

Note to Physician for Hydrogen fluoride (HF) and ammonium bifluoride exposure:

General: For burns of moderate areas, (greater than 8 square inches), ingestion and significant inhalation exposure, severe systemic effects may occur, and admission to a critical care unit should be considered. Monitor and correct for hypocalcemia, cardiac arrhythmias, hypomagnesemia and hyperkalemia. In some cases renal dialysis may be indicated. Inhalation: 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. Skin: For deep skin burns or contact with concentrated HF (over 50%) solution, consider infiltration about the affected area with 5% calcium gluconate [equal parts of 10% calcium gluconate and sterile saline for injection]. Burns beneath the nail may require splitting the nail and application of calcium gluconate to the exposed nail bed. For certain burns, especially of the digits, use of intra-arterial calcium gluconate may be indicated.

Eyes: Irrigation may be facilitated by use of Morgan lens or similar ocular irrigator, using 1% aqueous calcium gluconate solution [50ml of calcium gluconate 10% in 500 ml normal saline].

AN ALTERNATIVE FIRST AID PROCEDURE: The effect of HF, i.e. onset of pain, particularly in dilute solutions, may not be felt for up to 24 hours. It is important, therefore, that persons using HF have immediate access to an effective antidote even when they are away from their work place in order that first aid treatment can be commenced immediately. We recommend that any person in contact with HF should carry, or have access to a tube of HF Antidote Gel at all times; ideally with one tube at the work place, one on the person and one at home.

It is imperative that any person who has been contaminated by HF should seek medical advice when the treatment by HF Antidote Gel has been applied.

SECTION 5 — FIRE FIGHTING MEASURES

Fire hazards/conditions of flammability: Not flammable.

Flash point (Method): Not applicable. °C (°F)

Lower flammable limit (% by volume): n/ap

Upper flammable limit (% by volume): n/ap

Explosion data: *Sensitivity to mechanical impact:* Not sensitive. *Sensitivity to static discharge:* Not sensitive.

Oxidizing properties: None.

Auto-ignition temperature: None.

Suitable extinguishing media: As appropriate for burning of surrounding products.

Special fire-fighting procedures/equipment: n/ap

Hazardous combustion products: n/ap

SECTION 6 — ACCIDENTAL RELEASE MEASURES
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Personal precautions: Wear adequate personal protective equipment.

Environmental precautions: No special precautions required.

Spill response/Cleanup: Recover and reuse as much of the product as possible. Restrict access to area until completion of clean up. Ensure trained personnel conduct clean up. Do not touch spilled material.

Prohibited materials: None known.

SECTION 7 — HANDLING AND STORAGE

Safe handling procedures: Product is corrosive. Avoid contact with skin, eyes and clothing. Wear proper protective equipment, including rubber gloves.

Storage requirements: Store in a cool, dry area. Keep away from incompatible materials, (see Sect. 10)

Special packaging materials: Plastic or other corrosion resistant containers. Do not use glass containers!

Hydrogen fluoride attacks glass and other silicon containing compounds. Reacts with silica to produce silicon tetrafluoride, a hazardous colorless gas

SECTION 8 — EXPOSURE CONTROLS AND PERSONAL PROTECTION
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Ventilation and engineering controls: A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the

contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Respiratory protection: If the HF exposure limit is exceeded, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air purifying respirators do not protect workers in oxygen-deficient atmospheres. Since the IDLH is low (30 ppm), the above cartridge system is not specifically approved for HF. (3M Respirator Selection Guide).

Protective gloves/Skin protection: Wear protective clothing, including boots or safety shoes with polyvinyl chloride (PVC) or neoprene. Wear coveralls with long sleeves, gauntlets and gloves of PVC or neoprene. A high degree of protection is obtained with an air-inflated suit with mask and safety belt. Use protection suitable for conditions.

Eye protection: Use chemical goggles and/or a full face shield.

Other protective equipment: As required by workplace standards.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Physical form, color and odor: Clear transparent Liquid.

Odor threshold: n/av

pH: 4.88

Boiling point: n/av

Melting/freezing point: n/av

Vapour pressure: n/av

Solubility in water: Very soluble.

Coefficient of oil/water distribution: Essentially zero.

