

## TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane

Safety Data Sheet AKT851.3

Date of issue: 28/11/2016 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 CHLORIDE TRIISOPROPOXIDE, 2M in heptane
Product code	: AKT851.3
Formula	: C <sub>9</sub> H <sub>21</sub> ClO <sub>3</sub> Ti
Synonyms	: TRIISOPROPYLCHLOROTITANATE CHLOROTITANIUM TRIISOPROPOXIDE
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.

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#### 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]

Flammable liquids, Category 2	H225
Skin corrosion/irritation, Category 1B	H314
Serious eye damage/eye irritation, Category 1	H318
Specific target organ toxicity — Single exposure, Category 3, Narcosis	H336
Hazardous to the aquatic environment — Chronic Hazard, Category 1	H410
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) :



GHS02



GHS05



GHS07



GHS09

# TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane

## Safety Data Sheet

Signal word (CLP)	: Danger
Hazardous ingredients	: Titanium chloride triisopropoxide; n-Heptane
Hazard statements (CLP)	: H225 - Highly flammable liquid and vapour. H314 - Causes severe skin burns and eye damage. H336 - May cause drowsiness or dizziness. H410 - Very toxic to aquatic life with long lasting effects.
Precautionary statements (CLP)	: P280 - Wear protective gloves/protective clothing/eye protection/face protection. P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P240 - Ground/bond container and receiving equipment. P260 - Do not breathe vapours. P264 - Wash hands thoroughly after handling. P310 - Immediately call a POISON CENTER or doctor/physician

### 2.3. Other hazards

No additional information available

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Not applicable

### 3.2. Mixtures

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Titanium chloride triisopropoxide	(CAS-No.) 20717-86-6	56 - 60	Flam. Sol. 2, H228 Skin Corr. 1B, H314 Eye Dam. 1, H318
n-Heptane	(CAS-No.) 142-82-5 (EC-No.) 205-563-8 (EC Index-No.) 601-008-00-2	40 - 44	Flam. Liq. 2, H225 Skin Irrit. 2, H315 STOT SE 3, H336 Asp. Tox. 1, H304 Aquatic Acute 1, H400 Aquatic Chronic 1, H410
Isopropanol	(CAS-No.) 67-63-0 (EC-No.) 200-661-7 (EC Index-No.) 603-117-00-0	0 - 2	Flam. Liq. 2, H225 Eye Irrit. 2, H319 STOT SE 3, H336

Full text of H-statements: see section 16

## 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/.... Get immediate 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 immediate 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	: Causes severe skin burns and eye damage.
Symptoms/effects after inhalation	: May cause drowsiness or dizziness. May cause irritation to the respiratory tract. Exposure at high levels may have narcotic effects. Heptane can cause vertigo, incoordination and stupor at 5000ppm. Vapor inhalation of heptane may lead to impairment of coordination mental alertness, and reaction times, leading to accident proneness.
Symptoms/effects after skin contact	: Causes (severe) skin burns.
Symptoms/effects after eye contact	: Causes serious eye damage.
Symptoms/effects after ingestion	: May be harmful if swallowed.

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

Note to physician: Activated charcoal slurry may be administered. Activated charcoal slurry is prepared by suspending 50 grams of activated charcoal in 400 ml water and mixing thoroughly. Administer 5 ml/kg.

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### SECTION 5: Firefighting measures

#### 5.1. Extinguishing media

Suitable extinguishing media : Water spray. Water fog. Foam. Carbon dioxide. Dry chemical.  
Unsuitable extinguishing media : Do not use straight streams.

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

Fire hazard : Highly flammable liquid and vapour. Irritating fumes and caustic vapors may develop when material is exposed to elevated temperatures or open flame.  
Explosion hazard : May form flammable/explosive vapour-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 vapour 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

Avoid release to the environment. 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. Collect spillage.  
Methods for cleaning up : Clean up any spills as soon as possible, using an absorbent material to collect it. 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 vapours are flammable. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.  
Precautions for safe handling : Avoid all eye and skin contact and do not breathe vapour 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

Isopropanol (67-63-0)		
Austria	MAK (mg/m <sup>3</sup> )	500 mg/m <sup>3</sup> (short time value for large casting)
Austria	MAK (ppm)	200 ppm (short time value for large casting)

