

## SECTION 1: Identification

### 1.1. Identification

Product name	: SILICLAD®
Product code	: SIS6952.0
Product form	: Mixture
Physical state	: Liquid
Synonyms	: 20% OCTADECYL FUNCTIONAL SILANE in mixed alcohols
Chemical family	: ORGANOSILANE

### 1.2. Recommended use and restrictions on use

Recommended use	: Chemical intermediate
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### 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](mailto:info@gelest.com) - [www.gelest.com](http://www.gelest.com)

### 1.4. Emergency telephone number

Emergency number	: CHEMTREC: 1-800-424-9300 (USA); +1 703-527-3887 (International)
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## SECTION 2: Hazard(s) identification

### 2.1. Classification of the substance or mixture

**GHS-US classification**

Flammable liquids Category 3	H226 Flammable liquid and vapor
Skin corrosion/irritation Category 2	H315 Causes skin irritation
Serious eye damage/eye irritation Category 2A	H319 Causes serious eye irritation
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) : Warning  
Hazard statements (GHS US) :

: Warning  
: H226 - Flammable liquid and vapor  
: H315 - Causes skin irritation  
: H319 - Causes serious eye irritation  
: 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.  
: P261 - Avoid breathing vapors.  
: P264 - Wash hands thoroughly after handling.  
: P271 - Use only outdoors or in a well-ventilated area.  
: P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing  
: P303+P361+P353 - If on skin (or hair): take off immediately all contaminated clothing. rinse skin with water/shower  
: P332+P313 - If skin irritation occurs: Get medical advice/attention.  
: P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing  
: P337+P313 - If eye irritation persists: Get medical advice/attention.  
: P312 - Call a doctor if you feel unwell  
: P362 - Take off contaminated clothing and wash before reuse.  
: P370+P378 - In case of fire: Use water spray or fog, foam, carbon dioxide, dry chemical to extinguish.  
: P403+P233 - Store in a well-ventilated place. Keep container tightly closed.

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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)

No additional information available

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substances

Not applicable

### 3.2. Mixtures

Name	Product identifier	%	GHS-US classification
2-Methyl-2-butanol	(CAS-No.) 75-85-4	> 35	Flam. Liq. 2, H225 Acute Tox. 4 (Oral), H302 Skin Irrit. 2, H315 STOT SE 3, H335
4-Hydroxy-4-methyl-2-pentanone	(CAS-No.) 123-42-2	> 35	Flam. Liq. 4, H227 Skin Irrit. 2, H315 Eye Irrit. 2A, H319
Octadecyl functional silane	(CAS-No.) 39443-39-5	> 20	Not classified

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

## 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. If you feel unwell, seek medical advice.
- 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 medical advice/attention.
- First-aid measures after ingestion : Never give anything by mouth to an unconscious person. Get medical advice/attention.

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

- Symptoms/effects after inhalation : May cause respiratory irritation.
- Symptoms/effects after skin contact : Causes skin irritation.
- Symptoms/effects after eye contact : Causes serious eye irritation.
- 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 : Water spray. Water fog. Foam. Carbon dioxide. Dry chemical.
- Unsuitable extinguishing media : None known.

### 5.2. Specific hazards arising from the chemical

- Fire hazard : Flammable liquid and vapor. Irritating fumes and organic acid vapors may develop when material is exposed to elevated temperatures or open flame.

### 5.3. Special protective equipment and precautions for fire-fighters

- Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.
- 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 : Remove ignition sources. 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.

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### 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

Methods for cleaning up : Clean up any spills as soon as possible, using an absorbent material to collect it. Sweep or shovel spills into appropriate container for disposal. Use only non-sparking tools.

### 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

Precautions for safe handling : Avoid all eye and skin contact and do not breathe vapor and mist. Provide good ventilation in process area to prevent accumulation of vapors. Containers must be properly grounded before beginning transfer. Use only outdoors or in a well-ventilated area. Use only non-sparking tools.

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

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

Technical measures : Ground/bond container and receiving equipment. Proper grounding procedures to avoid static electricity should be followed.

Storage conditions : Keep container tightly closed.

Incompatible materials : Moist air. 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

4-Hydroxy-4-methyl-2-pentanone (123-42-2)		
ACGIH	ACGIH TWA (ppm)	50 ppm
OSHA	OSHA PEL (TWA) (mg/m <sup>3</sup> )	240 mg/m <sup>3</sup>
OSHA	OSHA PEL (TWA) (ppm)	50 ppm
IDLH	US IDLH (ppm)	1800 ppm (10% LEL)
NIOSH	NIOSH REL (TWA) (mg/m <sup>3</sup> )	240 mg/m <sup>3</sup>
NIOSH	NIOSH REL (TWA) (ppm)	50 ppm

### 8.2. Appropriate engineering controls

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

### 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. 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 organic vapor (black cartridge) respirator.

