TITANIUM DIISOPROPOXIDE BIS(2,4-PENTANEDIONATE), 75% in isopropanol

Safety Data Sheet AKT855

Date of issue: 11/09/2015 Version: 1.0

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

1.1. Product identifier

- Product form: Mixture
- Physical state: Liquid
- Product name: TITANIUM DIISOPROPOXIDE BIS(2,4-PENTANEDIONATE), 75% in isopropanol
- Product code: AKT855
- Formula: C16H28O6Ti
- Synonyms: TIACA; TITANIUM ACETYLACETONATE; TITANIUM DIISOPROPOXYBIS(ACETYLACETONATE)
- Chemical family: METAL ESTER

1.2. Relevant identified uses of the substance or mixture and uses advised against

- Use of the substance/mixture: Chemical intermediate
  For research and industrial use only

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

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

- GHS-US classification
  Flam. Liq. 2 H225
  Eye Irrit. 2A H319
  STOT SE 3 H336

- Full text of H-phrases: see section 16

2.2. Label elements

- GHS-US labeling
  Hazard pictograms (GHS-US):
  - GHS02
  - GHS07

- Signal word (GHS-US): Danger
- Hazard statements (GHS-US):
  - H225 - Highly flammable liquid and vapor
  - H319 - Causes serious eye irritation
  - H336 - May cause drowsiness or dizziness

- 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
  - P303+P361+P353 - If on skin (or hair): take off immediately all contaminated clothing. rinse skin with water/shower
  - P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
  - 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
  - P370+P378 - In case of fire: Use water spray or fog, foam, carbon dioxide, dry chemical to
TITANIUM DIISOPROPOXIDE BIS(2,4-PENTANEDIONATE), 75% in isopropanol
Safety Data Sheet

2.3. Other hazards
No additional information available

2.4. Unknown acute toxicity (GHS US)
No data available

SECTION 3: Composition/Information on ingredients

3.1. Substance
Not applicable

3.2. Mixture

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>GHS-US classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium diisopropoxide bis(2,4-pentanedionate)</td>
<td>(CAS No) 17927-72-9</td>
<td>&gt; 75</td>
<td>Not classified</td>
</tr>
<tr>
<td>Isopropanol</td>
<td>(CAS No) 67-63-0</td>
<td>&lt; 25</td>
<td>Flam. Liq. 2, H225</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute Tox. 4 (Oral), H302</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eye Irrit. 2A, H319, STOT SE 3, H336</td>
</tr>
</tbody>
</table>

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, both acute and delayed

Symptoms/injuries after inhalation: May cause drowsiness or dizziness. May cause irritation to the respiratory tract.

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

Symptoms/injuries after eye contact: Causes serious eye irritation.

Symptoms/injuries after ingestion: May be harmful if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed

Note to Physicians: In case of ingestion activated charcoal may be beneficial. Suspend 50g activated charcoal in 400mL water and mix well. Oral administration 5mL/kg, or 350 mL for an average adult.

SECTION 5: Firefighting measures

5.1. Extinguishing media
Unsuitable extinguishing media: Do not use straight streams.

5.2. Special hazards arising from the substance or mixture

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

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

5.3. Advice for firefighters

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

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

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: Oxidizing agent.
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
<table>
<thead>
<tr>
<th>Isopropanol (67-63-0)</th>
<th>ACGIH TWA (ppm)</th>
<th>200 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA ACGIH</td>
<td>ACGIH STEL (ppm)</td>
<td>400 ppm</td>
</tr>
<tr>
<td>USA NIOSH</td>
<td>NIOSH REL (TWA) (mg/m³)</td>
<td>980 mg/m³</td>
</tr>
<tr>
<td>USA NIOSH</td>
<td>NIOSH REL (TWA) (ppm)</td>
<td>400 ppm</td>
</tr>
<tr>
<td>USA NIOSH</td>
<td>NIOSH REL (STEL) (mg/m³)</td>
<td>1225 mg/m³</td>
</tr>
<tr>
<td>USA NIOSH</td>
<td>NIOSH REL (STEL) (ppm)</td>
<td>500 ppm</td>
</tr>
<tr>
<td>USA OSHA</td>
<td>OSHA PEL (TWA) (mg/m³)</td>
<td>980 mg/m³</td>
</tr>
<tr>
<td>USA OSHA</td>
<td>OSHA PEL (TWA) (ppm)</td>
<td>400 ppm</td>
</tr>
<tr>
<td>USA IDLH</td>
<td>US IDLH (ppm)</td>
<td>2000 ppm (10% LEL)</td>
</tr>
</tbody>
</table>

