

Material Safety Data Sheet

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: 100:1 BOE
OTHER/GENERIC NAMES: 100:1 BOE
PRODUCT USE: Semiconductor Manufacturing

MANUFACTURER: Honeywell/GEM3
101 Columbia Road
Morristown, New Jersey 07962-1053

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-5:00pm)
1-800-279-9998

IN CASE OF EMERGENCY CALL:
(24 Hours/Day, 7 Days/Week)
1-800-707-4555 or Chemtrec 1-800-424-9300
International: 1-703-527-3887

2. COMPOSITION/INFORMATION ON INGREDIENTS

<u>INGREDIENT NAME</u>	<u>CAS NUMBER</u>	<u>WEIGHT %</u>
Ammonium Fluoride	12125-01-8	< 40%
Hydrofluoric Acid	7664-39-3	< 02%

Trace impurities and additional material names not listed above may also appear in Section 15 toward 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:

Extremely hazardous liquid and vapor. Causes severe burns that may not be immediately painful or visible. May be fatal if inhaled or swallowed. May cause damage to bones.

POTENTIAL HEALTH HAZARDS

SKIN: Liquid causes severe irritation and burns of eyes and skin

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

INHALATION: May cause irritation to mucous membranes. Inhalation causes acute systematic poisoning which must receive immediate medical attention.

INGESTION: Ingestion causes vomiting and severe burns of mouth and stomach.

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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 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)

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

<u>INGREDIENT NAME</u>	<u>NTP STATUS</u>	<u>IARC STATUS</u>	<u>OSHA LIST</u>
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No ingredients listed in this section.

4. FIRST AID MEASURES

SKIN: Do not scrub. 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 a reduction in pain is an indicator of effectiveness of treatment.

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 the victim to a doctor.

ADVICE TO PHYSICIAN: Treat symptomatically.

For Hydrofluoric Acid:

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>

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5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

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

EXTINGUISHING MEDIA:

Use water or suitable agent for fires adjacent to non-leaking tanks or containers of HF. This substance is not combustible. Use water fog or carbon dioxide. 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:

The product is not flammable. Emits toxic fumes.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Use spray to cool exposed containers. Block sewers in the path of spreading spill to prevent entry. Remove containers of this material to cool areas. Prevent the boiling of this formulation. Wear self-contained breathing apparatus approved by NIOSH and full chemical protective clothing. Use water 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 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.

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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Material must be handled or transferred in an approved fume hood or with equivalent ventilation 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 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 hardhat, 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.

EXPOSURE GUIDELINES

<u>INGREDIENT NAME</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>OTHER LIMIT</u>
Hydrofluoric Acid	3ppm-Ceiling	3ppm (TWA)	3mg(F)/g creatinine in urine pre-shift 10mg(F)/g creatinine post-shift***
		<u>OSHA STEL</u>	<u>IDLH</u>
		6ppm (15min.)	30ppm
Ammonium Fluoride	2.5 mg/m ³	None	
	<u>AIHA Emergency Response Planning Guideline</u>		
	<u>ERPG-1</u>	<u>ERPG-2</u>	<u>ERPG-3</u>
	2ppm (60mins)	20ppm (60mins)	50ppm (60mins)
	2ppm (10mins)	20ppm (10mins)	50ppm (10mins)

- * = Limit established by Honeywell International, Inc.
- ** = Workplace Environmental Exposure Level (AIHA).
- *** = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS: None

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless liquid
PHYSICAL STATE: Liquid
MOLECULAR WEIGHT: Mixture

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CHEMICAL FORMULA:	NH ₄ F + HF
ODOR:	Slight pungent odor
SPECIFIC GRAVITY (water = 1.0):	1.108
SOLUBILITY IN WATER (weight %):	Miscible
pH:	~4
BOILING POINT:	Unknown
MELTING POINT:	N/A
VAPOR PRESSURE:	N/A
VAPOR DENSITY (air = 1.0):	N/A
EVAPORATION RATE:	N/A
% VOLATILES:	99+%
FLASH POINT:	N/A

(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID): Yes;

INCOMPATIBILITIES:

Chemical is very reactive. Store away from other chemicals

HAZARDOUS DECOMPOSITION PRODUCTS:

Releases highly corrosive forms of fluorides when heated; oxides of C

HAZARDOUS POLYMERIZATION:

Does not occur

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

Hydrofluoric Acid:

ihl-hmn LCLo: 50 ppm/30M

ihl-rat LC50: 1300 ppm/60M

ihl-man TCLo: 100 mg/m³/IM

Ammonium Fluoride:

oral-rat LD50:200 mg/kg

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: Tests on laboratory animals indicate HF in concentrate form may produce adverse mutagenic and reproductive effects. Cited in Registry of Toxic Effects of Substances (RTECS).

12. ECOLOGICAL INFORMATION

N/A

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13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Yes (Hydrofluoric Acid)

If yes, the RCRA ID number is: U134 D002

OTHER DISPOSAL CONSIDERATIONS: Observe all Federal, State, and Local Environmental regulations.

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.

14. TRANSPORT INFORMATION

US DOT PROPER SHIPPING NAME: Corrosive liquid, Toxic, N.O.S. (Ammonium Fluoride, Hydrofluoric Acid)

US DOT HAZARD CLASS: 8, 6.1

US DOT ID NUMBER: UN 2922

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

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Hydrofluoric Acid, Aqueous is listed

OTHER TSCA ISSUES: None

SARA TITLE III/CERCLA

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

<u>INGREDIENT NAME</u>	<u>SARA/CERCLA RQ (lb)</u>	<u>SARA EHS TPQ (lb)</u>
Hydrofluoric Acid	250 lb (as 100:1 BOE)	
Ammonium Fluoride	5,000 lb (as 100:1 BOE)	

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:

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	De Minimis Concentration 1.0

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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>
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No ingredients listed in this section.

ADDITIONAL REGULATORY INFORMATION: None

WHMIS CLASSIFICATION (CANADA): N/A

FOREIGN INVENTORY STATUS: N/A

16. OTHER INFORMATION

CURRENT ISSUE DATE: October 9, 2003

PREVIOUS ISSUE DATE: July 17, 2000

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

Converted to ANSI 16-section format.

OTHER INFORMATION: Honeywell MAKES NO WARRANTY, EXPRESSED OR IMPLIED, CONCERNING THIS MATERIAL OR THE USE OF THIS PRODUCT OTHER THAN INDICATED ON THE LABEL. BUYER ASSUMES ALL RISK OF USE AND/OR HANDLING OF THIS MATERIAL WHEN SUCH USE AND/OR HANDLING IS CONTRARY TO LABEL INSTRUCTIONS

NFPA Hazard Ratings:

Health: 3
Flammability: 0
Reactivity: 1
Special Hazards: