

# UltraPur™ 4MS

## Tetramethylsilane

Tetramethylsilane (4MS) is an important precursor used in the chemical vapor deposition (CVD) of low- $\kappa$  inter-metal dielectric films (IMDs) for sub-0.25  $\mu\text{m}$  IC interconnects. Nominally 1  $\mu\text{m}$  thick films with dielectric constants ( $\kappa$  values) of about 2.8 can be prepared with 4MS, which is a highly promising candidate for implementation in low- $\kappa$  film processes and related Si-C liners. Entegris offers 4MS in the highest purity available to the industry, which serves to minimize key film performance variables.

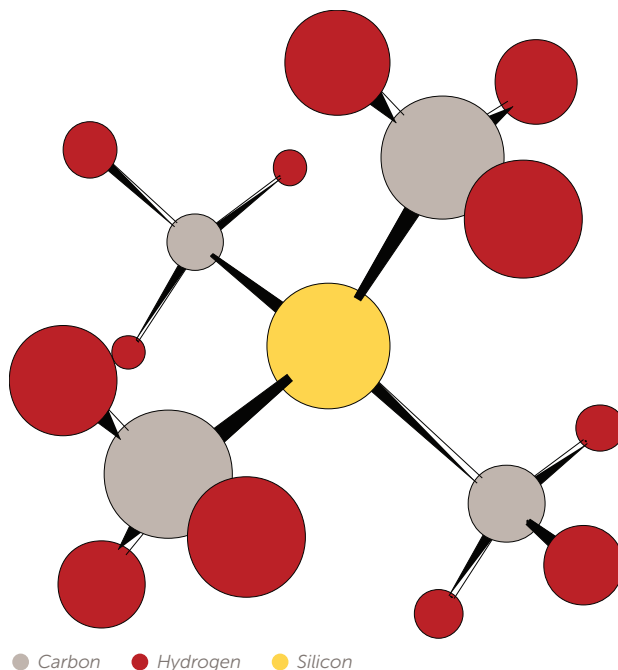
Entegris offers a semiconductor-grade 4MS. The material is proprietary and packaged using techniques specifically developed by Entegris. A certificate of analysis is provided with each 4MS order detailing the results of a comprehensive analysis including trace metals, water, chloride, and GC analysis.

Entegris is the semiconductor industry's innovator of liquid chemical delivery systems for 4MS. We provide development-stage, preproduction, and fab-wide 4MS liquid delivery systems.

Entegris is a leading industry supplier that provides a complete line of advanced materials, delivery systems, and control/monitoring systems that enable comprehensive material lifecycle management solutions for OEMs and end users.

### FEATURES & BENEFITS

- Semiconductor grade
- Reliable material supply
- Research and development support for materials compatibility
- Robust delivery system
- On-board ampoule refillable technology
- Standard shelf life of 12 months

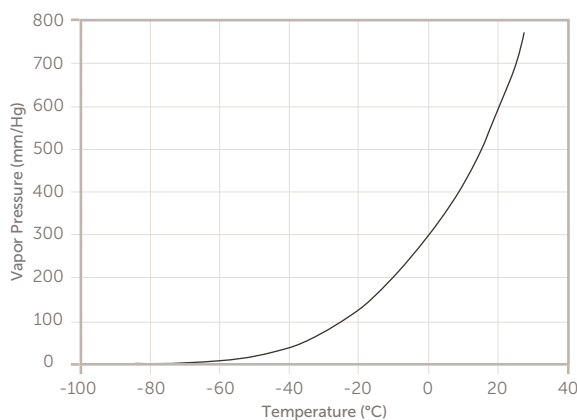


### APPLICATIONS

- Precursor for OSG by PECVD
- Precursor for  $\text{Si}_x\text{C}_y\text{N}_z$  deposition

### PERFORMANCE DATA

Vapor Pressure Curve



## SPECIFICATIONS

### Physical properties

<b>Chemical formula</b>	(CH <sub>3</sub> ) <sub>4</sub> Si
<b>Molecular weight</b>	88.22
<b>Specific gravity</b>	0.65
<b>Boiling point</b>	26.7°C (80.1°F) @ 0.1 mm Hg
<b>Melting point</b>	-99°C (-146.2°F)
<b>Flash point (closed cup)</b>	-27°C (-16.6°F)

### Purity analysis

Element	Detection limit	Specification	Analytical method
Aluminum	0.012 ppb	0.200 ppb	ICP-MS
Antimony	0.018 ppb	0.500 ppb	ICP-MS
Arsenic	0.018 ppb	0.500 ppb	ICP-MS
Barium	0.003 ppb	0.500 ppb	ICP-MS
Beryllium	0.005 ppb	0.500 ppb	ICP-MS
Bismuth	0.004 ppb	0.500 ppb	ICP-MS
Boron	0.334 ppb	5.000 ppb	ICP-MS
Cadmium	0.005 ppb	0.500 ppb	ICP-MS
Calcium	0.043 ppb	10.000 ppb	ICP-MS
Chromium	0.007 ppb	0.500 ppb	ICP-MS
Cobalt	0.005 ppb	0.500 ppb	ICP-MS
Copper	0.008 ppb	0.500 ppb	ICP-MS
Gallium	0.004 ppb	0.500 ppb	ICP-MS
Germanium	0.010 ppb	0.500 ppb	ICP-MS
Gold	0.006 ppb	0.500 ppb	ICP-MS

Purity analysis (continued)

Element	Detection limit	Specification	Analytical method
Iron	0.014 ppb	5.000 ppb	ICP-MS
Lead	0.004 ppb	0.500 ppb	ICP-MS
Lithium	0.006 ppb	0.500 ppb	ICP-MS
Magnesium	0.005 ppb	3.000 ppb	ICP-MS
Manganese	0.038 ppb	0.500 ppb	ICP-MS
Mercury	0.032 ppb	0.500 ppb	ICP-MS
Molybdenum	0.008 ppb	0.500 ppb	ICP-MS
Nickel	0.007 ppb	0.500 ppb	ICP-MS
Niobium	0.003 ppb	0.500 ppb	ICP-MS
Potassium	0.072 ppb	1.000 ppb	ICP-MS
Silver	0.013 ppb	0.500 ppb	ICP-MS
Sodium	0.032 ppb	2.000 ppb	ICP-MS
Strontium	0.004 ppb	0.500 ppb	ICP-MS
Tantalum	0.003 ppb	0.500 ppb	ICP-MS
Thallium	0.003 ppb	0.500 ppb	ICP-MS
Thorium	0.004 ppb	0.500 ppb	ICP-MS
Tin	0.033 ppb	0.500 ppb	ICP-MS
Titanium	0.015 ppb	0.500 ppb	ICP-MS
Uranium	0.004 ppb	0.500 ppb	ICP-MS
Vanadium	0.010 ppb	0.500 ppb	ICP-MS
Zinc	0.028 ppb	0.500 ppb	ICP-MS
Zirconium	0.004 ppb	0.500 ppb	ICP-MS

## Purity analysis (continued)

Parameter	Detection limit	Specification	Analytical method
Assay	—	99.99%	GC
Chloride	—	1 ppm	Typical
Color	—	10	Typical
Purity	—	99.99999%	ICP-MS
Water	1.3 ppm	20 ppm	KF titrator

## FOR MORE INFORMATION

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