**MATERIAL SAFETY DATA SHEET**


## TRANSENE COMPANY, INC.

10 ELECTRONICS AVENUE

DANVERS, MA 01923

**TEL:** (978) 777-7860 **FAX:** (978) 739-5640


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

IDENTITY (As Used on Label and List): **TITANIUM ETCHANT TYPE TFT**

**HAZARDOUS INGREDIENTS / IDENTITY INFORMATION**

PRODUCT NAME**:** TITANIUM ETCHANT TYPE TFT

COMMON SYNONYMS: Hydrogen Fluoride So1ution CHEMICAL FAMILY: Inorganic acid
NIOSH / RTECS NO.: MW7875000

PRODUCT USE: Semiconductor, Thin Film Microelectronics

**COMPONENTS**

COMPONENT % CAS NO.: OSHA / PEL ACGIF / TLV

Hydrofluoric acid 8 7664-39-3 3 ppm 3 ppm

Water ■ 90 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.

**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)

**PHYSICAL / CHEMICAL CHARACTERISTICS**

Boiling Point: 200$^0$F (approx.) Specific Gravity ($H_20$=1): N/A
(at 760 mm Hg)
Vapor Pressure (20$^o$) (mmHg): = 14 Vapor Density (AIR= l): N/A
Evaporation Rate: N/A % Volatiles by Volume (21$^0$C): 100%
Solubility in Water: Complete (100%) Melting Point: -35$^0$C (-31$^0$F)
Appearance and Odor: Colorless clear liquid (at 760 mmHg)
pH: 1.0 (0.1M solution) Physical State: Liquid

Coefficient Water / Oil Distribution: N/A

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**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

## REACTIVITY DATA

Stability: Stable Hazardous Polymerization: Will not occur

Conditions to Avoid: Moisture

Incompatibles: alkalies, 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

## HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/ TWA): 2.5 MG / $M^3$ (3ppm)

TLV (Ceiling) is for Hydrogen Fluoride

Short-term Exposure Limit (STEL): Not Established

PEL is for Hydrogen Fluoride

TOXICITY OF COMPONENTS

Inhalation- l Hr Mouse $LC_{50}$ for Hydrofluoric Acid 342 ppm
Inhalation- l Hr Rat $LC_{50}$ for Hydrofluoric Acid 1276 ppm
Intraperitoneal Mouse $LD_{50}$ for Water 190 g/kg
Intravenous Mouse $LD_{50}$ for Water 25 g/kg
Carcinogenicity: NTP: No IARC: No Z List: No OSHA Reg.: No
Carcinogenicity: None identified

## 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.

## 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!!

## 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

## 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.

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## STORAGE AND HANDLING PRECAUTIONS

STORAGE COLOR CODE: White (Corrosive)

STORAGE REQUIREMENTS: Keep container tightly closed. Store in corrosion-proof area Store at $38^{O}$ 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.

## 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.0.)

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