

## MATERIAL SAFETY DATA SHEET

MANUFACTURER'S NAME:

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EMERGENCY NO.: CHEMTREC 24 HOUR #: 1-800-424-9300

Date: 4/04

### SECTION I. IDENTITY: Niobium Etch Nb

### SECTION II. HAZARDOUS INGREDIENTS / IDENTITY INFORMATION

PRODUCT NAME: **Niobium Etch Nb**

COMMON SYNONYMS: Hydrogen Fluoride Solution

CHEMICAL FAMILY: Inorganic acid

NIOSH / RTECS NO.: MW7875000

PRODUCT USE: Semiconductor, Thin Film Microelectronics

Revised 12/03

#### COMPONENTS

<u>COMPONENT</u>	<u>%</u>	<u>CAS NO.:</u>	<u>OSHA / PEL</u>	<u>ACGIH / TLV</u>
Hydrofluoric acid	8-30%	7664-39-3	3 ppm	3 ppm
Water	<70%	7732-18-5	N/E	N/E
Surfactant/Wetting	≤0.5	----	----	----

MAY BE FATAL IF SWALLOWED. REACTS WITH WATER, LIBERATING HEAT. EXTREMELY HAZARDOUS LIQUID AND VAPOR! CAUSES SEVERE BURNS, MAY NOT BE IMMEDIATELY PAINFUL OR VISIBLE. EXCEPTIONAL HEALTH & CONTACT HAZARD! READ MATERIAL SAFETY DATA SHEET! Do not get in eyes, on skin, on clothing. Do not breathe vapors. Keep in tightly closed container in a cool area. Use with adequate ventilation. Wash thoroughly after handling. In case of spill, flush away with large amount of water. Neutralize washings with lime or soda ash.

#### HMIS Ratings

Health : 3

Reactivity : 1

Flammability : 1

### INTERNATIONAL LABELING

Very toxic by inhalation, in contact with skin and if swallowed causes severe burns. Keep container tightly closed and in a well-ventilated place. Wear suitable protective clothing and gloves. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

STORAGE COLOR CODE: WHITE (CORROSIVE)

### SECTION III. PHYSICAL / CHEMICAL CHARACTERISTICS

Boiling Point: 200<sup>0</sup>F (approx.)  
(at 760 mm Hg)

Vapor Pressure (20<sup>o</sup>) (mmHg): = 14

Evaporation Rate: N/A

Specific Gravity (H<sub>2</sub>O=1): 1.02 (TFT)

Vapor Density (AIR= 1): N/A

% Volatiles by Volume (21<sup>0</sup>C): 100%

Solubility in Water: Complete (100%)  
Appearance and Odor: Colorless clear liquid  
pH: 1.0 (0.1M solution)  
Coefficient Water / Oil Distribution: N/A

Melting Point: -35<sup>0</sup>C (-31<sup>0</sup>F)  
(at 760 mmHg)  
Physical State: Liquid

#### **SECTION IV. FIRE AND EXPLOSION HAZARD DATA**

Lower Flammability limits (% in air): N/A

NFPA 704M RATING: 4-0-0

Auto ignition Temperature: N/A

Flammable Limits: Upper - N/A Lower - N/A

Fire Extinguishing Media: Use extinguishing media suitable for surrounding fire.

WARNING! Apply water in flooding quantities from as far a distance as possible in the form of a fog.

DO NOT use a water stream.

Special Fire Fighting Procedures: Firefighters should wear proper protective equipment and self-contained breathing apparatus with full face piece operated in positive pressure mode. Move containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.

Unusual Fire and Explosion Hazards: A violent exothermic reaction occurs with water. Sufficient heat may be produced to ignite combustible materials. Reacts with most metals to produce hydrogen gas, which can form an explosive mixture with air.

