SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product form</td>
<td>Substance</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Substance name</td>
<td>t-BUTYLGERMANE</td>
</tr>
<tr>
<td>Product code</td>
<td>GEB1970</td>
</tr>
<tr>
<td>Formula</td>
<td>C4H12Ge</td>
</tr>
<tr>
<td>Synonyms</td>
<td>t-BUTYLGERMANIUM HYDRIDE</td>
</tr>
<tr>
<td>Chemical family</td>
<td>ORGANOGERMANIUM</td>
</tr>
</tbody>
</table>

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
info@gelest.com - www.gelest.com

GELEST INC.
Fritz-Klatte-Strasse 8
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

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]

Signal word (CLP): Danger

Hazard pictograms (CLP):

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHS02</td>
<td></td>
</tr>
</tbody>
</table>

Hazard statements (CLP): H225 - Highly flammable liquid and vapour.
Precautionary statements (CLP):

P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 - Keep container tightly closed.
2.3. Other hazards
No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substances
Substance type: Mono-constituent
Name: t-BUTYLGERMANE
CAS-No.: 149540-54-5

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>Classification according to Regulation (EC) No. 1272/2008 [CLP]</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-Butylermane</td>
<td>(CAS-No.) 149540-54-5</td>
<td>&gt; 95</td>
<td>Flam. Liq. 2, H225</td>
</tr>
</tbody>
</table>

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. If you feel unwell, seek medical advice.

First aid measures after skin contact: Wash with plenty of water/….

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, both acute and delayed
Symptoms/effects after inhalation: May cause irritation to the respiratory tract.

Symptoms/effects after skin contact: May cause skin irritation.

Symptoms/effects after eye contact: May cause eye irritation.

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

SECTION 5: Firefighting measures

5.1. Extinguishing media

Unsuitable extinguishing media: Water.

5.2. Special hazards arising from the substance or mixture
Fire hazard: Highly flammable liquid and vapour. Can generate hydrogen gas if exposed to caustic solutions. Irritating fumes and organic acid vapors may develop when material is exposed to elevated temperatures or open flame.

Explosion hazard: May form flammable/explosive vapour-air mixture.

5.3. Advice for firefighters
Firefighting instructions: Use water spray to cool exposed surfaces. 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 vapour 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
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 vapour and mist. Provide good ventilation in process area to prevent formation of vapour. Containers must be properly grounded before beginning transfer. Take precautionary measures against static discharge. 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. Use explosion-proof electrical equipment.

Storage conditions: Keep container tightly closed. Do not store at elevated temperature. Refrigeration is recommended.

Incompatible materials: Oxidizing agent.

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

7.3. Specific end use(s)
No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
No additional information available

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. 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.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties
Physical state: Liquid
t-BUTYLGERMANE
Safety Data Sheet

Appearance: Clear liquid.
Molecular mass: 132.73 g/mol
Colour: Straw.
Odour: Mild.
Odour threshold: No data available
Refractive index: No additional information available
pH: No data available
Relative evaporation rate (butylacetate=1): > 1
Melting point: No data available
Freezing point: < 0 °C
Boiling point: 50 °C
Flash point: < 23 °C
Auto-ignition temperature: No data available
Decomposition temperature: No data available
Flammability (solid, gas): Highly flammable liquid and vapour.
Vapour pressure: No data available
Relative vapour density at 20 °C: > 1
Relative density: 0.97
% Volatiles: 100 %
Solubility: Insoluble in 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: 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 at temperatures not exceeding 25°C for up to six months.

10.3. Possibility of hazardous reactions
Alkalai or base materials may cause the release of small quantities of hydrogen gas.

10.4. Conditions to avoid
Heat. Open flame. Sparks.

10.5. Incompatible materials
Oxidizing agent.

10.6. Hazardous decomposition products
Germanium oxides. Organic acid vapors.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute toxicity: Not classified
Skin corrosion/irritation: Not classified
Serious eye damage/irritation: Not classified
Respiratory or skin sensitisation: Not classified
Germ cell mutagenicity: Not classified
Carcinogenicity: Not classified
Reproductive toxicity: Not classified
STOT-single exposure: Not classified
STOT-repeated exposure: Not classified
t-BUTYLGERMANE
Safety Data Sheet

