MATERIAL SAFETY DATA SHEET

SUPPLIER: PRODUITS CHIMIQUE S ACP CHEMICALS INC

*** SECTION 1. CHEMICAL IDENTIFICATION ***

CCOHS CHEMICAL NAME : Hydrofluoric acid

SYNONYMS : * Fluorohydric acid
* HF
* Aqueous hydrogen fluoride
CAS REGISTRY NUMBER : 7664-39-3
PIN - (UN/NA NUMBER(S)) : 1790
RTECS NUMBER(S) : MW7875000
CHEMICAL FAMILY : Fluoride
MOLECULAR FORMULA : F-H
STRUCTURAL FORMULA : H-F

*** SECTION 2. DESCRIPTION ***

APPEARANCE AND ODOUR : Colourless liquid with a sharp irritating odour.
ODOUR THRESHOLD : 0.04 to 0.13 ppm
WARNING PROPERTIES :
Poor - Dilute solutions spilled on skin may not cause pain for several hours; odour may not warn of dangerous vapour concentrations.
COMPOSITION/PURITY :
Commercially available as 48% and 40% HF solutions in water.
USES AND OCCURRENCES :
Production of fluorine compounds, cleaning iron and steel castings, etching and frosting glass, the froth floatation of ores, and washing sand free of iron. Low concentrations of hydrogen fluoride are found in some commercial cleaning agents.

*** SECTION 3. HAZARDS IDENTIFICATION ***

** POTENTIAL HEALTH EFFECTS **

EFFECTS OF SHORT-TERM (ACUTE) EXPOSURE :
INHALATION :
Weak vapour concentrations of a few ppm can produce irritation of the nose, throat, eyes and respiratory tract. High vapour concentrations can cause severe burns to the lips, mouth, throat and lungs. Fluid accumulation in the lungs may occur and can lead to death.
SKIN CONTACT :
Hydrogen fluoride can cause deep and excruciatingly painful skin burns. Burns from strong HF (50-70%) are felt immediately, weaker solutions (25%) may take a few minutes to be noticed, solutions of 1-20% may not be felt for several hours. Serious skin splashes have caused death.
EYE CONTACT :
Hydrogen fluoride vapours can dissolve in the moisture on the surface of the eyes and cause irritation. Splashing into the eyes may cause severe and irreversible damage with possible corneal scarring.
INGESTION :
Severe burning and/or perforation of the digestive system which may lead to death.
EFFECTS OF LONG-TERM (CHRONIC) EXPOSURE :
The major health hazards of hydrogen fluoride exposure are related to its irritant and corrosive properties during short-term (acute) exposures.

There is less risk associated with its possible long-term exposure effects.
FLUOROSIS: Fluoride tends to accumulate in the bones and excessive amounts will produce weakening and degeneration of the bone structure (osteosclerosis). There may also be heart, nerve, and intestinal problems. The disease is called fluorosis. Fluorosis may be slowly and partially reversible.
CARCINOGENICITY :
No specific data is available. There is no evidence of an association between human cancer and exposure to inorganic fluorides.
TERATOGENICITY AND EMBRYOTOXICITY :
There is inconclusive data from animal studies suggesting possible reproductive effects. There are no reports of effects on humans.
REPRODUCTIVE TOXICITY :
Insufficient information
MUTAGENICITY :
Insufficient data
TOXICOLOGICALLY SYNERGISTIC MATERIALS :
Insufficient information
POTENTIAL FOR ACCUMULATION :
Fluoride is stored in the bone, but may be eliminated over a number of years.

