

# Material Safety Data Sheet

## HYDROFLUORIC ACID, ANHYDROUS

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME:** Hydrofluoric Acid, Anhydrous

**OTHER/GENERIC NAMES:** HF, Anhydrous HF, AHF, Hydrogen Fluoride, HF Acid

**PRODUCT USE:** Chemical Derivatives, Alkylation Catalyst

**MANUFACTURER:** Honeywell International  
Industrial Products  
101 Columbia Road  
Box 1053  
Morristown, New Jersey 07962-1053

**FOR MORE INFORMATION CALL:**

(Monday-Friday, 8:00am-4:30pm EST)  
HF Technical Service Department  
800-622-5002  
Or visit the Honeywell HF website:  
<http://www.HFacid.com>

**IN CASE OF EMERGENCY CALL:**

(24 Hours/Day, 7 Days/Week)  
800-707-4555 or 602-365-4980  
For Transportation Emergencies  
800-424-9300 (CHEMTREC for US)  
613-996-6666 (CANUTEC for Canada)

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

<u>INGREDIENT NAME</u>	<u>CAS NUMBER</u>	<u>WEIGHT %</u>
Hydrofluoric Acid	7664-39-3	100

Trace impurities and additional material names not listed above may also appear in the Regulatory Information Section 15 towards the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

### 3. HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW:** Clear, colorless, corrosive fuming liquid with an extremely acid odor. Forms dense white vapor clouds if released. Both liquid and vapor can cause severe burns to all parts of the body. Specialized medical treatment is required for all exposures.

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### POTENTIAL HEALTH HAZARDS

**SKIN:** Both liquid and vapor can cause severe burns, which may not be immediately painful or visible. HF will penetrate skin and attack underlying tissues. Large or multiple burns totaling over 25 square inches of body surface area may also cause hypocalcemia (depletion of calcium in the body) and other toxic effects which may be fatal. Prolonged contact with very dilute HF solutions will cause burns

**EYES:** Both liquid and vapor can cause irritation or corneal burns.

**INHALATION:** **Mild exposure:** Can irritate nose, throat and respiratory system. Onset of symptoms may be delayed for several hours.

**Severe exposure:** Can cause nose and throat burns, lung inflammation and pulmonary edema (fluid in the lungs). Also results in other toxic effects including hypocalcemia (depletion of calcium in the body) which if not properly treated can result in death.

**INGESTION:** Can cause severe mouth, throat and stomach burns and may be fatal if swallowed. Even with small amounts of dilute solutions, profound and possibly fatal hypocalcemia (depletion of calcium in body) and systematic toxicity is likely to occur unless medical treatment is promptly initiated.

**DELAYED EFFECTS:** The effects of contact with dilute solutions of hydrofluoric acid or its vapors may be delayed. The potential delay in clinical signs or symptoms for dilute solutions is given below. Symptoms might include pain, redness of the skin and possible tissue destruction.

<u>HF Concentration</u>	<u>Delay in Symptoms</u>
>50%	Immediately Apparent
20%-50%	1-8 hours
0%-20%	Up to 24 hours

Can also cause bone and joint changes in humans (Fluorosis).

Carcinogenicity: Hydrofluoric Acid is not listed by NTP, IARC, OSHA, US EPA, ACGIH, or Health Canada as a carcinogen.

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### 4. FIRST AID MEASURES

**SKIN:** Remove the victim from the contaminated area and immediately wash the burned area with plenty of water for a minimum of 15 minutes. Limit washing to 5 minutes if treatment specific for HF exposure is available. Remove all contaminated clothing while washing continuously. After thorough washing for at least 5 minutes, the burned area should be immersed in a solution of 0.13% iced aqueous Zephiran® Chloride until pain is relieved. As an alternate first aid treatment, 2.5% calcium gluconate gel may be continuously massaged into the burn area until the pain is relieved. For larger burns or burns treated with calcium gluconate gel (in which pain is present longer than 30 minutes), a physician should inject 5% aqueous calcium gluconate beneath, around and in the burned area. Use of local anesthetics is not recommended, as reduction in pain is an indicator of effectiveness of treatment.

