

MATERIAL SAFETY DATA SHEET**HYDROFLUORIC ACID**

PRODUCT CODE NUMBER(S): 6525-1, 6525-8, 6527-2

PRODUCT IDENTIFICATION**Chemical Name and Synonyms:** *Hydrofluoric acid; Hydrogen fluoride; Fluorohydric acid***Chemical Family:** *Inorganic acid***Chemical Formula:** *HF***Product Use:** *Laboratory reagent***Manufacturer's Name and Address:***Caledon Laboratories Ltd.
40 Armstrong Avenue
Georgetown, Ontario L7G 4R9***Telephone No:** *(905) 877-0101***Fax No:** *(905) 877-6666***Emergency Telephone No:** *CANUTEC (613) 996-6666***HAZARDOUS INGREDIENTS OF MATERIALS**

<i>Ingredients</i>	<i>%</i>	<i>TLV Units</i>	<i>CAS No.</i>
<i>Hydrofluoric acid</i>	<i>48-51</i>	<i>3 ppm (as F)</i>	<i>7664-39-3</i>

PHYSICAL DATA**Physical State:** *Liquid***Odour and Appearance:** *Clear, colourless, fuming corrosive liquid, acrid odour***Odour Threshold (ppm):** *0.04 - 0.13 ppm. Not good warning properties; odour may not provide sufficient warning of lethal concentrations.***Vapour Pressure (mm Hg):** *14 kPa @ 20°C***Vapour Density (Air = 1):** *0.99 at 13.6°C***Evaporation Rate (Bu ac=1):** *<1***Boiling Point (°C):** *112°C (40%); 66°C (70%)***Freezing Point (°C):** *-36°C***pH:** *<1***Specific Gravity:** *~1.15***Coefficient of Water/Oil distribution:** *Not available***SHIPPING DESCRIPTION****UN:** *1790***T.D.G. Class:** *8, (6.1)***Pkg. Group:** *II***REACTIVITY DATA****Chemical Stability:** *Normally stable. Sensitive to heat and light.***Incompatibility with other substances:** *Reacts violently with strong bases. Will dissolve glass, ceramics, metals containing silica, natural gum rubber and leather. Contact with glass, concrete and other silicon-bearing materials yields silicon tetrafluoride gas. Contact with cyanides and sulphides produces highly toxic gases of hydrogen cyanide and hydrogen sulphide. Reacts vigorously with carbon-**ates, releasing carbon dioxide. Corrodes all metals, except lead and platinum, releasing flammable/explosive hydrogen gas. Reaction with arsenic trioxide can be extremely hot. Reacts vigorously with fluorine gas and may burst into flame. Reacts violently with n-phenylazopiperidine, potassium permanganate, bismuthic acid, fluorine, metal oxides and water-reactive materials. Mixtures of hydrofluoric acid and nitric acid with glycerol, lactic acid or propylene glycol will build up pressure in closed containers sufficient to shatter the container (30 min to 12 hrs)***Reactivity:** *Do not store in glass. Avoid contact with metals and alkali metals. Avoid elevated temperatures, hot surfaces, all ignition sources, sparks, flames, all incompatible materials, generation of mist.***Hazardous Decomposition Products:** *Emits fumes of HF, hydrogen gas, other toxic compounds.***FIRE AND EXPLOSION DATA****Flammability:** *Non flammable, but releases flammable/explosive hydrogen gas in contact with metals or other substances.***Extinguishing Media:** *Use dry chemical powder. Use water as spray or fog, very carefully, to cool containers, but avoid direct contact with the chemical; it will cause violent splashing. Fight fire from upwind, from a safe distance. Firefighters must wear full-body encapsulating chemical resistant suit and full face-piece, positive-pressure self-contained breathing apparatus. Closed containers may explode in heat of fire; withdraw immediately in case of rising sound from venting device, or discolouration in container.***Flash Point (Method Used):** *Non flammable***Autoignition Temperature:** *Non flammable***Upper Flammable Limit (% by volume):** *Non flammable***Lower Flammable Limit (% by volume):** *Non flammable***Hazardous Combustion Products:** *Toxic vapours may be generated when heated. Flammable/explosive gases may be produced.***Sensitivity to Impact:** *None identified***Sensitivity to Static discharge:** *None but in some circumstances flammable/explosive gases may be generated which may be ignited by static discharge.***TOXICOLOGICAL PROPERTIES AND HEALTH DATA****Toxicological Data:****LC_{Lo}:** *(hum) 50 ppm/30 min***LC₅₀:** *(rat) 638 ppm/4 h; (mouse) 171 ppm/4h***Effects of Acute Exposure to Product:***Hydrofluoric acid is very toxic by any exposure route. Concentrations >7% are very toxic and corrosive; concentrations 1 - 7% are toxic and corrosive; concentrations <1% are harmful and very irritating. Exposure by any route of exposure can cause hypocalcemia (depletion of calcium in the body), which if not treated promptly can cause death.*

CODE: 6525-1, 6525-8, 6527-2

Inhaled: May be fatal if inhaled. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, causing burning sensation, coughing, wheezing, shortness of breath. Even weak concentrations of vapour cause irritation; high vapour concentrations cause severe burns to tissue, spasm of larynx and bronchi, and pulmonary edema, which can lead to death. Symptoms may be delayed for up to 24 hours.

