

**TITANIUM n-BUTOXIDE**

Safety Data Sheet AKT850

Date of issue: 30/12/2014

Revision date: 08/04/2019

Version: 1.1

**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1. Product identifier**

Product form	: Substance
Physical state	: Liquid
Substance name	: TITANIUM n-BUTOXIDE
Product code	: AKT850
Formula	: C16H36O4Ti
Synonyms	: TETRABUTYL TITANATE; TITANIUM TETRA(n-BUTOXIDE); BUTYL TITANATE
Chemical family	: METAL ESTER

**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](mailto:info@gelest.com) - [www.gelest.com](http://www.gelest.com)**GELEST INC.**Fritz-Klatte-Strasse 8  
65933 Frankfurt**Germany**

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[info@gelestde.com](mailto:info@gelestde.com) - [www.gelestde.com](http://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]**

Skin corrosion/irritation, Category 2	H315
Serious eye damage/eye irritation, Category 2	H319
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) :



GHS07

Signal word (CLP) :

: Warning

Hazard statements (CLP) :

: H315 - Causes skin irritation.  
H319 - Causes serious eye irritation.

Precautionary statements (CLP) :

: P280 - Wear protective gloves/protective clothing/eye protection/face protection.  
P264 - Wash hands thoroughly after handling.

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P302+P352 - IF ON SKIN: Wash with plenty of water.  
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P332+P313 - If skin irritation occurs: Get medical advice/attention.  
P337+P313 - If eye irritation persists: Get medical advice/attention.

### 2.3. Other hazards

No additional information available

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Substance type : Multi-constituent  
Name : TITANIUM n-BUTOXIDE  
CAS-No. : 5593-70-4  
EC-No. : 227-006-8

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Butyl titanate	(CAS-No.) 5593-70-4 (EC-No.) 227-006-8	> 97	Skin Irrit. 2, H315 Eye Irrit. 2, H319
n-Butanol	(CAS-No.) 71-36-3 (EC-No.) 200-751-6 (EC Index-No.) 603-004-00-6	< 3	Flam. Liq. 3, H226 Acute Tox. 4 (Oral), H302 Skin Irrit. 2, H315 Eye Dam. 1, H318 STOT SE 3, H335 STOT SE 3, H336

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. Material generates n-butanol on contact with water or moisture in skin, eyes and mucous membranes and has an irritating, dehydrating and defatting effect on overexposed tissue.

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

Suitable extinguishing media : Water spray. Water fog. Foam. Carbon dioxide. Dry chemical.

### 5.2. Special hazards arising from the substance or mixture

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

### 5.3. Advice for firefighters

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

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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 : 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. Containers and transfer lines require grounding during use. Provide good ventilation in process area to prevent formation of vapour. 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 : Moist air. Oxidizing agent. 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

n-Butanol (71-36-3)		
Austria	MAK (mg/m <sup>3</sup> )	150 mg/m <sup>3</sup>
Austria	MAK (ppm)	50 ppm
Austria	MAK Short time value (mg/m <sup>3</sup> )	600 mg/m <sup>3</sup>
Austria	MAK Short time value (ppm)	200 ppm
Belgium	Limit value (mg/m <sup>3</sup> )	62 mg/m <sup>3</sup>
Belgium	Limit value (ppm)	20 ppm
Bulgaria	OEL TWA (mg/m <sup>3</sup> )	100 mg/m <sup>3</sup>
Bulgaria	OEL STEL (mg/m <sup>3</sup> )	150 mg/m <sup>3</sup>
France	VLE (mg/m <sup>3</sup> )	150 mg/m <sup>3</sup>
France	VLE (ppm)	50 ppm
Germany	TRGS 900 Occupational exposure limit value (mg/m <sup>3</sup> )	310 mg/m <sup>3</sup> (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed)
Germany	TRGS 900 Occupational exposure limit value (ppm)	100 ppm (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed)
Germany	TRGS 903 Biological limit value	10 mg/g (Medium: urine - Time: end of shift - Parameter: 1-Butanol (after hydrolysis) 2 mg/g (Medium: urine - Time: before beginning of next shift - Parameter: 1-Butanol (after hydrolysis))
Greece	OEL TWA (mg/m <sup>3</sup> )	300 mg/m <sup>3</sup>
Greece	OEL TWA (ppm)	100 ppm
Greece	OEL STEL (mg/m <sup>3</sup> )	300 mg/m <sup>3</sup>
Greece	OEL STEL (ppm)	100 ppm

