CAMEO Chemicals

Print

Chemical Datasheet

HYDROFLUORIC ACID

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Chemical Identifiers

UN/NA Number	CAS Number	CHRIS Code	DOT Hazard Label
1790	7664-39-3	HFA	CORROSIVE POISON

NFPA 704: Red 0 -- Flammability: Will not burn
Blue 4 -- Health Hazard: Too dangerous to enter - vapor or liquid
Yellow 1 -- Reactivity: Unstable if heated - use normal precautions

General Description

A colorless fuming mobile aqueous solution with a pungent odor. Density 9.6 lb / gal. Corrosive to metals and tissue. Highly toxic by ingestion and inhalation. Exposure to fumes or very short contact with liquid may cause severe painful burns; penetrates skin to cause deep-seated ulceration that may lead to gangrene.

Hazards

Reactivity Alerts

Water-Reactive

Air-Reactive

Air & Water Reactions

Fumes in air. Fumes are highly irritating, corrosive, and poisonous. Generates much heat on dissolution [Merck, 11th ed., 1989]. Heat can cause spattering, fuming, etc.

Fire Hazard

Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.). Substance will react with water (some violently), releasing corrosive and/or toxic gases and runoff. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated or if contaminated with water. (ERG, 2008)

Health Hazard

TOXIC; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death. Reaction with water or moist air will release toxic, corrosive or flammable gases. Reaction with water may generate much heat that will increase the concentration of fumes in the air. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. (ERG, 2008)

Reactivity Profile

HYDROFLUORIC ACID attacks glass and any other silica containing material. May react with common metals (iron, steel) to generate flammable hydrogen gas if diluted below 65%. Reacts exothermically with chemical bases (examples: amines, amides, inorganic hydroxides). Can initiate polymerization in certain alkenes. Reacts with cyanide salts and compounds to release gaseous hydrogen cyanide. May generate flammable and/or toxic gases with dithiocarbamates, isocyanates, mercaptans, nitrides, nitriles, sulfides. Additional gas-generating reactions may occur with sulfites, nitrites, thiosulfates (to give H2S and SO3), dithionites (SO2), and carbonates. Can catalyze (increase the rate of) chemical reactions. Reacts explosively with cyanogen fluoride, methanesulfonic acid or glycerol mixed with nitric acid. Reacts violently with arsenic trioxide, phosphorus pentachloride, acetic anhydride, alkali metals, ammonium hydroxide, chlorosulfonic acid, ethylenediamine, fluorine, potassium permanganate, oleum, propylene oxide, vinyl acetate, mercury(II) oxide. Emits highly corrosive fumes of hydrogen fluoride gas when heated [Sax, 9th ed., 1996, p. 1839]. Contact with many silicon compounds and metal silicides causes violent evolution of gaseous

silicon tetrafluoride [Mellor, 1956, Vol. 2, suppl. 1, p. 121].

Mixing in equal molar portions with any of the following substances in a closed container caused the temperature and pressure to increase: acetic anhydride, 2-aminoethanol, chlorosulfonic acid, aqueous ammonia (48.7%), ethylenediamine, ethyleneimine, oleum, aqueous sulfuric acid (48.7%), aqueous sodium hydroxide (48.7%), propylene oxide, vinyl acetate [NFPA 1991].

Belongs to the Following Reactive Group(s)

- Acids, Inorganic Non-oxidizing
- Water

Response Recommendations

Firefighting

Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Use water in flooding quantities as fog. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible.

Non-Fire Response

Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Use water spray to knock-down vapors. Neutralize spilled material with crushed limestone, soda ash, or lime. Vapor knockdown water is corrosive or toxic and should be diked for containment. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Neutralize with agricultural lime (CaO), crushed limestone (CaCO3) or sodium bicarbonate (NaHCO3). Water spill: Neutralize with agricultural lime (CaO), crushed limestone (CaCO3), or sodium bicarbonate (NaHCO3). Add soda ash (Na2CO3). Adjust pH to neutral (pH=7). Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates.

Protective Clothing

Skin: If chemical is in liquid form, wear appropriate personal protective clothing to prevent skin contact.

Eyes: If chemical is in liquid form, wear appropriate eye protection to prevent eye contact.

Wash skin: If the chemical is in liquid form, the worker should immediately wash the skin when it becomes contaminated.

Remove: If chemical is in liquid form, work clothing that becomes wet or significantly contaminated should be removed and replaced.

Change: No recommendation is made specifying the need for the worker to change clothing after the work shift.