In contact with skin: Both liquid and vapour can cause deep and excruciatingly painful burns. Burns from strong HF (50%) are felt immediately; weaker solutions (25-50%) may not be noticed for a few minutes; burns from solutions less than 1-20% may not be felt for several hours but will still cause severe burns. The acid regenerates itself and keeps penetrating the flesh, stopping only when reaction with calcium in the bones is complete. Serious skin splashes have caused death.

In contact with eyes: Both liquid and vapour are extremely destructive to eye tissue. Vapours can dissolve in the moisture in the eyes and cause burns. May cause severe damage with corneal scarring.

Ingested: May be fatal if even small amounts or dilute solutions are swallowed. Very destructive to tissue; causes severe burning, possible perforation of the gastrointestinal tract, and hypocalcemia.

Effects of Chronic Exposure to Product:

The major health hazards of hydrogen fluoride exposure are related to its corrosive properties during acute exposure. There is less risk associated with long-term effects. Fluoride tends to accumulate in the bones and excessive amounts will produce weakening and degeneration of the bone structure (osteosclerosis). There may also be development of fluorosis, with heart, nerve and intestinal problems. Fluorosis may be slowly and partially reversible. May cause liver and kidney damage and CNS depression.

Carcinogenicity: Not classifiable as a human carcinogen.

Teratogenicity: Inconclusive data from animal studies. No reports of effects on humans (RTECS No. MW7875000).

Reproductive Effects: Insufficient data.

Mutagenicity: Insufficient data.

Synergistic Products: Insufficient data.

PREVENTIVE MEASURES

Engineering Controls: Local, corrosion-proof, exhaust ventilation required with vapours collected and neutralized with appropriate scrubbers. Total enclosure is probably needed in most operations involving HF liquid.

Respiratory Protection: Up to 30 ppm: NIOSH-approved chemical cartridge respirator with cartridge to protect against hydrogen fluoride, powered air-purifying respirator with cartridge to protect against hydrogen fluoride, gas mask with canister to protect against hydrogen fluoride, supplied-air respirator, or full-facepiece self-contained breathing apparatus. For higher or unknown concentrations, as in fire or spill conditions, positive pressure full-facepiece self-contained breathing apparatus or positive pressure full-facepiece supplied-air respirator with an auxiliary positive pressure self-contained breathing apparatus.

Eye Protection: Full face shield and chemical safety goggles. Do not wear contact lenses when working with chemicals.

Skin Protection: Natural rubber or neoprene gauntlet gloves. Resistance can vary, and should be evaluated under conditions of use. Sleeve protectors, coveralls, boots, or

body shield as required to prevent **any contact** in the event of splashing. Protective clothing must be used specifically for hydrofluoric acid operations, must be clearly marked and differentiated from other protective clothing. Protective clothing must be regularly laundered, checked and maintained. Notify laundry personnel of hazard.

Other Personal Protective Equipment: Safety shower and eyewash fountain must be available and in working order in work area.

Leak and Spill Procedure: Evacuate area and restrict access to personnel wearing protective equipment and clothing sufficient to prevent **any inhalation** of mist or vapours and **any contact** with skin and eyes (See "Preventive Measures"). Eliminate all sources of ignition. Stop leak if it is safe to do so. Use water spray to reduce or divert vapours. Do not get water inside containers. Spray the air with 6M NH₄OH. Dike to contain and prevent entry into sewers, waterways, or confined areas. Spilled product will make floors and surfaces slippery; use caution. Cover with soda ash and slaked lime mixture 50-50. Mix and add to water to form slurry. Scoop up slurry and transfer into containers for disposal. Ventilate area thoroughly. Wash site thoroughly with soda ash solution.

For advice on handling large HF spills contact Transport Emergency Assistance Plan through CANUTEC (emergencies) at 613-996-6666, or Canadian Chemical Producers Association (non-emergencies) 613-237-6215.

Waste Disposal: Follow all federal, provincial and local regulations for disposal.

Handling Procedures and Equipment: EXTREMELY CORROSIVE, TOXIC. Use extreme caution in all procedures involving HF. Only personnel thoroughly trained in its hazards should work with this substance. Do not work alone with this chemical. Wear appropriate protective clothing at all times. Avoid **all contact** with skin and eyes and **any inhalation** of vapours. When diluting, always add acid to water, not water to acid. Use the smallest amount possible for the purpose in a designated area with sufficient ventilation. When opening HF containers ensure that there are no sources of ignition present and that the work area is well-ventilated. Use spark resistant equipment and non-sparking tools. Do not leave open containers of HF unattended. Treat empty containers with caution as they contain hazardous residues.

