

**TETRAMETHOXYSILANE, 99+%**

Safety Data Sheet SIT7510.2

Date of issue: 02/03/2015

Revision date: 09/03/2019

Version: 2.1

SECTION 1: Identification**1.1. Identification**

Product name	: TETRAMETHOXYSILANE, 99+%
Product code	: SIT7510.2
Product form	: Substance
Physical state	: Liquid
Formula	: C4H12O4Si
Synonyms	: TMOS; TETRAMETHYLORTHOSILICATE; SILICON TETRAMETHOXIDE
Chemical family	: ORGANOMETHOXYSILANE

1.2. Recommended use and restrictions on use

Recommended use : Chemical intermediate

1.3. Supplier**GELEST, INC.**

11 East Steel Road
Morrisville, PA 19067
USA

T 215-547-1015 - F 215-547-2484 - (M-F): 8:00 AM - 5:30 PM EST

info@gelest.com - www.gelest.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 (USA); +1 703-527-3887 (International)

SECTION 2: Hazard(s) identification**2.1. Classification of the substance or mixture****GHS US classification**

Flammable liquids Category 2	H225 Highly flammable liquid and vapor
Acute toxicity (inhalation:vapor) Category 1	H330 Fatal if inhaled
Skin corrosion/irritation Category 2	H315 Causes skin irritation
Serious eye damage/eye irritation Category 1	H318 Causes serious eye damage
Specific target organ toxicity (single exposure) Category 3	H335 May cause respiratory irritation

Full text of H statements : see section 16

2.2. GHS Label elements, including precautionary statements**GHS US labeling**

Hazard pictograms (GHS US) :



Signal word (GHS US) : Danger

Hazard statements (GHS US) : H225 - Highly flammable liquid and vapor
H315 - Causes skin irritation
H318 - Causes serious eye damage
H330 - Fatal if inhaled
H335 - May cause respiratory irritation

Precautionary statements (GHS US) : P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P210 - Keep away from heat, open flames, sparks. - No smoking.
P240 - Ground/Bond container and receiving equipment
P241 - Use explosion-proof electrical equipment
P242 - Use only non-sparking tools.
P243 - Take precautionary measures against static discharge.
P260 - Do not breathe vapors.
P264 - Wash hands thoroughly after handling.
P271 - Use only outdoors or in a well-ventilated area.
P303+P361+P353 - If on skin (or hair): take off immediately all contaminated clothing. rinse skin with water/shower
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a doctor
P332+P313 - If skin irritation occurs: Get medical advice/attention.
P362 - Take off contaminated clothing and wash before reuse.

TETRAMETHOXYSilANE, 99+%

Safety Data Sheet

P370+P378 - In case of fire: Use water spray or fog, foam, carbon dioxide, dry chemical to extinguish.

P233 - Keep container tightly closed.

P403+P235 - Keep in a cool place

P405 - Store locked up.

P501 - Dispose of contents/container to licensed waste disposal facility.

2.3. Hazards not otherwise classified (HNOC)

Other hazards not contributing to the classification : Additional methanol may be formed by reaction with moisture and water.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

Substance type : Mono-constituent
Name : TETRAMETHOXYSilANE, 99+%
CAS-No. : 681-84-5

Name	Product identifier	%	GHS US classification
Tetramethoxysilane	(CAS-No.) 681-84-5	99 - 100	Flam. Liq. 2, H225 Acute Tox. 1 (Inhalation:vapour), H330 Skin Irrit. 2, H315 Eye Dam. 1, H318 STOT SE 3, H335

Full text of hazard classes and H-statements : see section 16

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general : Remove contaminated clothing and shoes. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). If possible show this sheet; if not available show packaging or label.

First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a poison center or doctor/physician.

First-aid measures after skin contact : Wash with plenty of soap and water. Get medical advice/attention.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

First-aid measures after ingestion : Never give anything by mouth to an unconscious person. Immediately call a poison center or doctor/physician.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects after inhalation : Fatal if inhaled. May cause respiratory irritation. Pulmonary edema. Cough. Shortness of breath.

Symptoms/effects after skin contact : Causes skin irritation.

