SECTION 1: Identification

1.1. Identification

<table>
<thead>
<tr>
<th>Product name</th>
<th>BORON t-BUTOXIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product code</td>
<td>AKB156</td>
</tr>
<tr>
<td>Product form</td>
<td>Substance</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Formula</td>
<td>C12H27BO3</td>
</tr>
<tr>
<td>Synonyms</td>
<td>TRI-T-BUTYL BORATE; TRI-T-BUTOXYBORANE; BORIC ACID TRI(TERT-BUTYL) ESTER; BORIC ACID (H3BO3), TRIS(1,1-DIMETHYLETHYL) ESTER</td>
</tr>
<tr>
<td>Chemical family</td>
<td>ESTER</td>
</tr>
</tbody>
</table>

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 3 (H226)
- Skin corrosion/irritation Category 2 (H315)
- Serious eye damage/eye irritation Category 2A (H319)
- Specific target organ toxicity (single exposure) Category 3 (H335)

Full text of H statements: see section 16

2.2. GHS Label elements, including precautionary statements

GHS US labeling

Hazard pictograms (GHS US): ![](flame) ![](warning)

Signal word (GHS US): Warning

Hazard statements (GHS US):

- 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.
- P312 - Call a doctor if you feel unwell
- 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+P337+P338 - 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.
- P321 - Specific treatment (see first aid instructions on this label)
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P362+P364 - Take off contaminated clothing and wash it before reuse.
P370+P378 - In case of fire: Use alcohol resistant foam, carbon dioxide, dry chemical to extinguish.
P403+P233 - Store in a well-ventilated place. 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)
No additional information available

2.4. Unknown acute toxicity (GHS US)
Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

<table>
<thead>
<tr>
<th>Substance type</th>
<th>Name</th>
<th>CAS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mono-constituent</td>
<td>BORON t-BUTOXIDE</td>
<td>7397-43-5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>GHS-US classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boron t-butoxide</td>
<td>(CAS-No.) 7397-43-5</td>
<td>95 - 100</td>
<td>Flam. Liq. 3, H226, Skin Irrit. 2, H315, Eye Irrit. 2A, H319, STOT SE 3, H335</td>
</tr>
</tbody>
</table>

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. 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: Alcohol-resistant foam. Carbon dioxide. Dry chemical.

Unsuitable extinguishing media: Avoid water spray as n-butanol will be generated.

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.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures: Eliminate ignition sources. Use special care to avoid static electric charges.
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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: 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
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: Avoid all eye and skin contact and do not breathe vapor and mist. Ground/bond container and receiving equipment. Take precautionary measures against static discharge. 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: Proper grounding procedures to avoid static electricity should be followed. Use explosion-proof electrical equipment.
Storage conditions: Keep container tightly closed. Keep in a cool place. Store locked up.
Incompatible materials: Water.
Storage area: Store in a well-ventilated place. Store away from heat.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Boron t-butoxide (7397-43-5)</th>
<th>ACGIH</th>
<th>ACGIH TWA (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>100 ppm</td>
</tr>
</tbody>
</table>

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.
SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

- **Physical state**: Liquid
- **Appearance**: Liquid.
- **Molecular mass**: 230.16 g/mol
- **Color**: Water white.
- **Odor threshold**: Mild odor of t-butanol.
- **Odor**: No data available
- **Refractive index**: 1.389
- **pH**: No data available
- **Relative evaporation rate (butyl acetate=1)**: No data available
- **Melting point**: No data available
- **Freezing point**: 18 - 19 °C
- **Boiling point**: 101 °C @ 74 mm Hg
- **Flash point**: 29 °C
- **Auto-ignition temperature**: No data available
- **Decomposition temperature**: No data available
- **Flammability (solid, gas)**: Flammable liquid and vapor
- **Vapor pressure**: No data available
- **Relative vapor density at 20 °C**: > 1
- **Relative density**: 0.811
- **% Volatiles**: > 90 %
- **Solubility**: 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.

10.3. Possibility of hazardous reactions

Material decomposes slowly in contact with air by reaction with moisture, liberating n-butanol and boric acid. Avoid contact with water.

10.4. Conditions to avoid

Heat. Open flame. Sparks.

10.5. Incompatible materials

Water.

