

# Safety Data Sheet

Version 3.1  
Revision Date 01/06/2017

SDS Number 300000005312  
Print Date 12/16/2017

## 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Z4MS CVD Precursor

Chemical formula : C<sub>4</sub>H<sub>12</sub>Si

Synonyms : TMS

Product Use Description : Semiconductor Processing

Manufacturer/Importer/Distributor : Air Products and Chemicals, Inc  
7201 Hamilton Blvd.  
Allentown, PA 18195-1501  
GST No. 123600835 RT0001  
QST No. 102753981 TQ0001

Telephone : 1-610-481-4911 Corporate  
1-800-345-3148 Chemicals Cust Serv  
1-800-752-1597 Gases/Electronics Cust Serv

Emergency telephone number (24h) : 800-523-9374 USA  
+1 610 481 7711 International

## 2. HAZARDS IDENTIFICATION

### GHS classification

Flammable liquids - Category 1  
Acute toxicity - Oral Category 4

### GHS label elements

#### Hazard pictograms/symbols



Signal Word: Danger

Hazard Statements:

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H224:Extremely flammable liquid and vapour.

H302:Harmful if swallowed.

## Precautionary Statements:

- Prevention : P210:Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking.  
P233:Keep container tightly closed.  
P240:Ground/Bond container and receiving equipment.  
P241:Use explosion-proof electrical/ventilating/lighting/equipment.  
P242:Use only non-sparking tools.  
P280a:Wear protective gloves and eye/face protection.
- Response : P303+P361+P353 :IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.  
P370+P378 :In case of fire, use recommended extinguishing media for extinction.
- Storage : P403+P235:Store in a well-ventilated place. Keep cool.
- Disposal : P501:Disposal of contents/container to be specified in accordance with regulations.

## Hazards not otherwise classified

Vapors may pose an asphyxiation hazard.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Weight)
Tetramethylsilane	75-76-3	100 %

Concentration is nominal. For the exact product composition, please refer to technical specifications. Contains no other components or impurities which will influence the classification of the product.

## 4. FIRST AID MEASURES

- General advice : Seek medical advice. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately.
- Eye contact : Rinse immediately with plenty of water also under the eyelids for at least 20 minutes. Remove contact lenses.
- Skin contact : Wash off immediately with plenty of water for at least 20 minutes. Wash off with soap and water. Immediately remove contaminated clothing, and any extraneous chemical, if possible to do so without delay.

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- Ingestion : Never give anything by mouth to an unconscious person. If a person vomits when lying on his back, place him in the recovery position. Prevent aspiration of vomit. Turn victim's head to the side.
- Inhalation : If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. Move to fresh air.
- Most important symptoms/effects - acute and delayed : Repeated and/or prolonged exposure to low concentrations of vapors and/or aerosols may cause: Sore throat.

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## 5. FIRE-FIGHTING MEASURES

- Suitable extinguishing media : Alcohol-resistant foam.  
Carbon dioxide (CO2).  
Dry chemical.  
Dry sand.  
Limestone powder.
- Specific hazards : Burning produces noxious and toxic fumes. In the event of fire, cool tanks with water spray. Fire or intense heat may cause violent rupture of packages. Flash back possible over considerable distance. May form explosive mixtures in air. The physical nature of tetramethylsilane is such that the vapors may pose an asphyxiation hazard.
- Special protective equipment for fire-fighters : Use personal protective equipment. Wear self contained breathing apparatus for fire fighting if necessary.

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## 6. ACCIDENTAL RELEASE MEASURES

- Personal Precautions, Protective Equipment, and Emergency Procedures : Wear suitable protective clothing, gloves and eye/face protection. Use self-contained breathing apparatus and chemically protective clothing. Remove all sources of ignition. Evacuate personnel to safe areas.
- Environmental precautions : Shut off or remove all ignition sources. Construct a dike to prevent spreading.
- Methods for cleaning up : Call Emergency Response number for advice. Approach suspected leak areas with caution. Absorb with inert absorbent materials such as: Dry sand. Vermiculite. Activated charcoal. Place in appropriate chemical waste container.
- Additional advice : Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. If possible, stop flow of product.