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### SECTION 9: Physical and chemical properties

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

Physical state	: Liquid
Appearance	: Hazy liquid.
Color	: Amber.
Odor	: No data available
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	: No data available
Boiling point	: 100 °C (initial)
Flash point	: 25 °C
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Flammability (solid, gas)	: Flammable liquid and vapor
Vapor pressure	: 20 mm Hg @ 20°C
Relative vapor density at 20 °C	: > 1
Relative density	: 0.88
% Volatiles	: > 75 %
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	: No data available

#### 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 bottles under a dry nitrogen for six months.

#### 10.3. Possibility of hazardous reactions

Undergoes non-hazardous polymerization.

#### 10.4. Conditions to avoid

Heat. Open flame. Sparks.

#### 10.5. Incompatible materials

Moist air. Oxidizing agent. Water.

#### 10.6. Hazardous decomposition products

Organic acid vapors. Silicon dioxide.

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

Acute toxicity : Not classified

##### 2-Methyl-2-butanol (75-85-4)

LD50 oral rat	1000 mg/kg
ATE US (oral)	1000 mg/kg body weight

##### 4-Hydroxy-4-methyl-2-pentanone (123-42-2)

LD50 oral rat	4 g/kg
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Skin corrosion/irritation : Causes skin irritation.

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Serious eye damage/irritation	: Causes serious eye irritation.
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
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.
Symptoms/effects after skin contact	: Causes skin irritation.
Symptoms/effects after eye contact	: Causes serious eye irritation.
Symptoms/effects after ingestion	: May be harmful if swallowed.
Reason for classification	: Expert judgment

### SECTION 12: Ecological information

#### 12.1. Toxicity

##### 4-Hydroxy-4-methyl-2-pentanone (123-42-2)

LC50 fish 1	420 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])
LC50 fish 2	420 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus)

#### 12.2. Persistence and degradability

No additional information available

#### 12.3. Bioaccumulative potential

##### 2-Methyl-2-butanol (75-85-4)

Log Pow	0.89
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##### 4-Hydroxy-4-methyl-2-pentanone (123-42-2)

Log Pow	1.03
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#### 12.4. Mobility in soil

No additional information available

#### 12.5. Other adverse effects

Effect on the ozone layer : No additional information available

### SECTION 13: Disposal considerations

#### 13.1. Disposal methods

Product/Packaging disposal recommendations : Incinerate. Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to licensed waste disposal facility.

Ecology - waste materials : Avoid release to the environment.

### SECTION 14: Transport information

#### 14.1. UN number

UN-No.(DOT) : 1993  
DOT NA no. : UN1993

#### 14.2. UN proper shipping name

Transport document description : UN1993 Flammable liquids, n.o.s. (20% OCTADECYL FUNCTIONAL SILANE in mixed alcohols), 3, III

Proper Shipping Name (DOT) : Flammable liquids, n.o.s.  
(20% OCTADECYL FUNCTIONAL SILANE in mixed alcohols)

Class (DOT) : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120

Packing group (DOT) : III - Minor Danger

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Hazard labels (DOT) : 3 - Flammable liquid



DOT Packaging Non Bulk (49 CFR 173.xxx) : 203  
DOT Packaging Bulk (49 CFR 173.xxx) : 242  
DOT Packaging Exceptions (49 CFR 173.xxx) : 150  
DOT Symbols : G - Identifies PSN requiring a technical name

### 14.3. Additional information

Emergency Response Guide (ERG) Number : 128  
Other information : No supplementary information available.

### Transport by sea

DOT Vessel Stowage Location : A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.

### Air transport

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 60 L  
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 220 L

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

#### 2-Methyl-2-butanol (75-85-4)

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

#### 4-Hydroxy-4-methyl-2-pentanone (123-42-2)

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

EPA TSCA Regulatory Flag : T - T - indicates a substance that is the subject of a final TSCA section 4 test rule.

### 15.2. International regulations

#### CANADA

No additional information available

#### 2-Methyl-2-butanol (75-85-4)

Listed on the Canadian DSL (Domestic Substances List)

#### 4-Hydroxy-4-methyl-2-pentanone (123-42-2)

Listed on the Canadian DSL (Domestic Substances List)

WHMIS Classification : Class B Division 3 - Combustible Liquid  
Class D Division 2 Subdivision B - Toxic material causing other toxic effects

### EU-Regulations

No additional information available

#### 2-Methyl-2-butanol (75-85-4)

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

#### 4-Hydroxy-4-methyl-2-pentanone (123-42-2)

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

### National regulations

#### 2-Methyl-2-butanol (75-85-4)

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 Japanese ISHL (Industrial Safety and Health Law)  
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)  
Listed on INSQ (Mexican National Inventory of Chemical Substances)

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### 4-Hydroxy-4-methyl-2-pentanone (123-42-2)