<table>
<thead>
<tr>
<th>Aspiration hazard</th>
<th>Not classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms/effects after inhalation</td>
<td>May cause irritation to the respiratory tract.</td>
</tr>
<tr>
<td>Symptoms/effects after skin contact</td>
<td>May cause skin irritation.</td>
</tr>
<tr>
<td>Symptoms/effects after eye contact</td>
<td>May cause eye irritation.</td>
</tr>
<tr>
<td>Symptoms/effects after ingestion</td>
<td>May be harmful if swallowed.</td>
</tr>
</tbody>
</table>

**SECTION 12: Ecological information**

12.1. **Toxicity**

<table>
<thead>
<tr>
<th>Acute aquatic toxicity</th>
<th>Not classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic aquatic toxicity</td>
<td>Not classified</td>
</tr>
</tbody>
</table>

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**

No additional information available

**SECTION 13: Disposal considerations**

13.1. **Waste treatment methods**

<table>
<thead>
<tr>
<th>Product/Packaging disposal recommendations</th>
<th>Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to licensed waste disposal facility.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional information</td>
<td>Handle empty containers with care because residual vapours are flammable.</td>
</tr>
<tr>
<td>Ecology - waste materials</td>
<td>Avoid release to the environment.</td>
</tr>
</tbody>
</table>

**SECTION 14: Transport information**

14.1. **UN number**

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

14.1. **UN number**

<table>
<thead>
<tr>
<th>UN-No. (ADR)</th>
<th>1993</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN-No. (IMDG)</td>
<td>1993</td>
</tr>
<tr>
<td>UN-No. (IATA)</td>
<td>1993</td>
</tr>
<tr>
<td>UN-No. (ADN)</td>
<td>1993</td>
</tr>
<tr>
<td>UN-No. (RID)</td>
<td>1993</td>
</tr>
</tbody>
</table>

14.2. **UN proper shipping name**

<table>
<thead>
<tr>
<th>Proper Shipping Name (ADR)</th>
<th>FLAMMABLE LIQUID, N.O.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper Shipping Name (IMDG)</td>
<td>FLAMMABLE LIQUID, N.O.S.</td>
</tr>
<tr>
<td>Proper Shipping Name (IATA)</td>
<td>Flammable liquid, n.o.s.</td>
</tr>
<tr>
<td>Proper Shipping Name (ADN)</td>
<td>FLAMMABLE LIQUID, N.O.S.</td>
</tr>
<tr>
<td>Proper Shipping Name (RID)</td>
<td>FLAMMABLE LIQUID, N.O.S.</td>
</tr>
<tr>
<td>Transport document description (ADR)</td>
<td>UN 1993 FLAMMABLE LIQUID, N.O.S. (t-BUTYLGERMANE), 3, II, (D/E)</td>
</tr>
<tr>
<td>Transport document description (IMDG)</td>
<td>UN 1993 FLAMMABLE LIQUID, N.O.S. (t-BUTYLGERMANE), 3, II</td>
</tr>
<tr>
<td>Transport document description (IATA)</td>
<td>UN 1993 Flammable liquid, n.o.s. (t-BUTYLGERMANE), 3, II</td>
</tr>
<tr>
<td>Transport document description (ADN)</td>
<td>UN 1993 FLAMMABLE LIQUID, N.O.S. (t-BUTYLGERMANE), 3, II</td>
</tr>
<tr>
<td>Transport document description (RID)</td>
<td>UN 1993 FLAMMABLE LIQUID, N.O.S. (t-BUTYLGERMANE), 3, II</td>
</tr>
</tbody>
</table>

14.3. **Transport hazard class(es)**

<table>
<thead>
<tr>
<th>ADR</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger labels (ADR)</td>
<td>3</td>
</tr>
</tbody>
</table>
t-BUTYLGERMANE
Safety Data Sheet

IMDG
Transport hazard class(es) (IMDG) : 3
Danger labels (IMDG) : 3

IATA
Transport hazard class(es) (IATA) : 3
Hazard labels (IATA) : 3

ADN
Transport hazard class(es) (ADN) : 3
Danger labels (ADN) : 3

RID
Transport hazard class(es) (RID) : 3
Danger labels (RID) : 3

14.4. Packing group
Packing group (ADR) : II
Packing group (IMDG) : II
Packing group (IATA) : II
Packing group (ADN) : II
Packing group (RID) : II

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) : F1
Special provisions (ADR) : 274, 601, 640C
**t-BUTYLGERMANE**  
Safety Data Sheet