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**EYES:** Irrigate eyes for at least 15 minutes with copious quantities of water, keeping eyelids apart and away from eyeballs during irrigation. Get competent medical attention immediately, preferably an eye specialist. If a physician is not immediately available, apply one or two drops of 0.5% tetracaine hydrochloride solution, or other aqueous, topical ophthalmic anesthetic and continue irrigation. Do not use the solution described for skin treatment. Use no other medications unless instructed to do so by a physician. Rubbing of the eyes is to be avoided. Irrigate with 1% calcium gluconate in normal saline for 1 to 2 hours to prevent or lessen corneal damage.

**INHALATION:** Move to fresh air. Keep the victim lying down, quiet and warm. Get competent medical attention immediately. If breathing has stopped, start artificial respiration at once. An authorized person should administer oxygen to a victim who is having difficulty breathing, until the victim is able to breathe easily by himself. Calcium Gluconate, 2.5% in normal saline may be given by nebulizer with oxygen. Do not give stimulants unless instructed to do so by a physician. Victim should be examined by a physician and held under observation for at least 24 hours.

**INGESTION:** Drink large amounts of water to dilute. Do not induce vomiting. Several glasses of milk or several ounces of milk of magnesia may be given for their soothing effect. Take victim to a doctor.

**ADVICE TO PHYSICIAN:** For large skin area burns (totaling greater than 25 square inches), 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 hemodialysis may be indicated. For certain burns, especially of the digits, use of intra-arterial calcium gluconate may be indicated. For inhalation exposures, 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. A booklet titled "Recommended Medical Treatment for Hydrofluoric Acid Exposure" is available from the Honeywell HF website: <http://www.HFacid.com>

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## **5. FIRE FIGHTING MEASURES**

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### FLAMMABLE PROPERTIES

<b>FLASH POINT:</b>	Not flammable
<b>FLASH POINT METHOD:</b>	Closed cup
<b>AUTOIGNITION TEMPERATURE:</b>	Not applicable
<b>UPPER FLAME LIMIT (volume % in air):</b>	Not applicable
<b>LOWER FLAME LIMIT (volume % in air):</b>	Not applicable
<b>FLAME PROPAGATION RATE (solids):</b>	Not applicable
<b>OSHA FLAMMABILITY CLASS:</b>	Not applicable

### **EXTINGUISHING MEDIA:**

Use water or suitable agent for fires adjacent to non-leaking tanks or containers of HF. Do not use solid water streams near ruptured tanks or spills of HF. Acid reacts with water and can splatter acid onto personnel.

### **UNUSUAL FIRE AND EXPLOSION HAZARDS:**

Reaction with certain metals generates flammable and potentially explosive hydrogen gas. Considerable heat is evolved when contacted with many substances. Heat increases pressure and may explode container. Will react violently with water.

### **SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:**

Wear self-contained breathing apparatus approved by NIOSH and full chemical protective clothing. Use water spray to keep containers cool.

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### **6. ACCIDENTAL RELEASE MEASURES**

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**IN CASE OF SPILL OR OTHER RELEASE:** (Always wear recommended personal protective equipment )

Good ventilation is necessary. Discharge will ordinarily be a vapor or a liquid that gives off fumes of HF gas. Those treating spills or repairing leaks must use full protective equipment. Take actions to minimize environmental impact. Try to contain spillage and avoid drainage to areas which cannot be treated. Rapid dilution of the spill with water to <50% will reduce the amount of fumes given off. Carefully neutralize the dilute liquid with lime slurry, soda ash, limestone, caustic soda or other alkaline material. (See Sections 10 and 13 for more information.)

**Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.**

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### **7. HANDLING AND STORAGE**

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**NORMAL HANDLING:** (Always wear recommended personal protective equipment.)

Do not breathe vapor or mist. Use only with adequate ventilation. Avoid all contact with skin, eyes and clothing, even dilute solutions. Do not add water to acid.

**STORAGE RECOMMENDATIONS:**

Store in approved containers only. Store in cool, well-ventilated area. Flammable hydrogen gas can be generated in metal storage containers. Diking of storage tanks is recommended. Carbon steel in HF service may be subject to indiscriminate hydrogen blistering and possibly other hydrogen related damage and should, therefore, be routinely inspected and repaired if needed. Non-destructive tank thickness testing (NDT), and other techniques should be utilized for periodic checks of tank wall thickness and to assure equipment integrity.