Symptoms/effects after eye contact : Causes serious eye damage. Even mild exposures can cause conjunctivitis and corneal scarring. Initial symptoms of exposure may include a "scratchy" feeling in the eyes. Silicon tetramethoxide causes severe eye injuries, as well as necrosis of corneal cells, which can progress long after exposure has ceased. These destructive effects resist treatment and permanent blindness is possible from exposure.

Symptoms/effects after ingestion : Oral toxicity is associated with methanol, the solvent and a hydrolysis product which causes nausea, vomiting, headache, visual effects including blindness.

Chronic symptoms : On contact with water this compound liberates methanol which is known to have a chronic effect on the central nervous system. Methanol may effect the central nervous system resulting in persistent or recurring headaches or impaired vision.

4.3. Immediate medical attention and special treatment, if necessary

NOTE TO PHYSICIAN: This product reacts with water in the acid contents of the stomach to form methanol. The combination of visual disturbances, metabolic acidosis and formic acid in urine is evidence of methanol poisoning. The therapeutic intravenous administration of ethanol (10 mls/hour) allows methanol to be preferentially oxidized and reduces production of methanol metabolites. Acidosis must be treated with intravenous administration of sodium bicarbonate and methanol elimination may be increased by hemodialysis, as indicated. Treatment should be based on blood methanol levels and acid-base balance.

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Water spray. Water fog. Foam. Carbon dioxide. Dry chemical.

Unsuitable extinguishing media : Do not use a heavy water stream.

TETRAMETHOXYSILANE, 99+%

Safety Data Sheet

5.2. Specific hazards arising from the chemical

- Fire hazard : Highly flammable liquid and vapor. Vapors of tetramethoxysilane cause corneal injury and blindness on even short exposures. Irritating fumes and organic acid vapors may develop when material is exposed to elevated temperatures or open flame.
- Explosion hazard : May form flammable/explosive vapor-air mixture.

5.3. Special protective equipment and precautions for fire-fighters

- Firefighting instructions : Fire fighters must wear positive pressure self-contained breathing apparatus. Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Avoid exposure of eyes to vapors.
- Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection. Avoid all eye and skin contact and do not breathe vapor and mist.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- General measures : Eliminate every possible source of ignition. Use special care to avoid static electric charges.

6.1.1. For non-emergency personnel

- Protective equipment : Wear protective equipment as described in Section 8.
- Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

- Protective equipment : Do not attempt to take action without suitable protective equipment. Equip cleanup crew with proper protection. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

- Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

- For containment : Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams.
- Methods for cleaning up : Provide ventilation system and use necessary personal protective equipment as described in "8. EXPOSURE CONTROLS AND PERSONAL PROTECTION". Take up liquid spill into inert absorbent material, e.g.: sand/earth.

6.4. Reference to other sections

- See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Additional hazards when processed : Handle empty containers with care because residual vapors are flammable. Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- Precautions for safe handling : Do not handle until all safety precautions have been read and understood. Handle in an enclosing hood with exhaust ventilation. Open carefully. Ground/bond container and receiving equipment. Use explosion-proof equipment. Use only non-sparking tools. Avoid all eye and skin contact and do not breathe vapor and mist.
- Hygiene measures : Wash hands thoroughly after handling. Wash contaminated clothing before reuse.

7.2. Conditions for safe storage, including any incompatibilities

- Technical measures : Proper grounding procedures to avoid static electricity should be followed. Ground/bond container and receiving equipment. Use explosion-proof electrical equipment.
- Storage conditions : Keep container tightly closed. Keep in a cool place. Store locked up.
- Incompatible materials : Oxidizing agent. Moisture. Water.
- Storage area : Store in a well-ventilated place. Store away from heat.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Tetramethoxysilane (681-84-5)		
ACGIH	ACGIH TWA (ppm)	1 ppm
NIOSH	NIOSH REL (TWA) (mg/m ³)	6 mg/m ³
NIOSH	NIOSH REL (TWA) (ppm)	1 ppm

8.2. Appropriate engineering controls

- Appropriate engineering controls : Handle in an enclosing hood with exhaust ventilation. Local exhaust is needed at source of vapors.