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

<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>Clear liquid. Slowly crystallizes in winter.</td>
</tr>
<tr>
<td>Molecular mass</td>
<td>364.26 g/mol</td>
</tr>
<tr>
<td>Color</td>
<td>Orange-red</td>
</tr>
<tr>
<td>Odor</td>
<td>No data available</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>Refractive index</td>
<td>1.4935</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative evaporation rate (butyl acetate=1)</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point</td>
<td>No data available</td>
</tr>
<tr>
<td>Freezing point</td>
<td>&lt; 20 °C Slowly crystallizes</td>
</tr>
<tr>
<td>Boiling point</td>
<td>95 °C initial (isopropanol)</td>
</tr>
<tr>
<td>Flash point</td>
<td>12 °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>Highly flammable liquid and vapor</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>35 mm Hg @ 21°C</td>
</tr>
<tr>
<td>Relative vapor density at 20 °C</td>
<td>&gt; 1</td>
</tr>
<tr>
<td>Relative density</td>
<td>0.992</td>
</tr>
<tr>
<td>VOC content</td>
<td>&gt; 20 %</td>
</tr>
<tr>
<td>Solubility</td>
<td>Slightly. Soluble in water. 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>8 - 11 cSt @ 25°C</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>Oxidizing properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosion limits</td>
<td>2 - 12 vol % (lower: upper: isopropanol)</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 moist air and rapidly in contact with water liberating isopropanol.

10.4. Conditions to avoid

Heat. Sparks. Open flame.

10.5. Incompatible materials

Oxidizing agent.

10.6. Hazardous decomposition products


SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity: Not classified

<table>
<thead>
<tr>
<th>Isopropanol (67-63-0)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 oral rat</td>
<td>1870 mg/kg</td>
</tr>
<tr>
<td>LD50 dermal rabbit</td>
<td>4059 mg/kg</td>
</tr>
<tr>
<td>LC50 inhalation rat (mg/l)</td>
<td>72600 mg/m³ (Exposure time: 4 h)</td>
</tr>
</tbody>
</table>
TITANIUM DIISOPROPOXIDE BIS(2,4-PENTANEDIONATE), 75% in isopropanol
Safety Data Sheet

Isopropanol (67-63-0)
ATE US (oral) 1870.000 mg/kg body weight
ATE US (dermal) 4059.000 mg/kg body weight

Titanium diisopropoxide bis(2,4-pentanedionate) (17927-72-9)
LD50 oral rat 2870 mg/kg
ATE US (oral) 2870.000 mg/kg body weight
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

Isopropanol (67-63-0)
IARC group 3 - Not classifiable
Reproductive toxicity: Not classified
Specific target organ toxicity (single exposure): May cause drowsiness or dizziness.
Specific target organ toxicity (repeated exposure): Not classified
Aspiration hazard: Not classified
Potential Adverse human health effects and symptoms: Material generates isopropanol on contact with water or moisture in skin, eyes and mucous membranes and has an irritating, dehydrating effect on overexposed tissue.
Symptoms/injuries after inhalation: May cause drowsiness or dizziness. May cause irritation to the respiratory tract.
Symptoms/injuries after skin contact: May cause skin irritation.
Symptoms/injuries after eye contact: Causes serious eye irritation.
Symptoms/injuries after ingestion: May be harmful if swallowed.
Reason for classification: Expert judgment

SECTION 12: Ecological information

12.1. Toxicity

Isopropanol (67-63-0)
LC50 fish 1 9640 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
EC50 Daphnia 1 13299 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 fish 2 11130 mg/l (Exposure time: 96 h - Species: Pimephales promelas [static])

12.2. Persistence and degradability
No additional information available

12.3. Bioaccumulative potential

Isopropanol (67-63-0)
Log Pow 0.05 (at 25 °C)

12.4. Mobility in soil
No additional information available

12.5. Other adverse effects
Other adverse effects: This substance may be hazardous to the environment.
Effect on ozone layer: No additional information available
Effect on the global warming: No known ecological damage caused by this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Sewage disposal recommendations: Do not dispose of waste into sewer.
Waste disposal recommendations: Incinerate. Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to licensed waste disposal facility.
Additional information: Handle empty containers with care because residual vapors are flammable.
Ecology - waste materials: Avoid release to the environment.

