

Material Safety Data Sheet

HYDROFLUORIC ACID, AQUEOUS (49%)

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Hydrofluoric Acid, Aqueous (49%)

OTHER/GENERIC NAMES: Aqueous HF, Hydrofluoric Acid Solution, 49% HF, Ultra High Purity HF, Electronic Grade HF, HF Acid

PRODUCT USE: Metal Pickling, Glass Etching, Chemical Derivatives, Semiconductor etching

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:
For Medical Emergencies (24 Hours/Day, 7 Days/Week)
800-498-5701
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	49
Water	7732-18-5	51

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 acrid odor. May produce white fumes if spilled. 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.

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 oils or greases unless instructed to do so by a physician. 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 burns of large skin areas (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>

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

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

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spray to keep containers cool.

6. ACCIDENTAL RELEASE MEASURES

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 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.

7. HANDLING AND STORAGE

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 contact with metals. Diking of storage tanks is recommended.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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 LIMIT</u>
Hydrofluoric acid	0.5 ppm TLV-TWA 2 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>	<u>NIOSH IDLH</u>
		6 ppm (15 min.)	30 ppm (30 mins)
<u>AIHA Emergency Response Planning Guideline</u>			
	<u>ERPG-1</u>	<u>ERPG-2</u>	<u>ERPG-3</u>
	2 ppm (60 mins) 2 ppm (10 mins)	20 ppm (60 mins) 50 ppm(10 mins)	50 ppm (60 mins) 170 ppm (10 mins)

Acute Exposure Guideline Levels (AEGL's)

	<u>10 mins</u>	<u>30 mins</u>	<u>60 mins</u>	<u>4 hours</u>	<u>8 hours</u>
<u>AEGL 1 (Non-Disabling)</u>	1.0 ppm				
<u>AEGL 2 (Disabling)</u>	95 ppm	34 ppm	24 ppm	12 ppm	12 ppm
<u>AEGL 3 (Lethality)</u>	170 ppm	62 ppm	44 ppm	22 ppm	22 ppm

*** = Biological Exposure Index

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS: None

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Colorless liquid, fumes in air
PHYSICAL STATE:	Liquid
MOLECULAR WEIGHT:	20.01 (HF)
CHEMICAL FORMULA:	49% HF in water by weight
ODOR:	Sharp pungent odor
SPECIFIC GRAVITY;	(Water = 1.0) 1.175 at 60°F, (15.5°C), 1.16 at 80°F (26.7°C)
SOLUBILITY IN WATER;	(Weight %) 100% by weight
pH:	3.4
BOILING POINT:	224°F, (106.7°C)
MELTING POINT:	-34°F, (-36.7°C)
VAPOR PRESSURE:	27 mm Hg at 70°F, (21.1°C)
VAPOR DENSITY (Air = 1.0):	2.21 at 70°F,(21.1°C) 1.76 at 80°F, (26.7°C)
EVAPORATION RATE:	Not applicable
% VOLATILES:	100%
IONIZATION POTENTIAL:	15.98 eV
FLASH POINT:	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

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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 natural leather, rubber and many organics. Considerable heat is evolved and a violent reaction can occur when water is added to HF.

HAZARDOUS DECOMPOSITION PRODUCTS:

Not applicable; boils away as hydrogen fluoride gas and water.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

Inhalation: LC ₅₀ (Rat)	=	5,100 ppm/5 min
LC ₅₀ (Rat)	=	1,300 ppm/60 min
LC ₅₀ (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

12. ECOLOGICAL INFORMATION

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

13. DISPOSAL CONSIDERATIONS

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 /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

PROPER DOT SHIPPING DESCRIPTION:

(FOR QUANTITIES OF >204 LBS "AS IS" IN A SINGLE CONTAINER)

RQ Hydrofluoric Acid, *with not more than 60% strength*, 8, (6.1), UN1790, PG II

PLACARDS REQUIRED:

Primary – Class 8 – Corrosive

Subsidiary – Class 6 – Poison (optional)

EMERGENCY RESPONSE GUIDEBOOK (2004 EDITION): Guide No. 157

For additional information on shipping regulations affecting this material, call Honeywell at 800-622-5002

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Hydrofluoric Acid, Aqueous 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>
Hydrofluoric Acid	100 as 100% HF (Equal to 204 lbs. as 49% HF)	100 as 100% HF

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>
Hydrofluoric Acid	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: Hydrofluoric acid is on the Commerce Control List: Export Control classification Number (ECCN) 1C350, Chemicals that may be used as Precursors for Toxic Chemical Agents (15 CFR 774, Supp. No.1). Licenses are required to export to certain countries.

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)

16. OTHER INFORMATION

CURRENT ISSUE DATE: December, 2005

PREVIOUS ISSUE DATE: January, 2005

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

Section 8: Updated ACGIH TLV-TWA

Section 14: Section 14: Correction in PSN sequence

Section 15: Commerce Control List information added

OTHER INFORMATION: National Fire Prevention Association (NFPA) Rating

Health 4, Flammability 0, Reactivity 1, Special Instruction – None