

NEOPENTASILANE

Safety Data Sheet SIN6597.07

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Version: 2.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking**1.1. Product identifier**

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

1.2. Relevant identified uses of the substance or mixture and uses advised against**1.2.1. Relevant identified uses**

Use of the substance/mixture : Chemical intermediate

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet**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

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65933 Frankfurt**Germany**

T +49 (0) 69 3535106-500 - F +49 (0) 69 3535106-501 - (M-F): 8:00 AM - 4:00 PM

info@gelestde.com - www.gelestde.com**1.4. Emergency telephone number**

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

SECTION 2: Hazards identification**2.1. Classification of the substance or mixture****Classification according to Regulation (EC) No. 1272/2008 [CLP]**

Flammable liquids, Category 2	H225
Pyrophoric Liquids, Category 1	H250
Skin corrosion/irritation, Category 1A	H314
Serious eye damage/eye irritation, Category 1	H318
Specific target organ toxicity — Single exposure, Category 3, Respiratory tract irritation	H335
Full text of H statements : see section 16	

Adverse physicochemical, human health and environmental effects

No additional information available

2.2. Label elements**Labelling according to Regulation (EC) No. 1272/2008 [CLP]**

Hazard pictograms (CLP) :



GHS02



GHS05



GHS07

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Signal word (CLP)	: Danger
Hazard statements (CLP)	: H225 - Highly flammable liquid and vapour. H250 - Catches fire spontaneously if exposed to air. H314 - Causes severe skin burns and eye damage. H335 - May cause respiratory irritation.
Precautionary statements (CLP)	: P280 - Wear protective gloves/protective clothing/eye protection/face protection. P260 - Do not breathe vapours. P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P222 - Do not allow contact with air. P264 - Wash hands thoroughly after handling. P310 - Immediately call a POISON CENTER or doctor/physician

2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substances

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

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
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 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 person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
First-aid measures after skin contact	: Immerse in cool water/wrap in wet bandages. Wash with plenty of 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/doctor.

4.2. Most important symptoms and effects, both 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. Indication of any immediate medical attention and special treatment needed

No additional information available

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SECTION 5: Firefighting measures

5.1. 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.

Unsuitable extinguishing media : Water.

5.2. Special hazards arising from the substance or mixture

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

5.3. Advice for firefighters

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 vapour 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 vapours 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 formation of vapour. Do not allow contact with air. Do not breathe vapours. 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.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Isotetrasilane (13597-87-0)

Italy - Portugal - USA ACGIH ACGIH TWA (ppm)

5 ppm (silane)

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Neopentasilane (15947-57-6)

Italy - Portugal - USA ACGIH

ACGIH TWA (ppm)

5 ppm (silane)

8.2. Exposure controls

Appropriate engineering controls:

Provide local exhaust or general room ventilation.

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
Colour	: Colourless.
Odour	: Disagreeable.
Odour threshold	: No data available
Refractive index	: No additional information available
pH	: No data available
Relative evaporation rate (butylacetate=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 vapour.
Vapour pressure	: 15 mm Hg @ 25°C
Relative vapour 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
Oxidising properties	: No data available
Explosive limits	: < 2 vol % (LEL)

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

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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.

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 sensitisation	: 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.
STOT-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

Acute aquatic toxicity	: Not classified
Chronic aquatic toxicity	: Not classified

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. Results of PBT and vPvB assessment

No additional information available

12.6. Other adverse effects

Other adverse effects : This substance may be hazardous to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment 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 vapours are flammable.
Ecology - waste materials	: Avoid release to the environment.

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SECTION 14: Transport information

14.1. UN number

In accordance with ADR / RID / IMDG / IATA / ADN

14.1. UN number

UN-No. (ADR)	: 3194
UN-No. (IMDG)	: 3194
UN-No. (IATA)	: 3194
UN-No. (ADN)	: 3194
UN-No. (RID)	: 3194

14.2. UN proper shipping name

Proper Shipping Name (ADR)	: PYROPHORIC LIQUID, INORGANIC, N.O.S.
Proper Shipping Name (IMDG)	: PYROPHORIC LIQUID, INORGANIC, N.O.S.
Proper Shipping Name (IATA)	: Pyrophoric liquid, inorganic, n.o.s.
Proper Shipping Name (ADN)	: PYROPHORIC LIQUID, INORGANIC, N.O.S.
Proper Shipping Name (RID)	: PYROPHORIC LIQUID, INORGANIC, N.O.S.
Transport document description (ADR)	: UN 3194 PYROPHORIC LIQUID, INORGANIC, N.O.S. (NEOPENTASILANE), 4.2, I, (B/E)
Transport document description (IMDG)	: UN 3194 PYROPHORIC LIQUID, INORGANIC, N.O.S. (NEOPENTASILANE), 4.2, I
Transport document description (IATA)	: UN 3194 Pyrophoric liquid, inorganic, n.o.s. (NEOPENTASILANE), 4.2
Transport document description (ADN)	: UN 3194 PYROPHORIC LIQUID, INORGANIC, N.O.S. (NEOPENTASILANE), 4.2, I
Transport document description (RID)	: UN 3194 PYROPHORIC LIQUID, INORGANIC, N.O.S. (NEOPENTASILANE), 4.2, I