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 Japanese ISHL (Industrial Safety and Health Law)  
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)  
Listed on the Canadian IDL (Ingredient Disclosure List)  
Listed on INSQ (Mexican National Inventory of Chemical Substances)  
Listed on CICR (Turkish Inventory and Control of Chemicals)

### 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

### 2-Methyl-2-butanol (75-85-4)

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

### 4-Hydroxy-4-methyl-2-pentanone (123-42-2)

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
H226	Flammable liquid and vapor
H227	Combustible liquid
H302	Harmful if swallowed
H315	Causes skin irritation
H319	Causes serious eye irritation
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 : 2 Moderate Hazard - Temporary or minor injury may occur  
Flammability : 3 Serious Hazard - Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 F and boiling points above 100 F. as well as liquids with flash points between 73 F and 100 F. (Classes IB & IC)  
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: 07/15/2015 Version: 1.0

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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## Hydrophobic Water-Dispersible Coatings For Glass and Ceramics

Features: Provides water-repellency, lubricity, surface resistivity to glass and vitreous surfaces.

Applications:





**semiconductor substrates** - provides hydrophobic anti-stiction coatings for silicon.

**laboratory glassware** - improves drainage, reduces breakage.

**optical fibers** - provides lubricity and reduces breakage during fabrication and operational flexing.

**clinical analysis** - decreases protein adsorption of analytical and diagnostic equipment  
decreases hemolysis and increases clotting time of blood. Siliclad® is not for food or drug use.

**porcelain ware** - provides a glide surface and reduces adhesion to other porcelain ware.

Capsular Description:	Thickness	 molecular	Cure	 air/moisture	Hardness	 low	Type	 solvent-borne 1-part
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### Siliclad® Hydrophobic Coating

#### Description

Siliclad® is a monomeric octadecylsilane derivative in a mixture of tertiary alcohols and diacetone alcohol that reacts with water to form a silanol-rich prepolymer. The silanol-rich prepolymer condenses with available hydroxyl groups of siliceous substrates to form a chemically bound alkylsilicone.

#### Properties of Treated Surfaces

Values reported are for glass slides dipped in 1% solutions of Siliclad® and cured 5 minutes at 100°C.

#### Critical Surface Tension

untreated	$\gamma_c = 78$ dynes/cm
treated (hydrophobic)	$\gamma_c = 31$ dynes/cm

#### Surface Resistivity

untreated	$1 \times 10^{12}$ ohms
treated	$1.2 \times 10^{13}$ ohms

#### Coefficient of Friction, Static (glass slide on glass slide)

untreated	0.9-1.0
treated	0.2-0.3

#### Blood Protein Adsorption

(comparative 100 hour adsorption value for whole human blood on borosilicate glass surfaces)

untreated	0.13mg/mm <sup>2</sup>
treated	0.01-0.02mg/mm <sup>2</sup>

#### Solution Properties of Siliclad®

solids	20%
color, gardner scale	7
specific gravity	0.88
flashpoint	27°C
viscosity	8-20 cSt.

#### Reference:

A. Almanza-Workman et al, J. Electrochem. Soc., 149, H6, 2002.

#### Shelf Life of Siliclad®

The shelf life of Siliclad® is six months in sealed containers. The product is normally hazy. A small amount of precipitate does not affect the performance of the solution.

#### Standard Packaging

**SIS6952.0 Siliclad®**

100g/\$20.00
1.5kg/\$172.00
15kg/commercial package

#### Application Methods

Siliclad® is most frequently used as a dilute aqueous dispersion containing 0.1-1.0% of reactive silane. A 0.2% solution of active chemical can be easily prepared by adding one part by weight of the product as supplied to 99 parts of water while stirring. The following treatment method is frequently employed.

1. Thoroughly clean objects with an alkaline detergent. Used or old glass surfaces may require immersion in 2-3% sodium hydroxide. All detergent and alkali should be removed with a final rinse.
2. Prepare a 1% solution of Siliclad® in water. Ordinary tap water is acceptable. "Hard water" or "fluoridated water," is not acceptable.
3. Immerse the glass or vitreous surface in the solution for 5-10 seconds, ensuring that all surfaces are wetted by the solution. Agitation of the solution or the object generally results in more uniform deposition. After immersion, remove the part and gently but thoroughly rinse with water to remove excess Siliclad® from the surface.
4. Cure Siliclad® by bringing surface temperature to 100°C for 3-5 minutes. Room temperature cure may be accomplished by air drying for 24 hours if relative humidity is 65% or less.

Each liter of solution will coat approximately 80 one liter beakers, 600 15cm test tubes, or approximately 250 m<sup>2</sup> of surface.

#### Stability of Siliclad® Solutions

Aqueous solutions are not stable and will turn cloudy and precipitate after standing for several days. The solution stability can be optimized by adjusting pH to 4.5-5.