The reaction between metals and fluorine is relatively slow at room temperature, but becomes vigorous and self-sustaining if the temperature is elevated. Use only in well-ventilated areas, vented gas storage cabinets, or fume hoods. Process valves should be opened and closed with remote controlled extensions passing through a suitable barricade for additional protection. Double valving should be employed to facilitate the reduction in pressure from high pressure sources of fluorine.

**Storage**

Use and store fluorine in a ventilated gas cabinet or fume hood. When a gas cabinet is warranted (e.g., cylinders larger than lecture bottle size that are used in a fume hood), install a fluorine gas monitoring system. Follow all applicable recommendations for storage and handling of compressed gases.

**Disposal**

Fluorine cylinders should be returned to the compressed gas distributor when emptied or no longer used.

**Laboratory Standard Operating Procedures**

Each principle investigator utilizing fluorine gas for research purposes should investigate appropriate management techniques to safely work with fluorine gas and minimize accidental human exposure or release of fluorine gas into the laboratory ambient environment.

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