Storage Requirements: Do not store in glass. Concentrations of 70% or less may be stored in polyethylene or PVC. Store in a cool, dry, well ventilated area, out of direct sunlight and away from all sources of ignition and incompatible materials. Keep tightly closed. Storage area should be constructed of corrosion-resistant materials and have raised sills, with trenching to safe area. Protect from damage, and inspect frequently for signs of damage or leaks.

FIRST AID MEASURES

Because of the insidious manner of penetration, a relatively mild or minor exposure can cause serious burns. Obtain medical attention immediately for all exposures. Rescuers should take care to ensure their own safety and to avoid contamination while caring for the victim.

Specific Measures:

Eyes: Wear protective gloves to avoid contact during first aid procedures. IMMEDIATELY flush eyes, with cool, gently running water, for at least twenty (20) minutes, holding eyelids open while flushing. Take care not to rinse

CODE: 6525-1, 6525-8, 6527-2

contaminated water into the unaffected eye. Get **MEDICAL ATTENTION IMMEDIATELY**. If medical help is not available within twenty (20) minutes, continue flushing until physician is available. Apply one or two drops of 0.5% pontocaine hydrochloride if it is available.

Skin: First aider must wear impervious gloves to avoid ANY contact with this chemical. Under running water remove contaminated clothing (including shoes, watches and rings) under running water. **IMMEDIATELY** flush the exposed area with large amounts of water for five (5) minutes, paying special attention to the skin under the nails. Flushing will remove surface HF, but not that which has penetrated to deeper tissue. After 5 minutes of flushing with water, immerse the affected skin in 0.13% benzalkonium chloride solution chilled with ice cubes or apply compresses soaked in iced solution. Change the compresses every 2-3 minutes. Continue until medical treatment is available. An alternative is to use 2.5% calcium gluconate gel, massaging gel into the site of contact. Apply gel every 15 minutes and massage continuously until medical treatment is available. If neither of these treatments is available, continue flushing with water until medical help is available. Immediately transport victim to an emergency care facility. Discard contaminated clothing, shoes and leather goods

Inhalation: **IMMEDIATELY REMOVE** to fresh air (caution must be used by rescuers to avoid exposure to the contaminating fumes, wear protective equipment and clothing and use the "buddy" system). **IMMEDIATELY OBTAIN MEDICAL ATTENTION**. Give oxygen for breathing difficulty. If breathing has stopped give artificial respiration. Avoid direct mouth to mouth contact. If breathing and pulse are absent give CPR. Stay with casualty until medical help arrives. Second rescuer should obtain oxygen equipment and ambulance.

Ingestion: **DO NOT INDUCE VOMITING. DO NOT GIVE BAKING SODA**. If casualty is alert and not convulsing, rinse mouth with water and give several vials of 10% calcium gluconate with 1 to 2 glasses of water to dilute the material. Milk, milk of magnesia or egg whites beaten with water may also be used. **IMMEDIATELY OBTAIN MEDICAL ATTENTION**. If spontaneous vomiting occurs have victim lean forward to reduce risk of aspiration of emesis, Rinse mouth and wash lips and skin thoroughly to avoid further burning of tissue. Avoid contact with emesis.

NOTES TO PHYSICIAN: For burns of large areas, (greater than 25 sq"), for ingestion and for significant inhalation exposure, severe systemic effects may occur. Monitor and correct for hypocalcemia, cardiac arrhythmias, hypomagnesemia and hyperkalemia. In some cases renal dialysis may be indicated. For certain burns, especially of the digits, use of intra-arterial calcium gluconate may be indicated. Treat as chemical pneumonia. Monitor for hypocalcemia. 2.5% calcium gluconate in normal saline by nebulizer or by ippb with 100% oxygen may decrease pulmonary damage. Bronchodilators may also be administered.

REFERENCES USED

CCINFO disc: Cheminfo
Budavari: The Merck Index, 12th ed., 1997
Royal Society of Chemistry: Chemical Safety Data Sheets, Vol. 3, 1990
Sax, Lewis: Hawley's Condensed Chemical Dictionary, 11th ed., 1987
Suppliers' Material Safety Data Sheets

ADDITIONAL INFORMATION

Date Issued: March 10, 1989

Revision: January 2011

MSDS: 6525-1, 6525-8, 6527-2

Proposed WHMIS Designation: D1A; D2A; E

Prepared by: Caledon Laboratories Ltd. (905) 877-0101
Caledon Laboratories Ltd. believes the information contained herein is reliable and accurate. Caledon makes no warranty with respect thereto and expressly disclaims all liability for reliance thereon. Such information is solely for your consideration, investigation, and verification.