Specific gravity or relative density (water = 1): 1.02

Vapour density: n/av

Volatile organic compounds (VOC's): n/ap

Evaporation rate: n/ap **Percent Volatile by Weight:** n/av

SECTION 10 — REACTIVITY AND STABILITY DATA

Stability and reactivity: Normally stable.

Conditions to avoid: Unintentional contact with water and moisture. Keep containers tightly closed, when not in use.

Materials to avoid: Strong bases, reactive metals. When diluting DO NOT add water to the acid. Add acid to water. Hydrogen fluoride is incompatible with arsenic trioxide, phosphorus pentoxide, ammonia, calcium oxide, sodium hydroxide, sulfuric acid, vinyl acetate, ethylenediamine, acetic anhydride, alkalis, organic materials, most common metals, rubber, leather, water, strong bases, carbonates, sulfides, cyanides, oxides of silicon, especially glass, concrete, silica, fluorine. Will also react with steam or water to produce toxic fumes.

Hazardous decomposition products: Toxic chlorine and fluorine fumes.

SECTION 11 — TOXICOLOGICAL INFORMATION

LD₅₀: Not established for this product. See Section 2 for values for ingredients.

LC₅₀: Not established for this product. See Section 2 for values for ingredients.

Exposure limits: ACGIH-TLV Hydrogen fluoride: -OSHA Permissible Exposure Limit (PEL): 3 ppm (TWA) ACGIH Threshold Limit Value (TLV): 3 ppm Ceiling as F 2 ppm (Ceiling) for Hydrogen chloride.

Carcinogenicity: None of the ingredients is listed by IARC, ACGIH, NTP, and OSHA as carcinogen.

Teratogenicity, mutagenicity, other reproductive effects: Hydrogen fluoride is investigated as mutagen and reproductive effector.

Sensitization to material: Not reported.

Conditions aggravated by exposure: Skin conditions.

Synergistic materials: None known.

Chronic Exposure: Intake of more than 6 mg of fluorine per day may result in fluorosis, bone and joint damage. Hypocalcemia and hypomagnesemia can occur from absorption of fluoride ion into blood stream.

Aggravation of Pre-existing Conditions: Persons with pre-existing skin disorders, eye problems, or impaired kidney or respiratory function may be more susceptible to the effects of HF.

SECTION 12 — ECOLOGICAL INFORMATION

Environmental effects: Product is corrosive. Low pH (acidity) of material is harmful to aquatic life.

Contains Hydrogen fluoride:

Environmental Fate: If the pH is 6.5, soil can bind fluorides tightly. High calcium content will immobilize fluorides, which can be damaging to plants when present in acid soils.

Environmental Toxicity: This material is expected to be slightly toxic to aquatic life. 60 ppm*/Fish/Lethal/Fresh Water
*=time period not specified. 300ppm/48hr./Shrimp/LC50/Aerated Saltwater – extremely harmful.

SECTION 13 — WASTE DISPOSAL

Handling for disposal: Reuse if possible.

Methods of disposal: Follow local, provincial, state and federal regulations.

SECTION 14 — TRANSPORTATION INFORMATION

Shipping description: TDG – Corrosive liquid, Acidic, Inorganic, N.O.S. (Ammonium bifluoride), Class 8, UN3264, PG II

Please note: This shipping description is of a general nature only. It does not consider package sizes, modes of transport and other specific circumstances. Appropriate regulations should be referenced, and handling for transportation of dangerous goods/hazardous materials should be performed by trained personnel only.

SECTION 15 — REGULATORY INFORMATION

WHMIS information: D1A, E

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and this MSDS contains all the information required by the CPR.

SECTION 16 — OTHER INFORMATION

Prepared by: Armstrong Manufacturing Inc.

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References:

1. ACGIH, Threshold Limit Values and Biological Exposure Indices for 2003.
2. International Agency for Research on Cancer Monographs, Supplement 7, 1988.
3. Canadian Centre for Occupational Health and Safety. CHEMINFO database.
4. Material Safety Data Sheets from raw materials suppliers.
5. N. Irving Sax. Dangerous Properties of Industrial Materials, Seventh Edition.

n/ap Not applicable

n/av Not available

MV/mt