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n-Butanol (71-36-3)		
Italy - Portugal - USA ACGIH	ACGIH TWA (ppm)	20 ppm
Latvia	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup>
USA IDLH	US IDLH (ppm)	1400 ppm (10% LEL)
USA NIOSH	NIOSH REL (ceiling) (mg/m <sup>3</sup> )	150 mg/m <sup>3</sup>
USA NIOSH	NIOSH REL (ceiling) (ppm)	50 ppm
USA OSHA	OSHA PEL (TWA) (mg/m <sup>3</sup> )	300 mg/m <sup>3</sup>
USA OSHA	OSHA PEL (TWA) (ppm)	100 ppm
Spain	VLA-ED (mg/m <sup>3</sup> )	61 mg/m <sup>3</sup>
Spain	VLA-ED (ppm)	20 ppm
Spain	VLA-EC (mg/m <sup>3</sup> )	154 mg/m <sup>3</sup>
Spain	VLA-EC (ppm)	50 ppm
Switzerland	KZGW (mg/m <sup>3</sup> )	150 mg/m <sup>3</sup>
Switzerland	KZGW (ppm)	50 ppm
Switzerland	MAK (mg/m <sup>3</sup> )	150 mg/m <sup>3</sup>
Switzerland	MAK (ppm)	50 ppm
United Kingdom	WEL STEL (mg/m <sup>3</sup> )	154 mg/m <sup>3</sup>
United Kingdom	WEL STEL (ppm)	50 ppm
Czech Republic	Expoziční limity (PEL) (mg/m <sup>3</sup> )	300 mg/m <sup>3</sup>
Finland	HTP-arvo (8h) (mg/m <sup>3</sup> )	150 mg/m <sup>3</sup>
Finland	HTP-arvo (8h) (ppm)	50 ppm
Finland	HTP-arvo (15 min)	230 mg/m <sup>3</sup>
Finland	HTP-arvo (15 min) (ppm)	75 ppm
Hungary	AK-érték	45 mg/m <sup>3</sup>
Hungary	CK-érték	90 mg/m <sup>3</sup>
Ireland	OEL (8 hours ref) (ppm)	20 ppm
Ireland	OEL (15 min ref) (ppm)	60 ppm (calculated)
Lithuania	IPRV (mg/m <sup>3</sup> )	45 mg/m <sup>3</sup>
Lithuania	IPRV (ppm)	15 ppm
Lithuania	NRV (mg/m <sup>3</sup> )	90 mg/m <sup>3</sup>
Lithuania	NRV (ppm)	30 ppm
Norway	Grenseverdier (Takverdi) (mg/m <sup>3</sup> )	75 mg/m <sup>3</sup>
Norway	Grenseverdier (Takverdi) (ppm)	25 ppm
Poland	NDS (mg/m <sup>3</sup> )	50 mg/m <sup>3</sup>
Poland	NDSch (mg/m <sup>3</sup> )	150 mg/m <sup>3</sup>
Romania	OEL TWA (mg/m <sup>3</sup> )	100 mg/m <sup>3</sup>
Romania	OEL TWA (ppm)	33 ppm
Romania	OEL STEL (mg/m <sup>3</sup> )	200 mg/m <sup>3</sup>
Romania	OEL STEL (ppm)	66 ppm
Slovakia	NPHV (priemerná) (mg/m <sup>3</sup> )	310 mg/m <sup>3</sup>
Slovakia	NPHV (priemerná) (ppm)	100 ppm
Slovakia	NPHV (Hraničná) (mg/m <sup>3</sup> )	310 mg/m <sup>3</sup>
Sweden	nivågränsvärde (NVG) (mg/m <sup>3</sup> )	45 mg/m <sup>3</sup>
Sweden	nivågränsvärde (NVG) (ppm)	15 ppm
Sweden	takgränsvärde (TGV) (mg/m <sup>3</sup> )	90 mg/m <sup>3</sup>
Sweden	takgränsvärde (TGV) (ppm)	30 ppm
Canada (Quebec)	PLAFOND (mg/m <sup>3</sup> )	152 mg/m <sup>3</sup>
Canada (Quebec)	PLAFOND (ppm)	50 ppm
Portugal	OEL TWA (ppm)	20 ppm

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### 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:

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
Appearance	: Clear liquid. Viscous.
Molecular mass	: 340.36 g/mol
Colour	: Pale yellow.
Odour	: No data available
Odour threshold	: No data available
Refractive index	: 1.493
pH	: No data available
Relative evaporation rate (butylacetate=1)	: No data available
Melting point	: -50 °C
Freezing point	: No data available
Boiling point	: 154 °C @ 1 mm Hg
Flash point	: 76 °C
Auto-ignition temperature	: 410
Decomposition temperature	: No data available
Flammability (solid, gas)	: Combustible liquid
Vapour pressure	: 0.5 mm Hg @ 140 °C
Relative vapour density at 20 °C	: > 1
Relative density	: 0.998
Solubility	: Reacts with water.
Log Pow	: No data available
Log Kow	: No data available
Viscosity, kinematic	: 67 cSt @ 25 °C
Viscosity, dynamic	: No data available
Explosive properties	: No data available
Oxidising properties	: No data available
Explosive limits	: 1.4 - 11.2 vol % (lower; upper; based on n-butanol released by hydrolysis)

### 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 in sealed containers.

### 10.3. Possibility of hazardous reactions

Material decomposes slowly in contact with moist air and rapidly in contact with water liberating n-butanol.