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Isopropanol (67-63-0)		
Austria	MAK Short time value (mg/m <sup>3</sup> )	2000 mg/m <sup>3</sup> 2000 mg/m <sup>3</sup> (STEL for large casting valid till 12/31/2013)
Austria	MAK Short time value (ppm)	800 ppm 800 ppm (STEL for large casting valid till 12/31/2013)
Belgium	Limit value (mg/m <sup>3</sup> )	500 mg/m <sup>3</sup>
Belgium	Limit value (ppm)	200 ppm
Belgium	Short time value (mg/m <sup>3</sup> )	1000 mg/m <sup>3</sup>
Belgium	Short time value (ppm)	400 ppm
Bulgaria	OEL TWA (mg/m <sup>3</sup> )	980 mg/m <sup>3</sup>
Bulgaria	OEL STEL (mg/m <sup>3</sup> )	1225 mg/m <sup>3</sup>
France	VLE (mg/m <sup>3</sup> )	980 mg/m <sup>3</sup>
France	VLE (ppm)	400 ppm
Germany	TRGS 900 Occupational exposure limit value (mg/m <sup>3</sup> )	500 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)	200 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	25 mg/l (Medium: whole blood - Time: end of shift - Parameter: Acetone) 25 mg/l (Medium: urine - Time: end of shift - Parameter: Acetone)
Greece	OEL TWA (mg/m <sup>3</sup> )	980 mg/m <sup>3</sup>
Greece	OEL TWA (ppm)	400 ppm
Greece	OEL STEL (mg/m <sup>3</sup> )	1225 mg/m <sup>3</sup>
Greece	OEL STEL (ppm)	500 ppm
Italy - Portugal - USA ACGIH	ACGIH TWA (ppm)	200 ppm
Italy - Portugal - USA ACGIH	ACGIH STEL (ppm)	400 ppm
Latvia	OEL TWA (mg/m <sup>3</sup> )	350 mg/m <sup>3</sup>
USA IDLH	US IDLH (ppm)	2000 ppm (10% LEL)
USA NIOSH	NIOSH REL (TWA) (mg/m <sup>3</sup> )	980 mg/m <sup>3</sup>
USA NIOSH	NIOSH REL (TWA) (ppm)	400 ppm
USA NIOSH	NIOSH REL (STEL) (mg/m <sup>3</sup> )	1225 mg/m <sup>3</sup>
USA NIOSH	NIOSH REL (STEL) (ppm)	500 ppm
USA OSHA	OSHA PEL (TWA) (mg/m <sup>3</sup> )	980 mg/m <sup>3</sup>
USA OSHA	OSHA PEL (TWA) (ppm)	400 ppm
Spain	VLA-ED (mg/m <sup>3</sup> )	500 mg/m <sup>3</sup> (it is prohibited the partial or complete commercialization or use of this substance as a phytosanitary or biocide compound)
Spain	VLA-ED (ppm)	200 ppm (it is prohibited the partial or complete commercialization or use of this substance as a phytosanitary or biocide compound)
Spain	VLA-EC (mg/m <sup>3</sup> )	1000 mg/m <sup>3</sup>
Spain	VLA-EC (ppm)	400 ppm
Switzerland	KZGW (mg/m <sup>3</sup> )	1000 mg/m <sup>3</sup>
Switzerland	KZGW (ppm)	400 ppm
Switzerland	MAK (mg/m <sup>3</sup> )	500 mg/m <sup>3</sup>
Switzerland	MAK (ppm)	200 ppm
United Kingdom	WEL TWA (mg/m <sup>3</sup> )	999 mg/m <sup>3</sup>
United Kingdom	WEL TWA (ppm)	400 ppm
United Kingdom	WEL STEL (mg/m <sup>3</sup> )	1250 mg/m <sup>3</sup>
United Kingdom	WEL STEL (ppm)	500 ppm
Czech Republic	Expoziční limity (PEL) (mg/m <sup>3</sup> )	500 mg/m <sup>3</sup>
Denmark	Grænseværdie (langvarig) (mg/m <sup>3</sup> )	490 mg/m <sup>3</sup>
Denmark	Grænseværdie (langvarig) (ppm)	200 ppm
Finland	HTP-arvo (8h) (mg/m <sup>3</sup> )	500 mg/m <sup>3</sup>
Finland	HTP-arvo (8h) (ppm)	200 ppm
Finland	HTP-arvo (15 min)	620 mg/m <sup>3</sup>

