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>
</tbody>
</table>
| Substance name | ALUMINUM s-BUTOXIDE, 99+%
| Product code | AKA020.1 |
| Formula | C12H27AlO3 |
| Synonyms | ALUMINUM TRI-sec-BUTOXIDE |
| Chemical family | METAL ALCOHOLATE |

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**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Category</th>
<th>H statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable liquids</td>
<td>3</td>
<td>H226</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>2</td>
<td>H319</td>
</tr>
</tbody>
</table>

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):**

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHS02</td>
<td>Flammable liquid and vapour.</td>
</tr>
<tr>
<td>GHS07</td>
<td>Causes serious eye irritation.</td>
</tr>
</tbody>
</table>

**Signal word (CLP):** Warning

**Hazard statements (CLP):**

- H226 - Flammable liquid and vapour.
- H319 - Causes serious eye irritation.

**Precautionary statements (CLP):**

- P280 - Wear protective gloves/protective clothing/eye protection/face protection.
- P264 - Wash hands thoroughly after handling.
ALUMINUM s-BUTOXIDE, 99+%  
Safety Data Sheet

P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.  
P240 - Ground/bond container and receiving equipment.  
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

2.3. Other hazards
No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substances

<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>
</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: Causes serious 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: Avoid water spray as s-butanol will be generated.

5.2. Special hazards arising from the substance or mixture
Fire hazard: Flammable liquid and vapour. Imitating fumes and organic acid vapors may develop when material is exposed to elevated temperatures or open flame.

5.3. Advice for firefighters
Firefighting instructions: 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.
ALUMINUM s-BUTOXIDE, 99+%  
Safety Data Sheet

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
Emergency procedures: Evacuate unnecessary personnel.
6.1.2. For emergency responders
Protective equipment: Equip cleanup crew with proper 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 and transfer lines require grounding during use. Do not allow vapors or dust to accumulate in work areas. 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.
Storage conditions: Keep container tightly closed.
Incompatible materials: 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
2-Butanol (78-92-2)

<table>
<thead>
<tr>
<th>Country</th>
<th>Parameter</th>
<th>Limit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>MAK (mg/m³)</td>
<td>150 mg/m³</td>
</tr>
<tr>
<td>Austria</td>
<td>MAK (ppm)</td>
<td>50 ppm</td>
</tr>
<tr>
<td>Austria</td>
<td>MAK Short time value (mg/m³)</td>
<td>600 mg/m³</td>
</tr>
<tr>
<td>Austria</td>
<td>MAK Short time value (ppm)</td>
<td>200 ppm</td>
</tr>
<tr>
<td>Belgium</td>
<td>Limit value (mg/m³)</td>
<td>307 mg/m³</td>
</tr>
<tr>
<td>Belgium</td>
<td>Limit value (ppm)</td>
<td>100 ppm</td>
</tr>
<tr>
<td>France</td>
<td>VME (mg/m³)</td>
<td>300 mg/m³</td>
</tr>
<tr>
<td>France</td>
<td>VME (ppm)</td>
<td>100 ppm</td>
</tr>
<tr>
<td>Greece</td>
<td>OEL TWA (mg/m³)</td>
<td>300 mg/m³</td>
</tr>
<tr>
<td>Greece</td>
<td>OEL TWA (ppm)</td>
<td>100 ppm</td>
</tr>
<tr>
<td>Greece</td>
<td>OEL STEL (mg/m³)</td>
<td>450 mg/m³</td>
</tr>
<tr>
<td>Germany</td>
<td>OEL STEL (ppm)</td>
<td>150 ppm</td>
</tr>
<tr>
<td>Italy - Portugal - USA ACGIH</td>
<td>ACGIH TWA (ppm)</td>
<td>100 ppm</td>
</tr>
<tr>
<td>Latvia</td>
<td>OEL TWA (mg/m³)</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>USA IDLH</td>
<td>US IDLH (ppm)</td>
<td>2000 ppm</td>
</tr>
<tr>
<td>USA NIOSH</td>
<td>NIOSH REL (TWA) (mg/m³)</td>
<td>305 mg/m³</td>
</tr>
<tr>
<td>USA NIOSH</td>
<td>NIOSH REL (TWA) (ppm)</td>
<td>100 ppm</td>
</tr>
<tr>
<td>USA NIOSH</td>
<td>NIOSH REL (STEL) (mg/m³)</td>
<td>455 mg/m³</td>
</tr>
<tr>
<td>USA NIOSH</td>
<td>NIOSH REL (STEL) (ppm)</td>
<td>150 ppm</td>
</tr>
<tr>
<td>USA OSHA</td>
<td>OSHA PEL (TWA) (mg/m³)</td>
<td>450 mg/m³</td>
</tr>
<tr>
<td>USA OSHA</td>
<td>OSHA PEL (TWA) (ppm)</td>
<td>150 ppm</td>
</tr>
<tr>
<td>Spain</td>
<td>VLA-ED (mg/m³)</td>
<td>308 mg/m³</td>
</tr>
</tbody>
</table>

