



Enabling Your Technology

NEOPENTASILANE

Safety Data Sheet SIN6597.07

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SECTION 1: Identification**1.1. Identification**

Product name : NEOPENTASILANE
 Product code : SIN6597.07
 Product form : Substance
 Physical state : Liquid
 Formula : H12Si5
 Synonyms : TETRASILYLSILANE
 2,2-DISILYLTRISILANE
 Chemical family : SILANE

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
Pyrophoric liquids Category 1	H250 Catches fire spontaneously if exposed to air
Skin corrosion/irritation Category 1A	H314 Causes severe skin burns and eye damage
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
 H250 - Catches fire spontaneously if exposed to air
 H314 - Causes severe skin burns and eye damage
 H318 - Causes serious eye damage
 H335 - May cause respiratory irritation

Precautionary statements (GHS US) : P280 - Wear protective gloves/protective clothing/eye protection/face protection.
 P260 - Do not breathe vapors.
 P310 - Immediately call a doctor
 P264 - Wash hands thoroughly after handling.
 P210 - Keep away from heat, open flames, sparks. - No smoking.
 P222 - Do not allow contact with air.
 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.
 P370+P378 - In case of fire: Use alcohol resistant foam, carbon dioxide, dry chemical to extinguish.
 P301+P330+P331 - If swallowed: rinse mouth. Do NOT induce vomiting
 P302+P334 - If on skin: Immerse in cool water/wrap with wet bandages
 P303+P361+P353 - If on skin (or hair): take off immediately all contaminated clothing. rinse skin with water/shower

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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
P363 - Wash contaminated clothing before reuse.
P233 - Keep container tightly closed.
P271 - Use only outdoors or in a well-ventilated area.
P403+P235 - Keep in a cool place
P405 - Store locked up.
P422 - Store contents under dry inert atmosphere
P501 - Dispose of contents/container to licensed waste disposal facility.
P321 - Specific treatment (see first aid instructions on this label)
P312 - Call a doctor if you feel unwell

2.3. Hazards not otherwise classified (HNOC)

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

Substance type : Multi-constituent
Name : NEOPENTASILANE
CAS-No. : 15947-57-6

Name	Product identifier	%	GHS-US classification
Neopentasilane	(CAS-No.) 15947-57-6	98 - 100	Flam. Liq. 2, H225 Pyr. Liq. 1, H250 Skin Corr. 1A, H314 Eye Dam. 1, H318 STOT SE 3, H335
Isotetrasilane	(CAS-No.) 13597-87-0	0 - 2	Flam. Liq. 2, H225 Pyr. Liq. 1, H250 Skin Corr. 1A, H314 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 : Immerse in cool water/wrap in wet bandages. Wash with plenty of soap and water. Get immediate 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 : Causes severe skin burns and eye damage.

Symptoms/effects after inhalation : May cause respiratory irritation. Overexposure may cause: Severe. Tissue damage.

Symptoms/effects after skin contact : Causes (severe) skin burns.

Symptoms/effects after eye contact : Causes serious eye damage. At levels below the flammability limit, silane is expected to affect the eyes by absorption and deposition of silicon dioxide, causing severe irritation and possible corneal damage.

Symptoms/effects after ingestion : May be harmful if swallowed.

4.3. Immediate medical attention and special treatment, if necessary

No additional information available

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : If unable to stop the flow of gas, neopentasilane should be allowed to burn until consumed. Secondary fires may be extinguished with alcohol resistant foam, carbon dioxide, dry chemical. Use of high expansion foam (100:1) is recommended to cover flames.

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Unsuitable extinguishing media : Water.

5.2. Specific hazards arising from the chemical

Fire hazard : Catches fire spontaneously if exposed to air. Highly flammable liquid and vapor. Irritating fumes and organic acid vapors may develop when material is exposed to water or open flame.

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions : Neopentasilane should be allowed to burn until consumed. Excessive pressure may develop in gas cylinders exposed to fire-heated may explode on contact with air. Cool cylinders and surroundings with water from a suitable distance. Exercise caution when fighting any chemical fire. In case of fire: Stop leak if safe to do so.

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.

Other information : NEOPENTASILANE will spontaneously ignite on contact with air. Pyrophoric liquid and gas.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

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".

Emergency procedures : Stop leak if safe to do so.

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

Methods for cleaning up : Stop flow of gas if possible. Evacuate area. The potential exists for spontaneous ignition and explosion. Allow vapors to disperse. Ventilate area.

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 : Catches fire spontaneously if exposed to air. Handle empty containers with care because residual vapors are flammable.

Precautions for safe handling : Containers must be properly grounded before beginning transfer. Handle only in sealed purged systems. Prevent reverse flow. Provide good ventilation in process area to prevent accumulation of vapors. Do not allow contact with air. Do not breathe vapors. Systems utilizing silane that do not involve complete consumption of silane should be equipped with burn boxes. See- Book of SEMI Standards, Facilities Standards and Safety Guidelines, Mountain View, CA, Semiconductor Equipment and Materials Int'l, 1993.

Hygiene measures : Wash contaminated clothing before reuse. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Store contents under dry inert atmosphere.

Storage conditions : Keep container tightly closed. Store in sealed cylinders in isolated area.

Incompatible materials : Acids. Alcohols. Oxidizing agent. Water.