<table>
<thead>
<tr>
<th>Limited quantities (ADR)</th>
<th>1L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excepted quantities (ADR)</td>
<td>E2</td>
</tr>
<tr>
<td>Packing instructions (ADR)</td>
<td>P001</td>
</tr>
<tr>
<td>Mixed packing provisions (ADR)</td>
<td>MP19</td>
</tr>
<tr>
<td>Portable tank and bulk container instructions (ADR)</td>
<td>T7</td>
</tr>
<tr>
<td>Portable tank and bulk container special provisions (ADR)</td>
<td>TP1, TP8, TP28</td>
</tr>
<tr>
<td>Tank code (ADR)</td>
<td>L1.5BN</td>
</tr>
<tr>
<td>Vehicle for tank carriage</td>
<td>FL</td>
</tr>
<tr>
<td>Transport category (ADR)</td>
<td>2</td>
</tr>
<tr>
<td>Special provisions for carriage - Operation (ADR)</td>
<td>S2, S20</td>
</tr>
<tr>
<td>Hazard identification number (Kemler No.)</td>
<td>33</td>
</tr>
<tr>
<td>Orange plates</td>
<td></td>
</tr>
</tbody>
</table>

| Tunnel restriction code (ADR) | D/E |

**Transport by sea**

<table>
<thead>
<tr>
<th>Special provisions (IMDG)</th>
<th>274</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited quantities (IMDG)</td>
<td>1L</td>
</tr>
<tr>
<td>Excepted quantities (IMDG)</td>
<td>E2</td>
</tr>
<tr>
<td>Packing instructions (IMDG)</td>
<td>P001</td>
</tr>
<tr>
<td>IBC packing instructions (IMDG)</td>
<td>IBC02</td>
</tr>
<tr>
<td>Tank instructions (IMDG)</td>
<td>T7</td>
</tr>
<tr>
<td>Tank special provisions (IMDG)</td>
<td>TP1, TP8, TP28</td>
</tr>
<tr>
<td>EmS-No. (Fire)</td>
<td>F-E</td>
</tr>
<tr>
<td>EmS-No. (Spillage)</td>
<td>S-E</td>
</tr>
<tr>
<td>Stowage category (IMDG)</td>
<td>B</td>
</tr>
</tbody>
</table>

**Air transport**

| PCA Excepted quantities (IATA) | E2 |
| PCA Limited quantities (IATA) | Y341 |
| PCA limited quantity max net quantity (IATA) | 1L |
| PCA packing instructions (IATA) | 353 |
| PCA max net quantity (IATA) | 5L |
| CAO packing instructions (IATA) | 364 |
| CAO max net quantity (IATA) | 60L |
| Special provisions (IATA) | A3 |
| ERG code (IATA) | 3H |

**Inland waterway transport**

| Classification code (ADN) | F1 |
| Special provisions (ADN) | 274, 601, 640C |
| Limited quantities (ADN) | 1L |
| Excepted quantities (ADN) | E2 |
| Carriage permitted (ADN) | T |
| Equipment required (ADN) | PP, EX, A |
| Ventilation (ADN) | VE01 |
| Number of blue cones/lights (ADN) | 1 |

**Rail transport**

| Classification code (RID) | F1 |
| Special provisions (RID) | 274, 601, 640C |
| Limited quantities (RID) | 1L |
| Excepted quantities (RID) | E2 |
| Packing instructions (RID) | P001 |
| Mixed packing provisions (RID) | MP19 |
### 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

**t**-BUTYLGERMANE is not on the REACH Candidate List

**t**-BUTYLGERMANE is not on the REACH Annex XIV List

**t**-BUTYLGERMANE 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.


| % Volatiles | 100 % |

#### 15.1.2. National regulations

**Germany**


**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**

- **Class for fire hazard**: Class II-1
- **Store unit**: 5 liter
- **Classification remarks**: R10 <H225>; Emergency management guidelines for the storage of flammable liquids must be followed

#### 15.2. Chemical safety assessment

No additional information available

**SECTION 16: Other information**

**Abbreviations and acronyms**

<table>
<thead>
<tr>
<th>Abbreviations</th>
<th>Acronyms</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Other information</td>
<td>Prepared by safety and environmental affairs.</td>
</tr>
<tr>
<td>Full text of H- and EUH-statements</td>
<td>Flam. Liq. 2</td>
</tr>
<tr>
<td></td>
<td>H225</td>
</tr>
</tbody>
</table>
t-BUTYLGERMANE
Safety Data Sheet

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.

© 2019 Gelest Inc. Morrisville, PA 19067