Print date: 09/04/2019  EN (English)  SDS ID: AKA020.1  3/10
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
ALUMINUM s-BUTOXIDE, 99+%  
Safety Data Sheet

Respiratory protection:  
NIOSH-certified organic vapor (black cartridge) respirator.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Appearance</td>
<td>Liquid. Viscous.</td>
</tr>
<tr>
<td>Molecular mass</td>
<td>246.32 g/mol</td>
</tr>
<tr>
<td>Colour</td>
<td>Pale yellow. Amber.</td>
</tr>
<tr>
<td>Odour</td>
<td>Slight odor of s-butanol.</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>Refractive index</td>
<td>1.438</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative evaporation rate (butylacetate=1)</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point</td>
<td>&lt; 0 °C</td>
</tr>
<tr>
<td>Freezing point</td>
<td>No data available</td>
</tr>
<tr>
<td>Boiling point</td>
<td>200 - 206 °C @ 30 mm Hg</td>
</tr>
<tr>
<td>Flash point</td>
<td>27 °C</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Flammable liquid and vapour.</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative vapour density at 20 °C</td>
<td>&gt; 1</td>
</tr>
<tr>
<td>Relative density</td>
<td>0.9671</td>
</tr>
<tr>
<td>% Volatiles</td>
<td>&gt; 25 %</td>
</tr>
<tr>
<td>Solubility</td>
<td>Reacts with water.</td>
</tr>
<tr>
<td>Log Pow</td>
<td>No data available</td>
</tr>
<tr>
<td>Log Kow</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, kinematic</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive limits</td>
<td>No data available</td>
</tr>
</tbody>
</table>

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 s-butanol and aluminum hydroxide.

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

10.5. Incompatible materials
Water:

10.6. Hazardous decomposition products

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute toxicity: Not classified

<table>
<thead>
<tr>
<th>Compound</th>
<th>LD50 oral rat</th>
<th>LD50 dermal rabbit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Butanol (78-92-2)</td>
<td>2200 mg/kg</td>
<td>&gt; 2000 mg/kg</td>
</tr>
</tbody>
</table>

Print date: 09/04/2019 EN (English) SDS ID: AKA020.1 5/10
ALUMINUM s-BUTOXIDE, 99+%  
Safety Data Sheet

Skin corrosion/irritation : Not classified  
Serious eye damage/irritation : Causes serious eye irritation.  
Respiratory or skin sensitisation : Not classified  
Germ cell mutagenicity : Not classified  
Reproductive toxicity : Not classified  
STOT-single exposure : Not classified  
STOT-repeated exposure : Not classified  
Aspiration hazard : Not classified  
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 : 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  
Acute aquatic toxicity : Not classified  
Chronic aquatic toxicity : Not classified

2-Butanol (78-92-2)

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 fish 1</td>
<td>3380 - 3990 mg/l (Exposure time: 96h - Species: Pimephales promelas [flow-through])</td>
</tr>
<tr>
<td>EC50 Daphnia 1</td>
<td>1859 - 7143 mg/l (Exposure time: 48h - Species: Daphnia magna [Static])</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability  
No additional information available

12.3. Bioaccumulative potential  
2-Butanol (78-92-2)

<table>
<thead>
<tr>
<th>Log Pow</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.6</td>
</tr>
</tbody>
</table>

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  
Product/Packaging disposal recommendations : 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  
In accordance with ADR / RID / IMDG / IATA / ADN

14.2. UN proper shipping name  
Proper Shipping Name (ADR) : FLAMMABLE LIQUID, N.O.S.  
Proper Shipping Name (IMDG) : FLAMMABLE LIQUID, N.O.S.  
Proper Shipping Name (IATA) : Flammable liquid, n.o.s.  
Proper Shipping Name (ADN) : FLAMMABLE LIQUID, N.O.S.  
Proper Shipping Name (RID) : FLAMMABLE LIQUID, N.O.S.
ALUMINUM s-BUTOXIDE, 99+%  
Safety Data Sheet