Storage area : Store in a well-ventilated place. Store away from heat.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Isotetrasilane (13597-87-0)		
ACGIH	ACGIH TWA (ppm)	5 ppm (silane)
Neopentasilane (15947-57-6)		
ACGIH	ACGIH TWA (ppm)	5 ppm (silane)

8.2. Appropriate engineering controls

Appropriate engineering controls : Provide local exhaust or general room ventilation.

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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 goggles or face shield. Contact lenses should not be worn

Skin and body protection:

Wear suitable protective clothing

Respiratory protection:

Where exposure through inhalation may occur from use, respiratory protection equipment is recommended. NIOSH-certified combination organic vapor/acid gas (yellow cartridge) respirator.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: Clear. Pyrophoric liquid.
Molecular mass	: 152.52 g/mol
Color	: Colorless.
Odor	: Disagreeable.
Odor threshold	: No data available
Refractive index	: No data available
pH	: No data available
Relative evaporation rate (butyl acetate=1)	: No data available
Melting point	: No data available
Freezing point	: < 0 °C
Boiling point	: 132 - 134 °C
Flash point	: < -40 °C
Auto-ignition temperature	: < 50 °C
Decomposition temperature	: No data available
Flammability (solid, gas)	: Catches fire spontaneously if exposed to air, Highly flammable liquid and vapor
Vapor pressure	: 15 mm Hg @ 25°C
Relative vapor density at 20 °C	: > 1
Relative density	: 0.805
% Volatiles	: 100 %
Solubility	: Insoluble in water. Reacts with water.
Log Pow	: No data available
Log Kow	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
Explosive properties	: No data available
Oxidizing properties	: No data available
Explosion limits	: < 2 vol % (LEL)

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 in sealed cylinders stored under a dry inert atmosphere.

10.3. Possibility of hazardous reactions

Reacts with oxygen in air, igniting spontaneously. Mixtures with mercury explode when shaken in the presence of air. Platinum, platinum and iron salts and other Lewis acids can cause generation of flammable hydrogen gas.

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10.4. Conditions to avoid

Open flame. Heat. Sparks. Do not allow contact with air.

10.5. Incompatible materials

Acids. Alcohols. Oxidizing agent. Water.

10.6. Hazardous decomposition products

Silicon dioxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity	: Not classified
Skin corrosion/irritation	: Causes severe skin burns and eye damage.
Serious eye damage/irritation	: Causes serious eye damage.
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
Specific target organ toxicity – single exposure	: May cause respiratory irritation.
Specific target organ toxicity – repeated exposure	: Not classified
Aspiration hazard	: Not classified
Symptoms/effects after inhalation	: May cause respiratory irritation. Overexposure may cause: Severe. Tissue damage.
Symptoms/effects after skin contact	: Causes (severe) skin burns.
Symptoms/effects after eye contact	: Causes serious eye damage. At levels below the flammability limit, silane is expected to affect the eyes by absorption and deposition of silicon dioxide, causing severe irritation and possible corneal damage.
Symptoms/effects after ingestion	: May be harmful if swallowed.

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

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Other adverse effects	: This substance may be hazardous to the environment.
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)	: 3194
DOT NA no.	UN3194

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14.2. UN proper shipping name

Transport document description	: UN3194 Pyrophoric liquid, inorganic, n.o.s. (NEOPENTASILANE), 4.2, I
Proper Shipping Name (DOT)	: Pyrophoric liquid, inorganic, n.o.s. (NEOPENTASILANE)
Class (DOT)	: 4.2 - Class 4.2 - Spontaneously combustible material 49 CFR 173.124
Packing group (DOT)	: I - Great Danger
Hazard labels (DOT)	: 4.2 - Spontaneously combustible



DOT Packaging Non Bulk (49 CFR 173.xxx)	: 181
DOT Packaging Bulk (49 CFR 173.xxx)	: 244
DOT Packaging Exceptions (49 CFR 173.xxx)	: None
DOT Symbols	: G - Identifies PSN requiring a technical name

14.3. Additional information

Emergency Response Guide (ERG) Number	: 135
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	: 13 - Keep as dry as reasonably practicable, 78 - Stow "separated longitudinally by an intervening complete compartment or hold from" explosives

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

NEOPENTASILANE (15947-57-6)

TSCA Exemption/Exclusion

CAUTION: This material is supplied for research and development purposes subject to the R&D exemption under TSCA, 40 CFR 720.36, and must meet the requirements of the exemption, including supervision by a "technically qualified individual" as defined by 40 CFR 720.3(ee). The use of this material for "commercial purposes" as defined by 40 CFR 720.3(r) is not permitted in the United States.

Isotetrasilane (13597-87-0)

Not listed on the United States TSCA (Toxic Substances Control Act) inventory

Neopentasilane (15947-57-6)

Not listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA

No additional information available

EU-Regulations

No additional information available

National regulations

No additional information available

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

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SECTION 16: Other information

Full text of H-phrases::

H225	Highly flammable liquid and vapor
H250	Catches fire spontaneously if exposed to air
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage
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 : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

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 : 3 Serious Hazard - Materials that may form explosive mixtures with water and are capable of detonation or explosive reaction in the presence of a strong initiating source. Materials may polymerize, decompose, self-react, or undergo other chemical change at normal temperature and pressure with moderate risk of explosion

Prepared by safety and environmental affairs.

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SDS US (GHS HazCom 2012) - Custom

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

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