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

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**ENGINEERING CONTROLS:**

Sufficient to reduce vapor and acid mists below permissible TLV levels. Packaging and unloading areas and open processing equipment may require mechanical exhaust systems.

#### **PERSONAL PROTECTIVE EQUIPMENT**

**SKIN PROTECTION:**

For routine product use, wear hydrofluoric acid-resistant jacket, trousers, boots and gauntlet gloves. For increased protection, use air-supplied totally encapsulating HF resistant protective suit.

**EYE PROTECTION:**

As a minimum, wear hard hat, chemical safety goggles (plastic lenses), and full face plastic shield. For increased protection, use air supplied hydrofluoric acid resistant hood.

**RESPIRATORY PROTECTION:**

Where required, use a respirator approved by NIOSH for HF gas or mists, as applicable. Some exposures may require a NIOSH-approved, self-contained breathing apparatus or air supplied respirator.

**ADDITIONAL RECOMMENDATIONS:**

Eyewash and quick-drench shower facilities, protected from freezing, should be available where HF is stored or handled.

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### EXPOSURE GUIDELINES (Guidelines exist for the following ingredients)

<u>INGREDIENT NAME</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>OTHER LIMITS</u>
Hydrogen Fluoride/Hydrofluoric acid	3 ppm – CEILING	3 ppm (TWA)	3 mg(F)/g creatinine in urine pre-shift 10 mg(F)/g creatinine post-shift***

<u>OSHA STEL</u> 6 ppm (15 min.)	<u>NIOSH IDLH</u> 30 ppm (30 mins)
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#### AIHA Emergency Response Planning Guideline

<u>ERPG-1</u>	<u>ERPG-2</u>	<u>ERPG-3</u>
2 ppm (60 mins)	20 ppm (60 mins)	50 ppm (60 mins)
2 ppm (10 mins)	50 ppm(10 mins)	170 ppm (10 mins)

\*\*\* = Biological Exposure Index

**OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:** None

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>APPEARANCE:</b>	Colorless liquid, fumes in air
<b>PHYSICAL STATE:</b>	Liquid
<b>MOLECULAR WEIGHT:</b>	20.01
<b>CHEMICAL FORMULA:</b>	HF
<b>ODOR:</b>	Sharp pungent odor
<b>SPECIFIC GRAVITY:</b>	(Water = 1.0) 0.97 at 70°F (21.1°C)
<b>SOLUBILITY IN WATER:</b>	(Weight %) 100% by weight
<b>pH:</b>	Not applicable
<b>BOILING POINT:</b>	67.2°F (19.55°C)
<b>MELTING POINT:</b>	-118°F (-84°C)
<b>VAPOR PRESSURE:</b>	776 mm Hg at 70°F (21.1°C)
<b>VAPOR DENSITY (Air = 1.0):</b>	2.21 at 70°F, (21.1°C), 1.76 at 80°F (26.7°C)
<b>EVAPORATION RATE:</b>	Not applicable
<b>% VOLATILES:</b>	100%
<b>IONIZATION POTENTIAL:</b>	15.98 eV
<b>FLASH POINT:</b>	Not flammable.
	(Flash point method and additional flammability data are found in section 5.)

## 10. STABILITY AND REACTIVITY

**NORMALLY STABLE? (CONDITIONS TO AVOID):** Stable under normal conditions.

### **INCOMPATIBILITIES:**

Glass, concrete and other silicon bearing materials: yield silicon tetrafluoride gas. Pressure buildup from this process has been known to rupture glass containers. Carbonates, sulfides and cyanides: yield toxic gases: carbon dioxide, hydrogen sulfide and hydrogen cyanide. Alkalis, some oxides: cause strong violent exothermic reactions. Common metals: yield hydrogen gas, a fire and explosive reactive hazard. Corrosive to many materials including leather, natural rubber and many organics. Considerable heat is evolved and a violent reaction can occur when water is added to HF.

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**HAZARDOUS DECOMPOSITION PRODUCTS:** Not applicable; boils away unchanged.