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<b>Isopropanol (67-63-0)</b>		
Finland	HTP-arvo (15 min) (ppm)	250 ppm
Hungary	AK-érték	500 mg/m <sup>3</sup>
Hungary	CK-érték	2000 mg/m <sup>3</sup>
Ireland	OEL (8 hours ref) (ppm)	200 ppm
Ireland	OEL (15 min ref) (ppm)	400 ppm
Lithuania	IPRV (mg/m <sup>3</sup> )	350 mg/m <sup>3</sup>
Lithuania	IPRV (ppm)	150 ppm
Lithuania	TPRV (mg/m <sup>3</sup> )	600 mg/m <sup>3</sup>
Lithuania	TPRV (ppm)	250 ppm
Norway	Grenseverdier (AN) (mg/m <sup>3</sup> )	245 mg/m <sup>3</sup>
Norway	Grenseverdier (AN) (ppm)	100 ppm
Norway	Grenseverdier (Korttidsverdi) (mg/m <sup>3</sup> )	245 mg/m <sup>3</sup>
Norway	Grenseverdier (Korttidsverdi) (ppm)	100 ppm
Poland	NDS (mg/m <sup>3</sup> )	900 mg/m <sup>3</sup>
Poland	NDSch (mg/m <sup>3</sup> )	1200 mg/m <sup>3</sup>
Romania	OEL TWA (mg/m <sup>3</sup> )	200 mg/m <sup>3</sup>
Romania	OEL TWA (ppm)	81 ppm
Romania	OEL STEL (mg/m <sup>3</sup> )	500 mg/m <sup>3</sup>
Romania	OEL STEL (ppm)	203 ppm
Slovakia	NPHV (priemerná) (mg/m <sup>3</sup> )	500 mg/m <sup>3</sup>
Slovakia	NPHV (priemerná) (ppm)	200 ppm
Slovakia	NPHV (Hraničná) (mg/m <sup>3</sup> )	1000 mg/m <sup>3</sup>
Sweden	nivågränsvärde (NVG) (mg/m <sup>3</sup> )	350 mg/m <sup>3</sup>
Sweden	nivågränsvärde (NVG) (ppm)	150 ppm
Sweden	kortidsvärde (KTV) (mg/m <sup>3</sup> )	600 mg/m <sup>3</sup>
Sweden	kortidsvärde (KTV) (ppm)	250 ppm
Canada (Quebec)	VECD (mg/m <sup>3</sup> )	1230 mg/m <sup>3</sup>
Canada (Quebec)	VECD (ppm)	500 ppm
Canada (Quebec)	VEMP (mg/m <sup>3</sup> )	985 mg/m <sup>3</sup>
Canada (Quebec)	VEMP (ppm)	400 ppm
Australia	TWA (mg/m <sup>3</sup> )	983 mg/m <sup>3</sup>
Australia	TWA (ppm)	400 ppm
Australia	STEL (mg/m <sup>3</sup> )	1230 mg/m <sup>3</sup>
Australia	STEL (ppm)	500 ppm
Portugal	OEL TWA (ppm)	200 ppm
Portugal	OEL STEL (ppm)	400 ppm
Portugal	OEL chemical category (PT)	A4 - Not Classifiable as a Human Carcinogen
<b>n-Heptane (142-82-5)</b>		
EU	IOELV TWA (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup>
EU	IOELV TWA (ppm)	500 ppm
Austria	MAK (mg/m <sup>3</sup> )	2000 mg/m <sup>3</sup> (all isomers)
Austria	MAK (ppm)	500 ppm (all isomers)
Austria	MAK Short time value (mg/m <sup>3</sup> )	8000 mg/m <sup>3</sup> (all isomers)
Austria	MAK Short time value (ppm)	2000 ppm (all isomers)
Belgium	Limit value (mg/m <sup>3</sup> )	1664 mg/m <sup>3</sup>
Belgium	Limit value (ppm)	400 ppm
Belgium	Short time value (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup>
Belgium	Short time value (ppm)	500 ppm
Bulgaria	OEL TWA (mg/m <sup>3</sup> )	1600 mg/m <sup>3</sup>
Cyprus	OEL TWA (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup>
Cyprus	OEL TWA (ppm)	500 ppm
France	VLE (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup> (restrictive limit)
France	VLE (ppm)	500 ppm (restrictive limit)