TETRAMETHOXYSilANE, 99+%

Safety Data Sheet

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:

Avoid all unnecessary exposure. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Hand protection:

Neoprene or nitrile rubber gloves

Eye protection:

Chemical worker's goggles must be worn. Safety glasses are not adequate eye protection. Contact lenses should not be worn

Skin and body protection:

Wear suitable protective clothing

Respiratory protection:

In case of insufficient ventilation, wear suitable respiratory equipment. NIOSH-certified full-face supplied air respirator.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: Clear liquid.
Molecular mass	: 152.22 g/mol
Color	: No data available
Odor	: Characteristic. Slight. Antiseptic.
Odor threshold	: No data available
Refractive index	: 1.3688
pH	: No data available
Relative evaporation rate (butyl acetate=1)	: No data available
Melting point	: 4 - 5 °C
Freezing point	: No data available
Boiling point	: 121 - 122 °C
Flash point	: 20 °C
Auto-ignition temperature	: 245 °C
Decomposition temperature	: No data available
Flammability (solid, gas)	: Highly flammable liquid and vapor
Vapor pressure	: 12 mm Hg @ 25°C
Relative vapor density at 20 °C	: 5.25
Relative density	: 1.032
% Volatiles	: 100 %
Solubility	: Reacts with water.
Log Pow	: No data available
Log Kow	: No data available
Viscosity, kinematic	: 0.5 cSt
Viscosity, dynamic	: No data available
Explosive properties	: No data available
Oxidizing properties	: No data available
Explosion limits	: 0.88 - 23.8 vol %

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Stable.

10.3. Possibility of hazardous reactions

Material decomposes slowly in contact with moist air or with water liberating methanol.

TETRAMETHOXYSILANE, 99+%

Safety Data Sheet

10.4. Conditions to avoid

Heat. Open flame. Sparks.

10.5. Incompatible materials

Oxidizing agent. Moisture. Water.

10.6. Hazardous decomposition products

Methanol. Organic acid vapors. Silicon dioxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

TETRAMETHOXYSILANE, 99+% (681-84-5)	
ATE US (vapors)	0.409 mg/l/4h
Tetramethoxysilane (681-84-5)	
LD50 dermal rabbit	17 ml/kg
LC50 inhalation rat (mg/l)	0.393 mg/l/4h
LDLo oral rat	700 mg/kg
LCLo inhalation rat	250 ppm/4h
LCLo inhalation mouse	1000 mg/m ³ /10M
ATE US (vapors)	0.393 mg/l/4h
ATE US (dust, mist)	0.393 mg/l/4h

Skin corrosion/irritation : Causes skin irritation.

Serious eye damage/irritation : Causes serious eye damage.

Severe eye injury and permanent blindness have been reported for humans.

Eye Irritation - rabbit: 250 mg: Severe Irritant

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

None of the components in this product at concentrations >0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

Reproductive toxicity : Not classified

STOT-single exposure : May cause respiratory irritation.

Under experimental conditions, the kidney was found to be the target organ.

Overexposure can cause lung damage - pulmonary toxin.

STOT-repeated exposure : Not classified

Aspiration hazard : Not classified

Symptoms/effects after inhalation : Fatal if inhaled. May cause respiratory irritation. Pulmonary edema. Cough. Shortness of breath.

Symptoms/effects after skin contact : Causes skin irritation.

Symptoms/effects after eye contact : Causes serious eye damage. Even mild exposures can cause conjunctivitis and corneal scarring. Initial symptoms of exposure may include a "scratchy" feeling in the eyes. Silicon tetramethoxide causes severe eye injuries, as well as necrosis of corneal cells, which can progress long after exposure has ceased. These destructive effects resist treatment and permanent blindness is possible from exposure.

Symptoms/effects after ingestion : Oral toxicity is associated with methanol, the solvent and a hydrolysis product which causes nausea, vomiting, headache, visual effects including blindness.

Chronic symptoms : On contact with water this compound liberates methanol which is known to have a chronic effect on the central nervous system. Methanol may affect the central nervous system resulting in persistent or recurring headaches or impaired vision.