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## 7. HANDLING AND STORAGE

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## Handling

Emergency showers and eye wash stations should be readily accessible. Adhere to work practice rules established by government regulations. Use only in well-ventilated areas. Avoid contact with eyes. Avoid breathing vapors and/or aerosols. See "Flammable and Combustible Liquid Code" NFPA No. 30, National Fire Protection Association, Boston, MA. Use personal protective equipment. When using, do not eat, drink or smoke.

## Storage

Keep containers tightly closed in a dry, cool and well-ventilated place. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Keep away from heat and sources of ignition. Keep in a dry, cool place. Keep away from oxidizers. Pressure may develop in the storage container, open carefully.

## Technical measures/Precautions

Keep away from open flames, hot surfaces and sources of ignition.

Storage Temperature : 32 - 104 °F (0 - 40 °C)

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## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### Engineering measures

Use explosion-proof equipment.

Apply process controls to ensure safe operating conditions. Assess potential flammability hazards based on flashpoint and potential ignition sources.

Provide readily accessible eye wash stations and safety showers.

Provide natural or explosion-proof ventilation adequate to ensure concentrations are kept below exposure limits.

### Personal protective equipment

Respiratory protection : Wear appropriate respirator when ventilation is inadequate. Use a NIOSH/MSHA approved respirator with organic vapor cartridges.

Hand protection : Neoprene gloves.  
Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Eye protection : Chemical safety glasses.

Skin and body protection : Long sleeve shirts and trousers without cuffs.

Environmental exposure controls : Shut off or remove all ignition sources.

Special instructions for protection and hygiene : Wash hands at the end of each workshift and before eating, smoking or using the toilet. Provide readily accessible eye wash stations and safety showers.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Liquid. Colorless.
Odor	: Odorless.
Odor threshold	: No data available.
pH	: Not applicable.
Melting point/range	: -146 °F (-99 °C)
Boiling point/range	: 80 °F (26.6 °C)
Flash point	: -85 °F (-65 °C)
Evaporation rate	: No data available.
Flammability (solid, gas)	: Not applicable.
Upper/lower explosion/flammability limit	: 36.25 %(V) / 0.9 %(V)
Vapor pressure	: 11.62 psia (0.80 bara)
Water solubility	: Insoluble.
Relative vapor density	: Heavier than air.
Relative density	: 0.648 (water = 1)
Partition coefficient (n-octanol/water)	: No data available.
Auto-ignition temperature	: 325 °C
Decomposition temperature	: No data available.
Viscosity	: No data available.
Molecular Weight	: 88.2 g/mol

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## 10. STABILITY AND REACTIVITY

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Chemical Stability : Stable under normal conditions.

Conditions to avoid : Heat, flames and sparks.

Materials to avoid : Oxidizing agents.

Hazardous decomposition products : Carbon dioxide (CO<sub>2</sub>).  
Carbon monoxide.  
Silicon Dioxide.

Possibility of hazardous Reactions/Reactivity : No data available.

## 11. TOXICOLOGICAL INFORMATION

### 11.1. Information on toxicological effects

#### Likely routes of exposure

Effects on Eye : Contact with eyes may cause irritation.

Effects on Skin : Mild skin irritation.

Inhalation Effects : May cause nose, throat, and lung irritation. Inhalation of vapors and/or aerosols in high concentration may cause irritation of respiratory system.

Ingestion Effects : Harmful if swallowed.

Symptoms : Repeated and/or prolonged exposure to low concentrations of vapors and/or aerosols may cause: Sore throat.

#### Acute toxicity

Acute Oral Toxicity : Harmful if swallowed. Acute oral toxicity testing noted diarrhea on the day of dosing as the only abnormal physical sign during the observation period; Acute oral toxicity testing at 2.0 g/kg resulted in the death of 1 of 2 test animals;. cause was likely of a physical nature (body temperature converted test material to a gas and caused distention of the abdomen).

