

# SAFETY DATA SHEET

Version 2.6  
Revision Date 14.12.2017  
Supersedes Version: 2.5

SDS Number 300000005312  
Print Date 16.12.2017

## SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier : Z4MS CVD Precursor

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

Synonyms : TMS

REACH Registration Number: 01-2119529239-34

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the Substance/Mixture : Semiconductor Processing

Restrictions on Use : No data available.

1.3. Details of the supplier of the safety data sheet : Air Products Ireland Ltd  
Unit 950 Western Industrial Estate  
Kileen Road  
Dublin 12  
Ireland

Email Address – Technical Information : prodinfo@airproducts.com

Telephone : 1-4659650

1.4. Emergency telephone number : (01) 463 4200 / +353 1 463 4200

## SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Flammable liquids - Category 1 H224:Extremely flammable liquid and vapour.  
Acute toxicity - Oral Category 4 H302:Harmful if swallowed.

2.2. 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.  
P240:Ground/Bond container and receiving equipment.  
P241:Use explosion-proof electrical/ventilating/lighting/equipment.  
P242:Use only non-sparking tools.  
P280:Wear protective gloves/protective clothing/eye protection/face protection.

Disposal : P501:Disposal of contents/container to be specified in accordance with regulations.

## 2.3. Other hazards

Vapors may pose an asphyxiation hazard.

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Components	EINECS / ELINCS Number	CAS Number	Concentration (Weight)
Tetramethylsilane	200-899-1	75-76-3	100 %

Components	Classification (CLP)	REACH Reg. #
Tetramethylsilane	Flam. Liq. 1 ;H225 Acute Tox. Oral 4 ;H302	01-2119529239-34

Refer to section 16 for full text of each relevant hazard statement (H).

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.

3.2. Mixtures : Not applicable.

## SECTION 4: First aid measures

### 4.1. Description of 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.

Ingestion : Never give anything by mouth to an unconscious person. If a person vomits when

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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.

## 4.2. Most important symptoms and effects, both acute and delayed

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

## 4.3. Indication of any immediate medical attention and special treatment needed

No data available.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Alcohol-resistant foam. Carbon dioxide (CO<sub>2</sub>).  
Dry chemical.  
Dry sand.  
Limestone powder.

Extinguishing media which must not be used for safety reasons. : No data available.

### 5.2. Special hazards arising from the substance or mixture

: 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.

5.3. Advice for firefighters : Use personal protective equipment. Wear self contained breathing apparatus for fire fighting if necessary.

## SECTION 6: Accidental release measures

6.1. 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.

6.2. Environmental precautions : Shut off or remove all ignition sources. Construct a dike to prevent spreading.

6.3. Methods and material for containment and 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.

6.4. Reference to other : For more information refer to Sections 8 & 13

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sections

## SECTION 7: Handling and storage

### 7.1. Precautions for safe 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. Use personal protective equipment. When using, do not eat, drink or smoke.

### 7.2. Conditions for safe storage, including any incompatibilities

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.

### 7.3. Specific end use(s)

Refer to section 1 or the extended SDS if applicable.

Storage Temperature : 0 - 40 °C

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

If applicable, refer to the extended section of the SDS for further information on CSA.

### 8.2. Exposure controls

#### 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. Standard EN 14387 - Gas filter(s), combined filter(s) and full face mask - EN 136.

Hand protection : 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.  
Neoprene gloves.  
Standard EN 374 - Protective gloves against chemicals.

Eye/face Protection : Chemical safety glasses.  
Standard EN 166 - Personal eye-protection.

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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.
Environmental Exposure Controls	: If applicable, refer to the extended section of the SDS for further information on CSA.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

(a/b) Physical state/Colour	: Liquid. Colorless.
(c) Odour	: Odorless.
(e) Relative Density	: 0.648 (water = 1)
(f) Melting point / freezing point	: -146 °F (-99 °C)
(g) Boiling point/range	: 80 °F (26.6 °C)
(h) Vapor pressure	: 11.62 psia (0.80 bara)
(i) Water solubility	: Insoluble.
(j) Partition coefficient: n-octanol/water [log Kow]	: Not known.
(k) pH	: Not applicable.
(l) Viscosity	: No data available.
(m) Particle characteristics	: No data available.
(n) Upper and lower explosion / flammability limits	: 36.25 %(V) / 0.9 %(V)
(o) Flash point	: -85 °F (-65 °C)
(p) Autoignition temperature	: 325 °C
(q) Decomposition temperature	: Not applicable.

### 9.2. Other information

Explosive properties	: No data available.
Oxidizing properties	: No data available.