14.3. Transport hazard class(es)

ADR

Transport hazard class(es) (ADR)	: 4.2
Danger labels (ADR)	: 4.2



IMDG

Transport hazard class(es) (IMDG)	: 4.2
Danger labels (IMDG)	: 4.2



IATA

Transport hazard class(es) (IATA)	: 4.2
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ADN

Transport hazard class(es) (ADN)	: 4.2
Danger labels (ADN)	: 4.2



RID

Transport hazard class(es) (RID)	: 4.2
Danger labels (RID)	: 4.2

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14.4. Packing group


Packing group (ADR)	: I
Packing group (IMDG)	: I
Packing group (IATA)	: Not applicable
Packing group (ADN)	: I
Packing group (RID)	: I

14.5. Environmental hazards

Dangerous for the environment	: No
Marine pollutant	: No
Other information	: No supplementary information available

14.6. Special precautions for user

- Overland transport

Classification code (ADR)	: S3
Special provisions (ADR)	: 274
Limited quantities (ADR)	: 0
Excepted quantities (ADR)	: E0
Packing instructions (ADR)	: P400
Mixed packing provisions (ADR)	: MP2
Tank code (ADR)	: L21DH
Tank special provisions (ADR)	: TU14, TC1, TE21, TM1
Vehicle for tank carriage	: AT
Transport category (ADR)	: 0
Special provisions for carriage - Packages (ADR)	: V1
Special provisions for carriage - Operation (ADR)	: S20
Hazard identification number (Kemler No.)	: 333
Orange plates	: 
Tunnel restriction code (ADR)	: B/E
EAC code	: 2W

- Transport by sea

Special provisions (IMDG)	: 274
Limited quantities (IMDG)	: 0
Excepted quantities (IMDG)	: E0
Packing instructions (IMDG)	: P400
EmS-No. (Fire)	: F-G
EmS-No. (Spillage)	: S-M
Stowage category (IMDG)	: D
Stowage and handling (IMDG)	: H1
Segregation (IMDG)	: SG63, SG26
Properties and observations (IMDG)	: Highly flammable liquids, may ignite spontaneously in moist air. In contact with air, evolve irritating and slightly toxic fumes.

- Air transport

PCA Limited quantities (IATA)	: Forbidden
PCA limited quantity max net quantity (IATA)	: Forbidden
PCA packing instructions (IATA)	: Forbidden
PCA max net quantity (IATA)	: Forbidden
CAO packing instructions (IATA)	: Forbidden

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CAO max net quantity (IATA) : Forbidden
ERG code (IATA) : 4W

- Inland waterway transport

Classification code (ADN) : S3
Special provisions (ADN) : 274
Limited quantities (ADN) : 0
Excepted quantities (ADN) : E0
Equipment required (ADN) : PP
Number of blue cones/lights (ADN) : 0

- Rail transport

Classification code (RID) : S3
Special provisions (RID) : 274
Limited quantities (RID) : 0
Excepted quantities (RID) : E0
Packing instructions (RID) : P400
Mixed packing provisions (RID) : MP2
Tank codes for RID tanks (RID) : L21DH
Special provisions for RID tanks (RID) : TU14, TU38, TC1, TE21, TE22, TE25, TM1
Transport category (RID) : 0
Special provisions for carriage – Packages (RID) : W1
Hazard identification number (RID) : 333

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

Not applicable

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

No REACH Annex XVII restrictions

NEOPENTASILANE is not on the REACH Candidate List

NEOPENTASILANE is not on the REACH Annex XIV List

NEOPENTASILANE is not subject to REGULATION (EU) No 649/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 concerning the export and import of hazardous chemicals.

NEOPENTASILANE is not subject to Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC

% Volatiles : 100 %

15.1.2. National regulations

Germany

12th Ordinance Implementing the Federal Immission Control Act - 12.BImSchV : Is not subject of the 12. BImSchV (Hazardous Incident Ordinance)

Netherlands

SZW-lijst van kankerverwekkende stoffen : The substance is not listed

SZW-lijst van mutagene stoffen : The substance is not listed

NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Borstvoeding : The substance is not listed

NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Vruchtbaarheid : The substance is not listed

NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Ontwikkeling : The substance is not listed

Denmark

Classification remarks : Emergency management guidelines for the storage of flammable liquids must be followed

Danish National Regulations : Young people below the age of 18 years are not allowed to use the product

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15.2. Chemical safety assessment

No additional information available

SECTION 16: Other information

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

Other information : Prepared by safety and environmental affairs.

Full text of H- and EUH-statements:

Eye Dam. 1	Serious eye damage/eye irritation, Category 1
Flam. Liq. 2	Flammable liquids, Category 2
Pyr. Liq. 1	Pyrophoric Liquids, Category 1
Skin Corr. 1A	Skin corrosion/irritation, Category 1A
STOT SE 3	Specific target organ toxicity — Single exposure, Category 3, Respiratory tract irritation
H225	Highly flammable liquid and vapour.
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.

SDS EU (REACH Annex II) - Custom

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.

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