Toxic Gases Produced: Hydrogen fluoride, hydrogen

Explosion Data-Sensitivity to Mechanical Impact:

None identified

Explosion Data-Sensitivity to Static Discharge:

None identified

#### **SECTION V. REACTIVITY DATA**

Stability: Stable

Hazardous Polymerization: Will not occur

Conditions to Avoid: Moisture

Incompatibles: alkalis, organic materials, most common metals, rubber, leather, fluorine, water, strong bases, carbonates, sulfides, cyanides, oxides of silicon, esp. glass, concrete, silica

Decomposition Products: hydrogen fluoride, hydrogen

#### **SECTION VI. HEALTH HAZARD DATA**

THRESHOLD LIMIT VALUE (TLV/ TWA): 2.5 MG / M<sup>3</sup> (3ppm)

TLV (Ceiling) is for Hydrogen Fluoride

Short-term Exposure Limit (STEL): Not Established

PEL is for Hydrogen Fluoride

#### **TOXICITY OF COMPONENTS**

Inhalation- 1 Hr Mouse LC<sub>50</sub> for Hydrofluoric Acid

342 ppm

Inhalation- 1 Hr Rat LC<sub>50</sub> for Hydrofluoric Acid

1276 ppm

Intraperitoneal Mouse LD<sub>50</sub> for Water

190 g/kg

Intravenous Mouse LD<sub>50</sub> for Water

25 g/kg

Carcinogenicity: NTP: No

IARC: No

Z List: No

OSHA Reg.: No

Carcinogenicity: None identified

#### **SECTION VII. EFFECTS OF OVEREXPOSURE:**

INHALATION: Irritation of nose and throat, severe irritation or burns of respiratory system, pulmonary edema, lung inflammation.

SKIN CONTACT: Severe burns (may be delayed)

EYE CONTACT: Severe burns (may be delayed)

SKIN ABSORPTION: Attacks underlying tissues and bone

INGESTION: Severe burns to mouth, throat, and stomach, kidney dysfunction

CHRONIC EFFECTS: Hypocalcemia, bone and joint damage

TARGET ORGANS: Eyes, skin, respiratory system

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: pulmonary disease, kidney disorders.

PRIMARY ROUTES OF ENTRY: ingestion, inhalation, skin contact, eye contact, absorption.

### **SECTION VIII. EMERGENCY & FIRST AID PROCEDURES:**

INGESTION: CALL A PHYSICIAN! If swallowed, do NOT induce vomiting. If conscious, give water, milk, or milk of magnesia.

INHALATION: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

SKIN CONTACT: Immediately flush with water for at least 15 minutes. Call a physician. If clothing comes in contact with the product, the clothing should be removed immediately and should be laundered before re-use.

EYE CONTACT: Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelid. CALL A PHYSICIAN AT ONCE!!

### **SECTION IX. SARA / TITLE III HAZARD CATEGORIES AND LISTS**

ACUTE: Yes CHRONIC: Yes FLAMMABILITY: No PRESSURE: No REACTIVITY: No  
EXTREMELY HAZAROUS SUBSTANCE: Yes Contains Hydrogen Fluoride (RQ-100 lbs., TPQ - 100 lbs.)

CERCLA HAZARDOUS SUBSTANCE: Yes Contains Hydrogen Fluoride (RQ-100 lbs.)

SARA 313 TOXIC CHEMICALS: Yes Contains Hydrogen Fluoride

Genetic Class: C16

TSCA INVENTORY: Yes

### **SECTION X. PRECAUTIONS FOR SAFE HANDLING AND USE**

Steps to Be Taken in Case Material is Released or Spilled: Wear self-contained breathing apparatus and full protective clothing. Stop leak if you can do so without risk. Ventilate area. Neutralize spill with soda ash or lime. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

Waste Disposal Method: In accordance with all current local, state and federal environmental regulations.

EPA HAZARDOUS WASTE NUMBER: U134 (Toxic Waste)

VENTILATION: Use general or local exhaust ventilation to meet TLV requirements.

RESPIRATORY PROTECTION: Respiratory protection required if airborne concentration exceeds TLV. At concentrations up to 20 ppm, a chemical cartridge respirator with acid cartridge and dust/mist filter is recommended. Above this level, a self-contained breathing apparatus is advised.

EYE / SKIN PROTECTION: Safety goggles and face shield, uniform, protective suit, neoprene gloves are recommended.