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Molecular Weight	: 88.2 g/mol
Odor threshold	: Odour threshold is subjective and inadequate to warn of overexposure.
Evaporation rate	: No data available.
Flammability (solid, gas)	: Not applicable.
Upper flammability limit	: 36.25 %(V)
Lower flammability limit	: 0.9 %(V)
Relative vapor density	: Heavier than air.

## SECTION 10: Stability and reactivity

10.1. Reactivity	: No reactivity hazard other than the effects described in sub-sections below.
10.2. Chemical stability	: Stable under normal conditions.
10.3. Possibility of hazardous reactions	: No data available.
10.4. Conditions to avoid	: Heat, flames and sparks.
10.5. Incompatible materials	: Oxidizing agents.
10.6. Hazardous decomposition products	: Carbon dioxide (CO <sub>2</sub> ). Carbon monoxide. Silicon Dioxide.

## SECTION 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
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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).

Acute Inhalation Toxicity : 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/kg OECD  
Test Guideline 402

Species : Rat.

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

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 one hour.

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.

## SECTION 12: Ecological information

### 12.1. Toxicity

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

Toxicity to other organisms : No data is available on the product itself.

### 12.2. Persistence and degradability

No data available.

### 12.3. Bioaccumulative potential

No data is available on the product itself.

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## 12.4. Mobility in soil

No data available.

## 12.5. Results of PBT and vPvB assessment

If applicable, refer to the extended section of the SDS for further information on CSA.

## 12.6. Other adverse effects

No data available.

Effect on the ozone layer

Ozone Depleting : No data available.  
Potential

Global Warming Potential : No data available.

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## SECTION 13: Disposal considerations

13.1. Waste treatment : Contact supplier if guidance is required.  
methods

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

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## SECTION 14: Transport information

### ADR

UN/ID No. : UN2749  
Proper shipping name : TETRAMETHYLSILANE  
Class or Division : 3  
Packing group : I  
Tunnel Code : (D/E)  
Label(s) : 3  
ADR/RID Hazard ID no. : 33  
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



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Class or Division : 3  
Packing group : I  
Label(s) : 3  
Marine Pollutant : No  
Segregation Group: : None

## RID

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

Transport in bulk according to Annex II of Marpol and the IBC Code

For complete transportation information, contact customer service.

### 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.

## SECTION 15: Regulatory information

### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

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.

### Other Regulations

REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

COMMISSION REGULATION (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Regulation (EC) No 1272/2008 the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

### 15.2. Chemical safety assessment

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If this product does not contain exposure scenarios, the components in this product are either exempt from REACH, do not meet the minimum volume threshold for a CSA, or the CSA has not yet been completed.

## SECTION 16: Other information

Ensure all national/local regulations are observed.

### Hazard Statements:

H225 Highly flammable liquid and vapour.  
H302 Harmful if swallowed.

### Indication of Method:

Flammable liquids Category 1 Extremely flammable liquid and vapour. Calculation method

Acute toxicity Category 4 Harmful if swallowed. Calculation method

### Abbreviations and acronyms:

ATE - Acute Toxicity Estimate  
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008  
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006  
EINECS - European Inventory of Existing Commercial Chemical Substances  
ELINCS - European List of Notified Chemical Substances  
CAS# - Chemical Abstract Service number  
PPE - Personal Protection Equipment  
Kow - octanol-water partition coefficient  
DNEL - Derived No Effect Level  
LC50 - Lethal Concentration to 50 % of a test population  
LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose)  
NOEC - No Observed Effect Concentration  
PNEC - Predicted No Effect Concentration  
RMM - Risk Management Measure  
OEL - Occupational Exposure Limit  
PBT - Persistent, Bioaccumulative and Toxic  
vPvB - Very Persistent and Very Bioaccumulative  
STOT - Specific Target Organ Toxicity  
CSA - Chemical Safety Assessment  
EN - European Standard  
UN - United Nations  
ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road  
IATA - International Air Transport Association  
IMDG - International Maritime Dangerous Goods  
RID - Regulations concerning the International Carriage of Dangerous Goods by Rail  
WGK - Water Hazard Class

### Key literature references and sources for data:

ECHA - Guidance on the compilation of safety data sheets  
ECHA - Guidance on the application of the CLP Criteria  
ARIEL database

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

For additional information, please visit our Product Stewardship web site at  
<http://www.airproducts.com/productstewardship/>

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This Safety Data Sheet has been established in accordance with the applicable European Directives and applies to all countries that have translated the Directives in their national laws. COMMISSION REGULATION (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

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