Reason for classification : RTECS Number: VV9800000

SECTION 12: Ecological information

12.1. Toxicity

No additional information available

12.2. Persistence and degradability

No additional information available

12.3. Bioaccumulative potential

No additional information available

TETRAMETHOXYSILANE, 99+%

Safety Data Sheet

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Other adverse effects : May be hazardous to aquatic life if released to open waters.
Effect on the ozone layer : No additional information available

SECTION 13: Disposal considerations

13.1. Disposal methods

Sewage disposal recommendations : Do not dispose of waste into sewer.
Product/Packaging disposal recommendations : Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to licensed waste disposal facility.
Additional information : Handle empty containers with care because residual vapors are flammable.
Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

14.1. UN number

UN-No.(DOT) : 2606
DOT NA No : UN2606

14.2. UN proper shipping name

Transport document description : UN2606 Methyl orthosilicate, 6.1, I
Proper Shipping Name (DOT) : Methyl orthosilicate
Class (DOT) : 6.1 - Class 6.1 - Poisonous materials 49 CFR 173.132
Packing group (DOT) : I - Great Danger
Hazard labels (DOT) : 6.1 - Poison inhalation hazard
3 - Flammable liquid



DOT Packaging Non Bulk (49 CFR 173.xxx) : 227
DOT Packaging Bulk (49 CFR 173.xxx) : 244
DOT Packaging Exceptions (49 CFR 173.xxx) : None

14.3. Additional information

Emergency Response Guide (ERG) Number : 155
Other information : No supplementary information available.

Transport by sea

DOT Vessel Stowage Location : D - The material must be stowed "on deck only" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers or one passenger per each 3 m of overall vessel length, but the material is prohibited on passenger vessels in which the limiting number of passengers is exceeded.
DOT Vessel Stowage Other : 40 - Stow "clear of living quarters"

Air transport

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : Forbidden
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : Forbidden

SECTION 15: Regulatory information

15.1. US Federal regulations

Tetramethoxysilane (681-84-5)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA

TETRAMETHOXYSilANE, 99+%

Safety Data Sheet

Tetramethoxysilane (681-84-5)

Listed on the Canadian DSL (Domestic Substances List)

WHMIS Classification	Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects
	Class D Division 2 Subdivision B - Toxic material causing other toxic effects

EU-Regulations

Tetramethoxysilane (681-84-5)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

National regulations

Tetramethoxysilane (681-84-5)

Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Japanese Poisonous and Deleterious Substances Control Law
Listed on the Canadian IDL (Ingredient Disclosure List)
Listed on INSQ (Mexican National Inventory of Chemical Substances)

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

Tetramethoxysilane (681-84-5)

U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information

Full text of H-phrases::

H225	Highly flammable liquid and vapor
H315	Causes skin irritation
H318	Causes serious eye damage
H330	Fatal if inhaled
H335	May cause respiratory irritation

Abbreviations and acronyms

: Abbreviations: ND: Not Determined, No Data; NA: Not Applicable; LD: Lethal Dose; LC: Lethal Concentration; ATE: Acute Toxicity Estimates; H: hour; °: °C unless otherwise stated; mm: millimeters Hg, torr; PEL: permissible exposure level; TWA: time weighted average; TLV: threshold limit value; TG: Test Guideline; NIOSH: National Institute for Occupational Safety and Health; IARC: International Agency for Research on Cancer; NTP: National Toxicology Program; HMIS: Hazardous Material Information System; CAS No.: Chemical Abstract Service Registration Number; EC No.: European Commission Registration Number; EC Index No.: European Commission Index Number; OECD: The Organisation for Economic Co-operation and Development; GHS: The Globally Harmonized System of Classification and Labelling; APF: Assigned Protection Factor.

Hazard Rating

Health	: 4 Severe Hazard - Life-threatening, major or permanent damage may result from single or repeated overexposures
Flammability	: 4 Severe Hazard - Flammable gases, or very volatile flammable liquids with flash points below 73 F, and boiling points below 100 F. Materials may ignite spontaneously with air. (Class IA)
Physical	: 1 Slight Hazard - Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

Prepared by safety and environmental affairs.

Date of issue: 02/03/2015 Revision date: 09/03/2019 Version: 2.1

SDS US (GHS HazCom 2012) - Custom

According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

TETRAMETHOXYSILANE, 99+%

Safety Data Sheet

The information contained in this document has been gathered from reference materials and/or Gelest, Inc. test data and is to the best knowledge and belief of Gelest, Inc. accurate and reliable. Such information is offered solely for your consideration, investigation and verification. It is not suggested or guaranteed that the hazard precautions or procedures described are the only ones which exist. Gelest, Inc. makes no warranties, express or implied, with respect to the use of such information and assumes no responsibility therefore. Information on this safety data sheet is not intended to constitute a basis for product specifications.

© 2019 Gelest Inc. Morrisville, PA 19067