*** SECTION 4. FIRST AID MEASURES ***

INHALATION :
Take proper precautions to ensure your own safety before attempting rescue, e.g. wear appropriate protective equipment, use the "buddy" system. Remove source of contamination or move victim to fresh air. If breathing has stopped, properly trained personnel should begin artificial respiration or cardiopulmonary resuscitation (CPR) immediately (avoid mouth to mouth contact). Oxygen is beneficial and should be administered by a person trained in its use, preferably on a physician's advice. Obtain medical attention immediately.
SKIN CONTACT :
Avoid contact with this chemical. Wear impervious protective gloves. Immediately, flush contaminated area with lukewarm, gently running water for at least 20 minutes. Under running water remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Then, soak the affected area with iced 0.2% water solution (1:500) hyamine 1622 (Rohm & Haas) or iced 0.13% Zephiran (Winthrop Laboratories). Where direct soaking is impossible, use compresses, changing them every 2 minutes. If sensitive tissues (e.g. lips or mouth) are burned, apply 2.5% calcium gluconate jelly. Obtain medical attention immediately.
EYE CONTACT :
Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 20 minutes, by the clock, holding the eyelid(s) open. Take care not to rinse contaminated water into the non-affected eye. If a physician is not immediately available, apply one or two drops of 0.5% pontocaine Hydrochloride (Winthrop Laboratories). Obtain medical attention immediately. NOTE: do not use any of the skin treatment preparations for burns to the eyes.
INGESTION :
Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing. Rinse mouth thoroughly with cold water. DO NOT INDUCE VOMITING. Have victim drink several vials of 10% calcium gluconate with 240 to 300 ml (8 to 10 ozs.) of water to dilute material in stomach. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. repeat administration of water. Obtain medical attention immediately.

FIRST AID COMMENTS :
Provide general supportive measures (comfort, warmth, rest). Consult a physician and/or the nearest Poison Control Centre for all exposures. Some recommendations in the above sections require that special first aid materials be available in areas where this chemical is handled. These recommendations may be considered medical acts in some jurisdictions and, therefore, should be reviewed with a physician and appropriate training and/or delegation obtained, as required. NOTE: Burns caused by weak hydrofluoric acid may go unnoticed for several hours. Therefore, first aid procedures must be followed if any contact is suspected.

NOTE TO PHYSICIANS :
Urine fluoride levels of greater than 4 mg/litre are considered unacceptable. levels below this are not considered to cause chronic bone defects such as fluorosis. Increases in bone density due to fluoride deposition can be detected by x-ray.

*** SECTION 5. FIRE FIGHTING MEASURES ***

FLASH POINT : Not flammable
LOWER FLAMMABLE (EXPLOSIVE) LIMIT (LFL/LEL) : Not applicable
UPPER FLAMMABLE (EXPLOSIVE) LIMIT (UFL/UEL) : Not applicable
AUTOIGNITION (IGNITION) TEMPERATURE : Not applicable
EXPLOSION DATA - SENSITIVITY TO MECHANICAL IMPACT : Not applicable
EXPLOSION DATA - SENSITIVITY TO STATIC CHARGE : Not applicable
EXTINGUISHING MEDIA :
Use extinguisher appropriate for the materials which are burning.
FIRE FIGHTING INSTRUCTIONS :
If water is used there may be a danger of violent HF splashing, and appropriate protective clothing should be worn. HF itself is not flammable, but when stored in metal containers flammable hydrogen gas may be produced.

** NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) HAZARD INDEX **

NFPA - HEALTH : 4 - Brief exposures could cause death or major irreversible injury.
NFPA - FLAMMABILITY : 0 - Not combustible
NFPA - REACTIVITY : 0 - Normally stable

*** SECTION 6. ACCIDENTAL RELEASE MEASURES ***

PRECAUTIONS :
Restrict access to area. Provide adequate ventilation, protective clothing, and respirators. For maximum protection an air-supplied acid suit should be
worn. Only trained personnel should participate in cleanup operations.
CLEAN-UP :
Eliminate all ignition sources. Avoid contact with spilled material. Stop leak if without risk. Use water spray to reduce vapours or divert vapour could drift. Do not get water inside containing vessels. Dike to prevent entry into waterways, sewers, basements or confined areas. Call for assistance on disposal. A number of safety supply companies market special hydrofluoric and absorbent cleanup kits. Advice on handling large HF spills can be obtained through the Transportation Emergency Assistance Plan (TEAP) of the Canadian Chemical Producers Association (CCPA). In emergencies contact TEAP through CANUTEC (Canadian Transport Emergency Centre) Collect(613) 996-6666. In non-emergency situations contact the CCPA at ((613) 237-6215.

