SECTION 1: Identification

1.1. Identification

Product name: ALUMINUM s-BUTOXIDE, 99+%
Product code: AKA020.1
Product form: Substance
Physical state: Liquid
Formula: C12H27AlO3
Synonyms: ALUMINUM TRI-sec-BUTOXIDE
Chemical family: METAL ALCOHOLATE

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 Flammable liquid and vapor
Serious eye damage/eye irritation Category 2A H319 Causes serious eye irritation
Full text of H statements: see section 16

2.2. GHS Label elements, including precautionary statements

GHS US labeling

Hazard pictograms (GHS US):

- Warning
- Fire

Signal word (GHS US): Warning
Hazard statements (GHS US): H226 - Flammable liquid and vapor
H319 - Causes serious eye irritation
Precautionary statements (GHS US):

- P280 - Wear protective gloves/protective clothing/eye protection/face protection.
- P264 - Wash hands thoroughly after handling.
- P210 - Keep away from heat, open flames, sparks. - No smoking.
- P233 - Keep container tightly closed.
- 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.
- P303+P361+P353 - If on skin (or hair): take off immediately all contaminated clothing. rinse skin with water/shower.
- P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
- P370+P378 - IF INHALED: Move受害者 to fresh air. If not better: get medical advice/attention.
- P337+P313 - If eye irritation persists: Get medical advice/attention.
- P403+P235 - Keep in a cool place.
- 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
ALUMINUM s-BUTOXIDE, 99+%  
Safety Data Sheet

SECTION 3: Composition/Information on ingredients

3.1. Substances

Substance type : Mono-constituent
Name : ALUMINUM s-BUTOXIDE, 99+%  
CAS-No. : 2269-22-9

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>GHS-US classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum s-butoxide</td>
<td>(CAS-No.) 2269-22-9</td>
<td>&gt; 99</td>
<td>Flam. Liq. 3, H226</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eye Irrit. 2A, H319</td>
</tr>
<tr>
<td>2-Butanol</td>
<td>(CAS-No.) 78-92-2</td>
<td></td>
<td>Flam. Liq. 3, H226</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eye Irrit. 3A, H319</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>STOT SE 3, H336</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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.

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 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. Immediate medical attention and special treatment, if necessary

No additional information available

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media


Unsuitable extinguishing media : Avoid water spray as s-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.

5.3. Special protective equipment and precautions for fire-fighters

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 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

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 vapor and mist. Provide good ventilation in process area to prevent accumulation of vapors. 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.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th></th>
<th>ACGIH</th>
<th>OSHA</th>
<th>OSHA</th>
<th>NIOSH</th>
<th>NIOSH</th>
<th>NIOSH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ACGIH TWA (ppm)</td>
<td>OSHA PEL (TWA) (mg/m³)</td>
<td>OSHA PEL (TWA) (ppm)</td>
<td>US IDLH (ppm)</td>
<td>NIOSH REL (TWA) (mg/m³)</td>
<td>NIOSH REL (TWA) (ppm)</td>
</tr>
<tr>
<td>2-Butanol (78-92-2)</td>
<td>100 ppm</td>
<td>450 mg/m³</td>
<td>150 ppm</td>
<td>2000 ppm</td>
<td>305 mg/m³</td>
<td>100 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.2. 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:
NIOSH-certified organic vapor (black cartridge) respirator.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid</td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>Liquid. Viscous.</td>
<td></td>
</tr>
<tr>
<td>Molecular mass</td>
<td>246.32 g/mol</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Pale yellow. Amber.</td>
<td></td>
</tr>
<tr>
<td>Odor</td>
<td>Slight odor of s-butanol.</td>
<td></td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td>Refractive index</td>
<td>1.438</td>
<td></td>
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</table>
ALUMINUM s-BUTOXIDE, 99+%  
Safety Data Sheet

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
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</tr>
<tr>
<td>Relative evaporation rate (butyl acetate=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 vapor</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative vapor 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>
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<tr>
<td>Oxidizing properties</td>
<td>No data available</td>
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<tr>
<td>Explosion 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

2-Butanol (78-92-2)

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 oral rat</td>
<td>2200 mg/kg</td>
</tr>
<tr>
<td>LD50 dermal rabbit</td>
<td>&gt; 2000 mg/kg</td>
</tr>
<tr>
<td>ATE US (oral)</td>
<td>2200 mg/kg body weight</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation : Not classified
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 : Not classified

Specific target organ toxicity – repeated exposure : Not classified
ALUMINUM s-BUTOXIDE, 99+%  
Safety Data Sheet

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

<table>
<thead>
<tr>
<th>2-Butanol (78-92-2)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 fish 1</td>
<td>3380 - 3990 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])</td>
</tr>
<tr>
<td>EC50 Daphnia 1</td>
<td>1859 - 7143 mg/l (Exposure time: 48 h - 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)

| Log Pow | 0.6 |

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 : 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. (ALUMINUM s-BUTOXIDE), 3, III
Proper Shipping Name (DOT) : Flammable liquids, n.o.s. (ALUMINUM s-BUTOXIDE)
Class (DOT) : 3 - Class 3 : Flammable and combustible liquid 49 CFR 173.120
Packing group (DOT) : III - Minor Danger
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.
SECTION 15: Regulatory information

15.1. US Federal regulations

**Aluminum s-butoxide (2269-22-9)**
Listed on the United States TSCA (Toxic Substances Control Act) inventory

**2-Butanol (78-92-2)**
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Subject to reporting requirements of United States SARA Section 313

SARA Section 313 - Emission Reporting 1 %

15.2. International regulations

**CANADA**

**Aluminum s-butoxide (2269-22-9)**
Listed on the Canadian DSL (Domestic Substances List)

**2-Butanol (78-92-2)**
Listed on the Canadian DSL (Domestic Substances List)

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

**EU-Regulations**

**Aluminum s-butoxide (2269-22-9)**
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

**2-Butanol (78-92-2)**
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

**National regulations**

**Aluminum s-butoxide (2269-22-9)**
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 Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

**2-Butanol (78-92-2)**
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 INSO (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-Butanol (78-92-2)**
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information

Full text of H-phrases:

| H226       | Flammable liquid and vapor |
# ALUMINUM s-BUTOXIDE, 99+%  
Safety Data Sheet

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H319</td>
<td>Causes serious eye irritation</td>
</tr>
<tr>
<td>H335</td>
<td>May cause respiratory irritation</td>
</tr>
<tr>
<td>H336</td>
<td>May cause drowsiness or dizziness</td>
</tr>
</tbody>
</table>

**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 Index No.: European Commission Registration Number; EC 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

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>2</td>
<td>Moderate Hazard - Temporary or minor injury may occur</td>
</tr>
<tr>
<td>Flammability</td>
<td>3</td>
<td>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 &amp; IC)</td>
</tr>
<tr>
<td>Physical</td>
<td>1</td>
<td>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.</td>
</tr>
</tbody>
</table>

Prepared by safety and environmental affairs.

Date of issue: 02/19/2015  
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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