Inhalation : Vapor inhalation testing at a mean concentration of 2,130 ppm over a 7-hour period resulted in no deaths and no reaction observed during exposure or post-exposure.

Acute Dermal Toxicity : Nontoxic. Testing for absorption through skin demonstrated no systemic effects and slight erythema and edema, which subsided at 48 hours.

Acute Dermal Toxicity - Components  
Tetramethylsilane

LD50 : > 2,000 mg/kgOECD    Species : Rat.  
Test Guideline 402

Skin corrosion/irritation : Mild skin irritation. Only slight scaling was detected in one skin irritation test.

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Serious eye damage/eye irritation : Mild eye irritation. Tests for eye irritation using animals demonstrated a response of slight pain; conjunctival response completely subsided within onehour.

Sensitization. : No data available.

## Chronic toxicity or effects from long term exposures

Carcinogenicity : No data available.

Reproductive toxicity : No data is available on the product itself.

Germ cell mutagenicity : No evidence of mutagenic activity was observed in a bacterial mutation assay.

Specific target organ systemic toxicity (single exposure) : No data available.

Specific target organ systemic toxicity (repeated exposure) : No data available.

Aspiration hazard : No data available.

## Delayed and Immediate Effects and Chronic Effects from Short and Long Term Exposure

This product contains no listed carcinogens according to IARC, ACGIH, NTP and/or OSHA in concentrations of 0.1 percent or greater. Testing for mutagenic activity has been negative.

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## 12. ECOLOGICAL INFORMATION

### Ecotoxicity effects

Aquatic toxicity : No data is available on the product itself.

Toxicity to other organisms : No data available.

### Persistence and degradability

Biodegradability : No data is available on the product itself.

Mobility : No data available.

Bioaccumulation : No data is available on the product itself.

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## 13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products : Contact supplier if guidance is required.

Contaminated packaging : Dispose of container and unused contents in accordance with federal, state, and local requirements.

## 14. TRANSPORT INFORMATION

### DOT

UN/ID No. : UN2749  
Proper shipping name : Tetramethylsilane  
Class or Division : 3  
Packing group : I  
Label(s) : 3  
Marine Pollutant : No

### IATA

UN/ID No. : UN2749  
Proper shipping name : Tetramethylsilane  
Class or Division : 3  
Packing group : I  
Label(s) : 3  
Marine Pollutant : No

### IMDG

UN/ID No. : UN2749  
Proper shipping name : TETRAMETHYLSILANE  
Class or Division : 3  
Packing group : I  
Label(s) : 3  
Marine Pollutant : No

### TDG

UN/ID No. : UN2749  
Proper shipping name : TETRAMETHYLSILANE  
Class or Division : 3  
Packing group : I  
Label(s) : 3  
Marine Pollutant : No

### Further Information

The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact customer service.



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## 15. REGULATORY INFORMATION

Toxic Substance Control Act (TSCA) 12(b) Component(s):

None.

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.
EU	EINECS	Included on EINECS inventory or polymer substance, monomers included on EINECS inventory or no longer polymer.
Canada	DSL	Included on Inventory.
Australia	AICS	Included on Inventory.
Japan	ENCS	Included on Inventory.
South Korea	ECL	Included on Inventory.
China	SEPA	Included on Inventory.
Philippines	PICCS	Included on Inventory.

EPA SARA Title III Section 312 (40 CFR 370) Hazard Classification  
Acute Health Hazard Fire Hazard.

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)

This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other harm.

## 16. OTHER INFORMATION

### NFPA Rating

Health : 1  
Fire : 4  
Instability : 0

### HMIS Rating

Health : 1  
Flammability : 4  
Physical hazard : 0

Prepared by : Air Products and Chemicals, Inc. Global EH&S Department

Telephone : 1-610-481-4911 Corporate  
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For additional information, please visit our Product Stewardship web site at  
<http://www.airproducts.com/productstewardship/>

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