*** SECTION 7. HANDLING AND STORAGE ***

HANDLING :
In some containers HF degrades to produce flammable hydrogen gas. When opening HF containers ensure that no sparks or sources of ignition are present and that the work area is well ventilated. Use extreme caution in all procedures involving HF. Open containers of HF should not be left unattended. When splash or inhalation exposure is possible, appropriate protective clothing must be worn.
STORAGE :
At concentrations of 70% or less, HF may be stored in plastic (polyethylene or PVC) vessels. Protect storage containers from heat or direct sunlight. The storage area should have adequate, independent, ventilation and have no sources of heat or sparks. Fans or other electrical equipment should be spark resistant.

*** SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION ***

NOTE : Exposure to this material can be controlled in many ways. The measures appropriate for a particular worksite depend on how this material is used and on the extent of exposure. This general information can be used to help develop specific control measures. Ensure that control systems are properly designed and maintained. Comply with occupational, environmental, fire, and other applicable regulations.

SAMPLING AND ANALYSIS :
Use appropriate instrumentation and sampling strategy (location, timing, duration, frequency and number of samples). Interpretation of the sampling results is related to these variables and the analytical method. NIOSH METHOD(S): 7903 - NIOSH Manual of Analytical Methods. 3rd edition. Vol. 1 (Acids, inorganic); 7902 - NIOSH Manual of Analytical Methods. 3rd edition. Vol. 1 (Fluorides, aerosols and gas)
ENGINEERING CONTROLS :
Total enclosure is probably needed in most operations involving HF liquid. Adequate general (dilution) and local exhaust ventilation is also required.
PERSONAL PROTECTIVE EQUIPMENT :
If engineering controls, work practices, and administrative controls are not effective in reducing the concentration of airborne contaminant below the recommended/legislated exposure limit, wear suitable, approved respiratory protection. Appropriate respirators should be available for use in emergencies. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance, inspection, cleaning, and evaluation. Refer to the Canadian Standards Association standard Z94.4-M1982, "Selection, Care, and Use of Respirators".
RESPIRATORY PROTECTION GUIDELINES :
NIOSH RECOMMENDATIONS FOR HYDROGEN FLUORIDE CONCENTRATIONS IN AIR (7): UP TO 30 ppm: SAR; or SCBA; or powered air-purifying respirator with cartridge(s)to protect against hydrogen fluoride; or chemical cartridge respirator with cartridge(s) to protect against hydrogen fluoride; or gas mask with canister to protect against hydrogen fluoride. EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA. ESCAPE: Gas mask with canister to protect against hydrogen fluoride; or escape-type SCBA. NOTE: The IDLH concentration for hydrogen fluoride is 30 ppm. NOTE: Substance reported to cause eye irritation or damage; may require eye protection. ABBREVIATIONS:

SAR = supplied-air respirator; SCBA = self-contained breathing apparatus. IDLH = Immediately Dangerous to Life or Health. NOTE: In these recommendations, the IDLH concentration is defined as the maximum concentration which would not cause any escape-impairing symptoms or irreversible health effects to a person
exposed for 30 minutes if the respirator failed. Recommendations apply only to NIOSH and MSHA (Mine Safety and Health Administration) approved respirators. Air-purifying respirators do not protect against oxygen-deficient atmospheres.
EYE/FACE PROTECTION :
Chemical safety goggles and a full face shield attached to a wide-brimmed hard hat whenever anhydrous HF may splash.
SKIN PROTECTION :
Protective clothing (gloves, coveralls, boots, etc.), as required. Sleeve protectors are recommended.
RESISTANCE OF MATERIALS FOR PROTECTIVE CLOTHING :
EXCELLENT: Chlorinated polyethylene, neoprene, nitrile rubber. GOOD: Natural rubber, Viton FAIR/POOR: Nitrile/polyvinyl chloride, polyethylene, polyurethane, polyvinyl alcohol NOTE: Resistance of specific materials may vary from product to product. Evaluate resistance under conditions of use. Maintain protective clothing carefully and inspect regularly.
EXPOSURE CONTROLS/PERSONAL PROTECTION COMMENTS :
Emergency showers must be available. It is preferable to have these showers hooked up to an alarm system so that other workers are made aware and can assist in any emergency. Protective clothing used specifically for hydrofluoric acid operations should be clearly marked, preferably with a distinctive color, to differentiate it from other protective clothing. All protective clothing must be regularly laundered, checked and maintained.