10.6. Hazardous decomposition products

Boron oxide fumes. Organic acid vapors.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

- **Acute toxicity**: Not classified
- **Skin corrosion/irritation**: Causes skin irritation.
- **Serious eye damage/irritation**: Causes serious eye irritation.
- **Respiratory or skin sensitization**: Not classified
- **Germ cell mutagenicity**: Not classified
- **Carcinogenicity**: Not classified
### BORON t-BUTOXIDE
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<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reproductive toxicity</td>
<td>: Not classified</td>
<td></td>
</tr>
<tr>
<td>Specific target organ toxicity – single exposure</td>
<td>: May cause respiratory irritation.</td>
<td></td>
</tr>
<tr>
<td>Specific target organ toxicity – repeated exposure</td>
<td>: Not classified</td>
<td></td>
</tr>
<tr>
<td>Aspiration hazard</td>
<td>: Not classified</td>
<td></td>
</tr>
<tr>
<td>Symptoms/effects after inhalation</td>
<td>: May cause respiratory irritation.</td>
<td></td>
</tr>
<tr>
<td>Symptoms/effects after skin contact</td>
<td>: Causes skin irritation.</td>
<td></td>
</tr>
<tr>
<td>Symptoms/effects after eye contact</td>
<td>: Causes serious eye irritation.</td>
<td></td>
</tr>
<tr>
<td>Symptoms/effects after ingestion</td>
<td>: May be harmful if swallowed.</td>
<td></td>
</tr>
<tr>
<td>Reason for classification</td>
<td>: Expert judgment</td>
<td></td>
</tr>
<tr>
<td><strong>SECTION 12: Ecological information</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.1.</td>
<td>Toxicity</td>
<td>No additional information available</td>
</tr>
<tr>
<td>12.2.</td>
<td>Persistence and degradability</td>
<td>No additional information available</td>
</tr>
<tr>
<td>12.3.</td>
<td>Bioaccumulative potential</td>
<td>No additional information available</td>
</tr>
<tr>
<td>12.4.</td>
<td>Mobility in soil</td>
<td>No additional information available</td>
</tr>
<tr>
<td>12.5.</td>
<td>Other adverse effects</td>
<td>This substance may be hazardous to the environment.</td>
</tr>
<tr>
<td>Effect on the ozone layer</td>
<td>: No additional information available</td>
<td></td>
</tr>
<tr>
<td><strong>SECTION 13: Disposal considerations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.1.</td>
<td>Disposal methods</td>
<td>Do not dispose of waste into sewer.</td>
</tr>
<tr>
<td>Sewage disposal recommendations</td>
<td>: Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to licensed waste disposal facility.</td>
<td></td>
</tr>
<tr>
<td>Product/Packaging disposal recommendations</td>
<td>: Dispose of contents/container to licensed waste disposal facility.</td>
<td></td>
</tr>
<tr>
<td>Additional information</td>
<td>: Handle empty containers with care because residual vapors are flammable.</td>
<td></td>
</tr>
<tr>
<td>Ecology - waste materials</td>
<td>: Avoid release to the environment.</td>
<td></td>
</tr>
<tr>
<td><strong>SECTION 14: Transport information</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 14.1. | UN number                                                               | UN-No.(DOT) : 1993  
DOT NA no. : UN1993                                                      |
| 14.2. | UN proper shipping name                                                 | UN1993 Flammable liquids, n.o.s. (BORON t-BUTOXIDE), 3, III                |
| Transport document description | : UN1993 Flammable liquids, n.o.s. (BORON t-BUTOXIDE)  
Flammable liquids, n.o.s. (BORON t-BUTOXIDE) |
| Proper Shipping Name (DOT) | : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120          |
| Class (DOT) | : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120          |
| Packing group (DOT) | : 3 - Flammable liquid                                                  |
| Hazard labels (DOT) | : III - Minor Danger                                                   |
| DOT Symbols | : G - Identifies PSN requiring a technical name                        |                                                                              |
| **14.3.** | Additional information                                                | Emergency Response Guide (ERG) Number : 128                              |

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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
BORON t-BUTOXIDE (7397-43-5)
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.

15.2. International regulations
CANADA
No additional information available

EU-Regulations
No additional information available

National regulations
Boron t-butoxide (7397-43-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

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

SECTION 16: Other information

Full text of H-phrases:

| H226 | Flammable liquid and vapor |
| 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)
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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: 10/12/2015
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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