**HAZARDOUS POLYMERIZATION:** Will not occur.

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### **11. TOXICOLOGICAL INFORMATION**

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**IMMEDIATE (ACUTE) EFFECTS:**

Inhalation: LC <sub>50</sub> (Rat)	=	5,100 ppm/5 min
LC <sub>50</sub> (Rat)	=	1,300 ppm/60 min
LC <sub>50</sub> (Mouse)	=	6,247 ppm/5 min

Skin: 2% solution of HF was corrosive to rabbit skin with 1 hour exposure, but not with 1 minute exposure.

**DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:**

Prolonged exposure can cause bone and joint changes in humans. (Fluorosis – Increased bone density and mottling of teeth.)

**OTHER DATA:** None

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### **12. ECOLOGICAL INFORMATION**

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Aquatic toxicity: 60 ppm\*/fish/lethal/fresh water. (\*time period not specified).

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### **13. DISPOSAL CONSIDERATIONS**

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**RCRA**

**Is the unused product a RCRA hazardous waste if discarded?** Yes

**If yes, the RCRA ID number is:** U134 (hydrofluoric acid) and D002 (Corrosive)

**OTHER DISPOSAL CONSIDERATIONS:** As waste disposal methods may vary, contact the supplier for specific recommendations. Treat small amounts by adding to an excess of water and neutralize with a lime slurry, soda ash, limestone, caustic soda or other alkali. Add to water and neutralize cautiously as reaction is immediate and can be violent. Considerable amounts of harmful vapors may be released. Good ventilation is required. Dispose of residue (or slurry) by removal to an approved chemical waste landfill or by an approved waste contractor.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

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### 14. TRANSPORT INFORMATION

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#### PROPER DOT SHIPPING DESCRIPTION:

(FOR QUANTITIES WITH >100 LBS IN A SINGLE CONTAINER)

RQ Hydrogen Fluoride, Anhydrous, 8, UN1052, PG I, (6.1)

Poison Inhalation Hazard, Hazard Zone C

#### PLACARDS REQUIRED:

Primary – Class 8 – Corrosive

Subsidiary – Class 6 – Poison Inhalation Hazard

EMERGENCY RESPONSE GUIDEBOOK (2000 EDITION): Guide No. 125

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

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### 15. REGULATORY INFORMATION

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#### TOXIC SUBSTANCES CONTROL ACT (TSCA)

**TSCA INVENTORY STATUS:** Hydrofluoric Acid, Anhydrous is listed.

**OTHER TSCA ISSUES:** None

#### SARA TITLE III/CERCLA:

##### RQs and TPQs:

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

<u>INGREDIENT NAME</u>	<u>SARA/CERCLA RQ (lbs)</u>	<u>SARA EHS TPQ (lbs)</u>
Hydrogen Fluoride	100	100

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center (800-424-8802) and to your Local Emergency Planning Committee.

**SECTION 311 HAZARD CLASS:** Immediate. Delayed

**SARA 313 TOXIC CHEMICALS:**

The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

<u>INGREDIENT NAME</u>	<u>COMMENT</u>
Hydrogen Fluoride	None

#### STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

<u>INGREDIENT NAME</u>	<u>WEIGHT %</u>	<u>COMMENT</u>
No ingredients in this section		

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### **ADDITIONAL REGULATORY INFORMATION:**

Storage or in process use greater than the specified threshold quantity of 1000 lbs. is subject to OSHA 29 CFR Part 1910.119, Process Safety Management of Highly Hazardous Chemicals.

Stationary sources (fixed facilities) with more than the specified threshold quantity of 1000 lbs. of Hydrogen Fluoride/Hydrofluoric Acid (concentration 50% or greater) are subject to EPA 40 CFR Part 68, Section 112(r)7

Accidental Release Prevention Requirements: Risk Management Programs.

### **WHMIS CLASSIFICATION (CANADA):**

Class D, Division 1, Subdivision A and

Class E

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

### **FOREIGN INVENTORY STATUS:**

Canadian DSL (Domestic Substances List)

EINECS (European Inventory of Existing Chemical Substances) (EINECS #:231-634-8)

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## **16. OTHER INFORMATION**

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**CURRENT ISSUE DATE:** January, 2004

**PREVIOUS ISSUE DATE:** January, 2003

### **CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:**

Minor wording changes for clarification made in Sections 1,8,14,15,16

**OTHER INFORMATION:** National Fire Prevention Association (NFPA) Rating  
Health 4, Flammability 0, Reactivity 1, Special Instructions – None