** EXPOSURE GUIDELINES **

* THRESHOLD LIMIT VALUES (TLVs) / AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH) / 1992-93 *

CEILING EXPOSURE LIMIT (TLV-C) : 3 ppm (2.5 mg/m3), as F*
TLV COMMENTS :
*TLV for hydrogen fluoride In many Canadian jurisdictions exposure limits are similar to the ACGIH TLVs. Since the manner in which exposure limits are established, interpreted, and implemented can vary, obtain detailed information from the appropriate government agency in each jurisdiction.

*** SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES ***

MOLECULAR WEIGHT : 20.01
CONVERSION FACTOR : 1 ppm = 0.82 mg/m3 (pure HF) at 25 deg C
MELTING POINT : Variable
BOILING POINT : variable; 112 deg C (40% HF); 66 deg C (70% HF)
RELATIVE DENSITY (SPECIFIC GRAVITY) : Variable, 1.0 - 1.3 (water = 1)
SOLUBILITY IN WATER : Soluble in all proportions.
SOLUBILITY IN OTHER LIQUIDS :
Soluble in alcohol; slightly soluble in ether, benzene, toluene, xylene and tetralin.
VAPOUR DENSITY : 0.99 @ 13.6 deg C (air=1)
VAPOUR PRESSURE : Variable; 18 pa (10% HF), 1653 Pa (50% HF) at 20 deg C
SATURATION VAPOUR CONCENTRATION : Variable; 180 ppm (10% HF); 16,300 ppm (50% HF) at 20 deg C.
EVAPORATION RATE : Variable
CRITICAL TEMPERATURE : Not applicable
COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT) :

Not available
OTHER PHYSICAL PROPERTIES : ACIDITY: Moderately strong acid; pKa = 3.19

*** SECTION 10. STABILITY AND REACTIVITY ***

STABILITY : Normally stable
HAZARDOUS POLYMERIZATION : Polymerization not considered hazardous.
INCOMPATIBILITY - MATERIALS TO AVOID :
BASES (e.g. caustic soda) - can react violently. The acid will dissolve glass, ceramics, metals containing silica, natural gum rubber and leather. FLUORINE GAS - reacts vigorously with a 50% hydrofluoric acid solution and may burst into flame. ARSENIC TRIOXIDE - reaction can be extremely hot.
CORROSIVITY TO METALS :
Can dissolve metals containing silica. Wax, lead and platinum are not corroded. Most other metals are corroded to some degree.

*** SECTION 11. TOXICOLOGICAL INFORMATION ***

LC50 (rat, 5 min): 4,970 ppm
LC50 (rat, 5 min): 18,200 ppm
LC50 (rat, 1 hour): 1,310 ppm
LC50 (rat, 1 hour): 1,108 ppm
LC50 (mice, 5 min): 6,247 ppm
LC50 (guinea pigs, 15 min): 4,320 ppm
LC50 (monkey, 1 hour): 1,774 ppm
Extremely corrosive on contact with any body tissue. Liver and kidney damage in rats and rabbits after acute exposure.

*** SECTION 12. ECOLOGICAL INFORMATION ***

NOTE : This section is under development.

*** SECTION 13. DISPOSAL CONSIDERATIONS ***

Review federal, provincial, and local regulations prior to disposal. Consult the chemical supplier or TEAP for advice on disposal.

*** SECTION 14. TRANSPORT INFORMATION ***

** TRANSPORTATION OF DANGEROUS GOODS (TDG) SHIPPING INFORMATION **

SHIPPING NAME AND DESCRIPTION: Hydrofluoric acid solution, more than 60 per cent hydrogen fluoride
PRODUCT IDENTIFICATION NUMBER (PIN): 1790
CLASSIFICATION: 8 - Corrosive substance; 6.1 - Poisonous substance; 9.2 - Environmentally hazardous substance
SPECIAL PROVISIONS: 46, 99, 109
IMO CLASSIFICATION: 8, 6.1
ICAO CLASSIFICATION: 8, 6.1
PACKING GROUP: I
SHIPPING NAME AND DESCRIPTION: Hydrofluoric acid solution, not more than 60 per cent hydrogen fluoride
PRODUCT IDENTIFICATION NUMBER (PIN): 1790
CLASSIFICATION: 8 - Corrosive substance; 6.1 - Poisonous substance; 9.2 - Environmentally hazardous substance
SPECIAL PROVISIONS: 46, 99, 109
IMO CLASSIFICATION: 8, 6.1
ICAO CLASSIFICATION: 8, 6.1
PACKING GROUP: II