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### 10.4. Conditions to avoid

Heat. Open flame. Sparks.

### 10.5. Incompatible materials

Oxidizing agent.

### 10.6. Hazardous decomposition products

Butenes. n-Butanol. Organic acid vapors. Titanium oxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Acute toxicity : Not classified

Butyl titanate (5593-70-4)	
LD50 oral rat	3122 mg/kg
ATE CLP (oral)	3122 mg/kg bodyweight
n-Butanol (71-36-3)	
LD50 oral rat	700 mg/kg
LD50 dermal rabbit	3402 mg/kg
LC50 inhalation rat (ppm)	> 8000 ppm/4h
ATE CLP (oral)	500 mg/kg bodyweight

Skin corrosion/irritation	: Causes skin irritation.
Serious eye damage/irritation	: Causes serious eye irritation.
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
Aspiration hazard	: Not classified
Symptoms/effects after inhalation	: May cause irritation to the respiratory tract.
Symptoms/effects after skin contact	: May cause skin irritation. Material generates n-butanol on contact with water or moisture in skin, eyes and mucous membranes and has an irritating, dehydrating and defatting effect on overexposed tissue.
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

n-Butanol (71-36-3)	
LC50 fish 1	1730 - 1910 mg/l (Exposure time: 96 h - Species: Pimephales promelas [static])
EC50 Daphnia 1	1983 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 fish 2	1740 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
EC50 Daphnia 2	1897 - 2072 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])

### 12.2. Persistence and degradability

No additional information available

### 12.3. Bioaccumulative potential

n-Butanol (71-36-3)	
BCF fish 1	0.64
Log Pow	0.785 (at 25 °C)

### 12.4. Mobility in soil

No additional information available

### 12.5. Results of PBT and vPvB assessment

No additional information available

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### 12.6. Other adverse effects

No additional information available

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Product/Packaging disposal recommendations : Incinerate. 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

### 14.1. UN number

UN-No. (ADR) : Not applicable

UN-No. (IMDG) : Not applicable

UN-No. (IATA) : Not applicable

UN-No. (ADN) : Not applicable

UN-No. (RID) : Not applicable

### 14.2. UN proper shipping name

Proper Shipping Name (ADR) : Not applicable

Proper Shipping Name (IMDG) : Not applicable

Proper Shipping Name (IATA) : Not applicable

Proper Shipping Name (ADN) : Not applicable

Proper Shipping Name (RID) : Not applicable

### 14.3. Transport hazard class(es)

#### ADR

Transport hazard class(es) (ADR) : Not applicable

#### IMDG

Transport hazard class(es) (IMDG) : Not applicable

#### IATA

Transport hazard class(es) (IATA) : Not applicable

#### ADN

Transport hazard class(es) (ADN) : Not applicable

#### RID

Transport hazard class(es) (RID) : Not applicable

### 14.4. Packing group

Packing group (ADR) : Not applicable

Packing group (IMDG) : Not applicable

Packing group (IATA) : Not applicable

Packing group (ADN) : Not applicable

Packing group (RID) : Not applicable

### 14.5. Environmental hazards

Dangerous for the environment : No

Marine pollutant : No

Other information : This product is Combustible as defined by the US Department of Transportation (DOT). It is regulated for transport in the US in container > 119 gallons (450 liters). The product is not regulated for transport by the IATA, ADR/RID, ADN or the IMDG regulations.

### 14.6. Special precautions for user

#### - Overland transport

No data available

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### - Transport by sea

No data available

### - Air transport

No data available

### - Inland waterway transport

Not applicable

### - Rail transport

Not applicable

### 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

TITANIUM n-BUTOXIDE is not on the REACH Candidate List

TITANIUM n-BUTOXIDE is not on the REACH Annex XIV List

TITANIUM n-BUTOXIDE 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.

TITANIUM n-BUTOXIDE is not subject to Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC

#### 15.1.2. National regulations

##### Germany

Reference to AwSV : Water hazard class (WGK) 1, Slightly hazardous to water (Classification according to VwVwS, Annex 3; ID No. 2297)

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 III-1

Store unit : 50 liter

Classification remarks : Flammable according to the Danish Ministry of Justice; 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:

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

Other information : Prepared by safety and environmental affairs.

Full text of H- and EUH-statements:



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Acute Tox. 4 (Oral)	Acute toxicity (oral), Category 4
Eye Dam. 1	Serious eye damage/eye irritation, Category 1
Eye Irrit. 2	Serious eye damage/eye irritation, Category 2
Flam. Liq. 3	Flammable liquids, Category 3
Skin Irrit. 2	Skin corrosion/irritation, Category 2
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.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H318	Causes serious eye damage.
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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The logo for Gelest, featuring the word "Gelest" in a large, white, serif font. The letters are set against a light blue background that is shaped like a right-angled triangle pointing to the right. The "G" is partially cut off by the left edge of the frame.