Transport document description (ADR) : UN 1993 FLAMMABLE LIQUID, N.O.S. (ALUMINUM s-BUTOXIDE), 3, III (D/E)
Transport document description (IMDG) : UN 1993 FLAMMABLE LIQUID, N.O.S. (ALUMINUM s-BUTOXIDE), 3, III
Transport document description (IATA) : UN 1993 FLAMMABLE LIQUID, N.O.S. (ALUMINUM s-BUTOXIDE), 3, III
Transport document description (ADN) : UN 1993 FLAMMABLE LIQUID, N.O.S. (ALUMINUM s-BUTOXIDE), 3, III
Transport document description (RID) : UN 1993 FLAMMABLE LIQUID, N.O.S. (ALUMINUM s-BUTOXIDE), 3, III

14.3. Transport hazard class(es)

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

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) : III
Packing group (IMDG) : III
Packing group (IATA) : III
Packing group (ADN) : III
## Environmental hazards

<table>
<thead>
<tr>
<th>Packing group (RID)</th>
<th>III</th>
</tr>
</thead>
</table>

### 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, 640E
- Limited quantities (ADR): 5L
- Excepted quantities (ADR): E1
- Packing instructions (ADR): P001, IBC03, LP01, R001
- Mixed packing provisions (ADR): MP19
- Portable tank and bulk container instructions (ADR): T4
- Portable tank and bulk container special provisions (ADR): TP1, TP29
- Tank code (ADR): LGBF
- Vehicle for tank carriage: FL
- Transport category (ADR): 3
- Special provisions for carriage - Packages (ADR): V12
- Special provisions for carriage - Operation (ADR): S2
- Hazard identification number (Kemler No.): 30
- Orange plates: 30
- Tunnel restriction code (ADR): D/E

#### - Transport by sea

- Special provisions (IMDG): 223, 274, 955
- Limited quantities (IMDG): 5 L
- Excepted quantities (IMDG): E1
- Packing instructions (IMDG): P001, LP01
- IBC packing instructions (IMDG): IBC03
- Tank instructions (IMDG): T4
- Tank special provisions (IMDG): TP1, TP29
- EmS-No. (Fire): F-E
- EmS-No. (Spillage): S-E
- Stowage category (IMDG): A

#### - Air transport

- PCA Excepted quantities (IATA): E1
- PCA Limited quantities (IATA): Y344
- PCA limited quantity max net quantity (IATA): 10L
- PCA packing instructions (IATA): 355
- PCA max net quantity (IATA): 60L
- CAO packing instructions (IATA): 366
- CAO max net quantity (IATA): 220L
- Special provisions (IATA): A3
- ERG code (IATA): 3L

#### - Inland waterway transport

- Classification code (ADN): F1
- Special provisions (ADN): 274, 601, 640E
- Limited quantities (ADN): 5 L
ALUMINUM s-BUTOXIDE, 99+%  
Safety Data Sheet

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
ALUMINUM s-BUTOXIDE, 99+% is not on the REACH Candidate List
ALUMINUM s-BUTOXIDE, 99+% is not on the REACH Annex XIV List
ALUMINUM s-BUTOXIDE, 99+% 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 : > 25 %

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
Class for fire hazard : Class II-1
Store unit : 5 liter
Classification remarks : R10 <H226;H319>; Emergency management guidelines for the storage of flammable liquids must be followed
ALUMINUM s-BUTOXIDE, 99+%  
Safety Data Sheet

15.2. Chemical safety assessment

No additional information available

SECTION 16: Other information

Abbreviations and acronyms:

<table>
<thead>
<tr>
<th>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</th>
</tr>
</thead>
</table>

Other information: Prepared by safety and environmental affairs.

Full text of H- and EUH-statements:

| Eye Irrit. 2 | Serious eye damage/eye irritation, Category 2 |
| Flam. Liq. 3 | Flammable liquids, Category 3 |
| STOT SE 3 | Specific target organ toxicity — Single exposure, Category 3, Respiratory tract irritation |
| STOT SE 3 | Specific target organ toxicity — Single exposure, Category 3, Narcosis |
| H226 | Flammable liquid and vapour. |
| H319 | Causes serious eye irritation. |
| H335 | May cause respiratory irritation. |
| H336 | May cause drowsiness or dizziness. |

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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