*** SECTION 15. REGULATORY INFORMATION ***

** WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) **

PROPOSED WHMIS CLASSIFICATION :
Poisonous and infectious material - Immediate and serious effects - Very toxic
Poisonous and infectious material - Other effects - Very toxic
Corrosive material
WHMIS HEALTH EFFECTS :
Acute lethality - very toxic - immediate
Corrosive to animal skin
Chronic toxicity - very toxic - other
TDG class 6.1 - toxic - immediate
WHMIS INGREDIENT DISCLOSURE LIST :
Confirmed A; Meets criteria for disclosure at 1% or greater
DETAILED WHMIS CLASSIFICATION ACCORDING TO CRITERIA :
CLASS A - COMPRESSED GAS: Does not meet criteria
CLASS B - FLAMMABLE & COMBUSTIBLE MATERIAL: Does not meet criteria
CLASS C - OXIDIZING MATERIAL: Does not meet criteria
CLASS D - POISONOUS AND INFECTIOUS MATERIAL. DIVISION 1 - IMMEDIATE AND SERIOUS TOXIC EFFECTS: Meets criteria for "Very toxic material."
Acute Lethality: "Very toxic"; LC50 (rat) 1100 ppm (1-hour exposure)
POISONOUS AND INFECTIOUS MATERIAL. DIVISION 2 - OTHER TOXIC EFFECTS: Meets criteria for "Very toxic material." See detailed evaluation below.
CHRONIC HEALTH EFFECTS: "Very toxic"; low doses cause fluorosis.
CARCINOGENICITY: Does not meet criteria; not in reference lists
TERATOGENICITY AND EMBRYOTOXICITY: Insufficient information; evidence is limited and inconclusive.
REPRODUCTIVE EFFECTS: Insufficient information
MUTAGENICITY: Insufficient information; no studies reported.
RESPIRATORY SENSITIZATION: Does not meet criteria; not reported as human respiratory sensitizer.
SKIN SENSITIZATION: Does not meet criteria
SKIN IRRITATION: Does not meet criteria; corrosive materials are not also classified as irritants.
EYE IRRITATION: Does not meet criteria; corrosive materials are not also classified as irritants.
CLASS E - CORROSIVE MATERIAL: Classified as "Corrosive Material"; in TDG Class 8
CLASS F - DANGEROUSLY REACTIVE MATERIAL: Does not meet criteria

*** SECTION 16. OTHER INFORMATION ***

SELECTED BIBLIOGRAPHY :
(1) NIOSH criteria for a recommended standard for occupational exposure to hydrogen fluoride. Cincinnati, Ohio : U.S. Department of Health, Education, and Welfare, Public Health Service Centre for Disease Control, March 1976
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(3) Halton, D.M.; Baynes, C.H.; Dranitsaris, P. Toxicity levels to humans during acute exposure to hydrogen fluoride. A report prepared for the Atomic Energy Control Board, Ottawa, Ontario, Canada, INFO-0143, November 28, 1984
(4) Hydrofluoric acid exposure - recommended medical treatment. Morristown, N.J. : Allied Corporation, 1984
(5) Bertuna, S. Treatment of HF burns with hyamine : a case report.

Medical Bulletin (Exxon). Vol. 29 (Nov. 1969). p. 270-277
(6) Hydrogen fluoride : chemical hazard summary : no. 8 (C85-3E). Hamilton, Ontario : CCOHS, 1985
(7) NIOSH pocket guide to chemical hazards. NIOSH June 1990. p. 126-127
Information on chemicals reviewed in the CHEMINFO database is drawn from a number of publicly available sources. A list of general references used to compile CHEMINFO records is available in the main database menu.

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