Provide: Eyewash fountains should be provided (when chemical is in liquid form) in areas where there is any possibility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. Facilities for quickly drenching the body should be provided (when chemical is in liquid form) within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] (NIOSH, 2003)

_____Dupont Average Standardized Breakthrough Times_____
(for HYDROFLUORIC ACID)

Tychem® BR
greater than 480 min. (concentration: 50%)
67* min. (concentration: 92 (90ºC)% at 90ºC)
Tychem® Butyl
greater than 480 min. (concentration: 48-51%)
Tychem® CPF1
greater than 480 min. (concentration: 48%)
Tychem® CPF2
greater than 480 min. (concentration: 48%)
immediate (less than 10 min.) (concentration: 70%)
Tychem® CPF3
180 min. (concentration: 48-51%)
Tychem® CPF4
greater than 480 min. (concentration: 48%)
immediate (less than 10 min.) (concentration: 70%)
Tychem® F

greater than 480 min. (concentration: 48%)
39 min. (concentration: 70%)
Tychem® LV
greater than 480 min. (concentration: 50%)
67* min. (concentration: 92 (90ºC)% at 90ºC)
Tychem® PVC
greater than 480 min. (concentration: 48-50%)
Tychem® QC
greater than 480 min. (concentration: 48%)
Tychem® QC for Corrections
greater than 480 min. (concentration: 48%)
Tychem® Reflector®
greater than 480 min. (concentration: 49-51%)
67 min. (concentration: 92% at 90ºC)
Tychem® Responder®
greater than 480 min. (concentration: 49-51%)
67 min. (concentration: 92% at 90ºC)
Tychem® Responder® CSM
greater than 480 min. (concentration: 49-51%)
67 min. (concentration: 92% at 90ºC)
Tychem® SL
greater than 480 min. (concentration: 48%)
immediate (less than 10 min.) (concentration: 70%)
Tychem® ThermoPro
greater than 480 min. (concentration: 48-51%)
39 min. (concentration: 70%)
Tychem® TK
greater than 480 min. (concentration: 48%)
67* min. (concentration: 92 (90ºC)% at 90ºC)
greater than 480 min. (concentration: 70%) (DuPont, 2008)

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First Aid

Eye: If this chemical in liquid form or in solution contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be

worn when working with this chemical.

Skin: If this chemical in solution or in liquid form contacts the skin, immediately flush the contaminated skin with water. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water. Get medical attention promptly.

Breathing: If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible.

Swallow: If this chemical in solution has been swallowed, get medical attention immediately. (NIOSH, 1997)

Physical Properties

Molecular Formula: HF (aqueous)

Flash Point: data unavailable

Lower Explosive Limit: data unavailable

Upper Explosive Limit: data unavailable

Autoignition Temperature: Not flammable (USCG, 1999)

Melting Point: -118.0 ° F (NIOSH, 2003)

Vapor Pressure: 783.0 mm Hg (NIOSH, 2003)

Vapor Density: data unavailable

Specific Gravity: 1.15 (AAR, 2003)

Boiling Point: 152.0 ° F at 760.0 mm Hg (USCG, 1999)

Molecular Weight: 20.0 (NIOSH, 2003)

Water Solubility: Miscible (NIOSH, 2003)

AEGL-1	AEGL-2	AEGL-3

1.0 ppm for 10 minutes	95.0 ppm for 10 minutes	170.0 ppm for 10 minutes
1.0 ppm for 30 minutes	34.0 ppm for 30 minutes	62.0 ppm for 30 minutes
1.0 ppm for 60 minutes	24.0 ppm for 60 minutes	44.0 ppm for 60 minutes
1.0 ppm for 4 hours	12.0 ppm for 4 hours	22.0 ppm for 4 hours
1.0 ppm for 8 hours	12.0 ppm for 8 hours	22.0 ppm for 8 hours
(NRC, 2008)		

ERPG-1	ERPG-2	ERPG-3
2.0 ppm	20.0 ppm	50.0 ppm
(AIHA, 2008)		

TEEL: data unavailable

IDLH: 30.0 ppm (NIOSH, 2003)

Regulatory Information

Regulatory Names: HYDROFLUORIC ACID
HYDROFLUORIC ACID (CONC. 50% OR GREATER)
HYDROGEN FLUORIDE

CAA RMP: Regulated chemical with a Threshold Quantity of 1000 pounds.

CERCLA: Regulated chemical with a Reportable Quantity of 100 pounds.

EHS (EPCRA 302): Regulated chemical with a Reportable Quantity of 100 pounds and a Threshold Planning Quantity of 100 pounds.

TRI (EPCRA 313): Regulated chemical.

RCRA Chemical Code: U134

Alternate Chemical Names

- ACIDE FLUORHYDRIQUE (DOT FRENCH)
- ACIDO FLUORHÍDRICO (DOT SPANISH)
- ACIDO FLUORHÍDRICO, SOLUCIÓN DE (DOT SPANISH)

- ALSURF 45
- ANHYDROUS HYDROFLUORIC ACID
- ANHYDROUS HYDROGEN FLUORIDE
- ANTISAL 2B
- AQUEOUS HYDROGEN FLUORIDE (I.E., HYDROFLUORIC ACID)
- FLUORHYDRIC ACID
- FLUORIC ACID
- FLUORINE HYDRIDE (FH)
- FLUORINE MONOHYDRIDE
- HF-A
- HYDROFLUORIC ACID (CONC. 50% OR GREATER)
- HYDROFLUORIC ACID GAS
- HYDROFLUORIC ACID, SOLUTION
- HYDROGEN FLUORIDE (AS F)
- HYDROGEN FLUORIDE (HF)
- HYDROGEN FLUORIDE (HYDROFLUORIC ACID)
- HYDROGEN MONOFLUORIDE