## **SECTION XI. STORAGE AND HANDLING PRECAUTIONS**

STORAGE COLOR CODE: White (Corrosive)

STORAGE REQUIREMENTS: Keep container tightly closed. Store in corrosion-proof area Store at 38<sup>o</sup> or below. Isolate from incompatible materials. Protect from freezing. Material should remain in the original polyethylene container.

### **ADDITIONAL PRECAUTIONS**

HYDROFLUORIC ACID is incompatible with glass and all silicon-bearing materials should and should never be transferred to glass containers. Material should remain in the original polyethylene container. Unlined steel tanks in Hydrofluoric Services are subject to indiscriminate hydrogen blistering and should routinely be inspected and repaired.

## **SECTION XII. TRANSPORTATION AND ADDITIONAL INFORMATION**

### **DOMESTIC (D.O.T.)**

PROPER SHIPPING NAME: Hydrofluoric acid, solution

HAZARD CLASS: 8, 6.1      UN / NA# UN1790      PACKING GROUP: II

REPORTABLE QTY: 100 LBS.      LABELS: CORROSIVE, POISON

REGULATORY REFERENCES: 49CFR 172.101; 173.264

### **INTERNATIONAL (I.M.O.)**

PROPER SHIPPING NAME: Hydrofluoric acid, solution

HAZARD CLASS: 8, 6.1      UN#: UN1790      IMCO: Page 8184

MARINE POLLUTANTS: NO      PACKING GROUP: II

LABELS: CORROSIVE, POISON

REGULATORY REFERENCES: 49CFR 172.102; PART 176; imo

### **AIR (I.C.A.O.)**

PROPER SHIPPING NAME: Hydrofluoric acid, solution

HAZARD CLASS: 8, 6.1      UN# UN1790      LABELS: CORROSIVE, POISON

PACKING GROUP: II

REGULATORY REFERENCES: 49CFR 172.101; 173.6; PART 175; ICAO / IATA

U.S. CUSTOMS HARMONIZATION NO.: 28111100002

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## ADDENDUM TO MATERIAL SAFETY DATA SHEET REGULATORY STATUS

THIS ADDENDUM MUST NOT BE  
DETACHED FROM THE MSDS  
IDENTIFIES SARA 313 SUBSTANCE(S)  
Any copying or redistribution of the MSDS  
must include a copy of this addendum  
(Chem.Key: PHACD)

### HAZARD CATEGORIES FOR SARA

#### Section 311/312 Reporting

Acute      Chronic      Fire      Pressure      Reactive

Product or Components Of Products	SARA EHS Sect. 302		SARA Section 313 Chemicals		CERCLA Sec. 103	RCRA
	RQ (lbs.)	TPQ (lbs.)	Name List	Chemical Category	RQ (lbs.)	Section 261.33
Hydrogen Fluoride (7664-39-3)	100	100	Yes	No	100	U134

Applicable Products:  
Buffer HF, Siloxide Etchant, Reagent  
Semiconductor Etchants (RSE 100- RSE 1155),  
Hydrofluoric Acid 49%, Wright Etchant , TFT

SARA Section 302 EHS RQ: Reportable Quantity of Extremely Hazardous Substance, listed at 40 CFR 355.

SARA Section 302 EHS TPQ: Threshold Planning Quantity of Extremely Hazardous Substance. An asterisk (\*) following a threshold Planning Quantity signifies that if the material is a solid and has a particle size equal to or larger than 100 micrometers, the Threshold Planning Quantity + 10,000 LBS.

SARA Section 313 Chemicals: Toxic Substances subject to annual release reporting requirements listed at 40 CFR 372.65.

CERCLA Sec 103: Comprehensive Environmental Response, Compensation and Liability Act (Superfund). Releases to air, land or water of these hazardous substances which exceed the Reportable Quantity (RQ) must be reported to the National Response Center (800-424-8802); Listed at 40 CFR 302.4

RCRA: Resource Conservation and Reclamation Act. Commercial chemical product wastes designated as acute hazards and toxic under 40 CFR 261.33

Effective Date 12-04-03 Supersedes 02-17-87

Hydrogen Fluoride