SECTION 14: Transport information

14.1. UN number
UN-No.(DOT) 1993
TITANIUM DIISOPROPOXIDE BIS(2,4-PENTANEDIONATE), 75% in isopropanol
Safety Data Sheet

DOT NA no. UN1939

### 14.2. UN proper shipping name

<table>
<thead>
<tr>
<th>Proper Shipping Name (DOT)</th>
<th>Flammable liquids, n.o.s. (TITANIUM DIISOPROPOXIDE BIS(2,4-PENTANEDIONATE), 75% in isopropanol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport hazard class(es) (DOT)</td>
<td>3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120</td>
</tr>
<tr>
<td>Hazard labels (DOT)</td>
<td>3 - Flammable liquid</td>
</tr>
</tbody>
</table>

**DOT Symbols**

- G - Identifies PSN requiring a technical name

**Packing group (DOT)**

- II - Medium Danger

### 14.3. Additional information

Other information: No supplementary information available.

#### Transport by sea

**DOT Vessel Stowage Location**

- B - (i) The material may be stowed “on deck” or “under deck” on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) “On deck only” on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.

#### Air transport

**DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)**

- 5 L

**DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)**

- 60 L

### SECTION 15: Regulatory information

#### 15.1. US Federal regulations

**Isopropanol (67-63-0)**

- Listed on the United States TSCA (Toxic Substances Control Act) inventory
- Subject to reporting requirements of United States SARA Section 313
- EPA TSCA Regulatory Flag T - T - indicates a substance that is the subject of a Section 4 test rule under TSCA.
- SARA Section 313 - Emission Reporting 1.0 % (only if manufactured by the strong acid process, no supplier notification)

**Titanium diisopropoxide bis(2,4-pentanedionate) (17927-72-9)**

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

#### 15.2. International regulations

**Isopropanol (67-63-0)**

- Listed on the AICS (Australian Inventory of Chemical Substances)
- Listed on the Canadian DSL (Domestic Substances List)
- Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
- Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
- 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 Turkish inventory of chemical
TITANIUM DIISOPROPOXIDE BIS(2,4-PENTANEDIONATE), 75% in isopropanol
Safety Data Sheet

Titanium diisopropoxide bis(2,4-pentanedionate) (17927-72-9)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on the Canadian DSL (Domestic Substances List)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
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 Turkish Inventory of Chemicals

15.3. US State regulations
TITANIUM DIISOPROPOXIDE BIS(2,4-PENTANEDIONATE), 75% in isopropanol()

<table>
<thead>
<tr>
<th>U.S. - California - Proposition 65 - Carcinogens List</th>
<th>U.S. - California - Proposition 65 - Developmental Toxicity</th>
<th>U.S. - California - Proposition 65 - Reproductive Toxicity - Female</th>
<th>U.S. - California - Proposition 65 - Reproductive Toxicity - Male</th>
<th>Non-significant risk level (NSRL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Isopropanol (67-63-0)

<table>
<thead>
<tr>
<th>U.S. - California - Proposition 65 - Carcinogens List</th>
<th>U.S. - California - Proposition 65 - Developmental Toxicity</th>
<th>U.S. - California - Proposition 65 - Reproductive Toxicity - Female</th>
<th>U.S. - California - Proposition 65 - Reproductive Toxicity - Male</th>
<th>Non-significant risk level (NSRL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

SECTION 16: Other information

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.

Full text of H-phrases:
- Acute Tox. 4 (Oral)
- Eye Irrit. 2A
- Flam. Liq. 2
- STOT SE 3
- H225
- H302
- H319
- H336

HMIS III Rating
- Health: 2 Moderate Hazard - Temporary or minor injury may occur
- Flammability: 3 Serious Hazard
- Physical: 1 Slight Hazard

Prepared by safety and environmental affairs.
TITANIUM DIISOPROPOXIDE BIS(2,4-PENTANEDIONATE), 75% in isopropanol
Safety Data Sheet

Date of issue: 11/09/2015          Version: 1.0

SDS US (GHS HazCom 2012) - Custom

According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

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.

© 2015 Gelest Inc. Morrisville, PA 19067