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n-Heptane (142-82-5)		
France	VME (mg/m <sup>3</sup> )	1668 mg/m <sup>3</sup> (restrictive limit)
France	VME (ppm)	400 ppm (restrictive limit)
Germany	TRGS 900 Occupational exposure limit value (mg/m <sup>3</sup> )	2100 mg/m <sup>3</sup> (all isomers)
Germany	TRGS 900 Occupational exposure limit value (ppm)	500 ppm (all isomers)
Gibraltar	Eight hours mg/m <sup>3</sup>	2085 mg/m <sup>3</sup>
Gibraltar	Eight hours ppm	500 ppm
Greece	OEL TWA (mg/m <sup>3</sup> )	2000 mg/m <sup>3</sup>
Greece	OEL TWA (ppm)	500 ppm
Greece	OEL STEL (mg/m <sup>3</sup> )	2000 mg/m <sup>3</sup>
Greece	OEL STEL (ppm)	500 ppm
Italy - Portugal - USA ACGIH	ACGIH TWA (ppm)	400 ppm
Italy - Portugal - USA ACGIH	ACGIH STEL (ppm)	500 ppm
Italy	OEL TWA (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup>
Italy	OEL TWA (ppm)	500 ppm
Latvia	OEL TWA (mg/m <sup>3</sup> )	350 mg/m <sup>3</sup>
Latvia	OEL TWA (ppm)	85 ppm
USA IDLH	US IDLH (ppm)	750 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m <sup>3</sup> )	350 mg/m <sup>3</sup>
USA NIOSH	NIOSH REL (TWA) (ppm)	85 ppm
USA NIOSH	NIOSH REL (ceiling) (mg/m <sup>3</sup> )	1800 mg/m <sup>3</sup>
USA NIOSH	NIOSH REL (ceiling) (ppm)	440 ppm
USA OSHA	OSHA PEL (TWA) (mg/m <sup>3</sup> )	2000 mg/m <sup>3</sup>
USA OSHA	OSHA PEL (TWA) (ppm)	500 ppm
Spain	VLA-ED (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup> (indicative limit value)
Spain	VLA-ED (ppm)	500 ppm (indicative limit value)
Switzerland	KZGW (mg/m <sup>3</sup> )	1600 mg/m <sup>3</sup>
Switzerland	KZGW (ppm)	400 ppm
Switzerland	MAK (mg/m <sup>3</sup> )	1600 mg/m <sup>3</sup>
Switzerland	MAK (ppm)	400 ppm
Netherlands	Grenswaarde TGG 8H (mg/m <sup>3</sup> )	1200 mg/m <sup>3</sup>
Netherlands	Grenswaarde TGG 15MIN (mg/m <sup>3</sup> )	1600 mg/m <sup>3</sup>
United Kingdom	WEL TWA (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup>
United Kingdom	WEL TWA (ppm)	500 ppm
United Kingdom	WEL STEL (mg/m <sup>3</sup> )	6255 mg/m <sup>3</sup> (calculated)
United Kingdom	WEL STEL (ppm)	1500 ppm (calculated)
Czech Republic	Expoziční limity (PEL) (mg/m <sup>3</sup> )	1000 mg/m <sup>3</sup>
Denmark	Grænseværdie (langvarig) (mg/m <sup>3</sup> )	820 mg/m <sup>3</sup>
Denmark	Grænseværdie (langvarig) (ppm)	200 ppm
Finland	HTP-arvo (8h) (mg/m <sup>3</sup> )	1200 mg/m <sup>3</sup>
Finland	HTP-arvo (8h) (ppm)	300 ppm
Finland	HTP-arvo (15 min)	2100 mg/m <sup>3</sup>
Finland	HTP-arvo (15 min) (ppm)	500 ppm
Hungary	AK-érték	2000 mg/m <sup>3</sup>
Hungary	CK-érték	8000 mg/m <sup>3</sup> (Substances with European indicative limits (96/94/EC, 2000/39/EC, 2006/15/EC, 2009/161/EU), which currently has no peak limit concentration. In these cases, Annex 3.1. should be used exercised)
Ireland	OEL (8 hours ref) (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup>
Ireland	OEL (8 hours ref) (ppm)	500 ppm
Ireland	OEL (15 min ref) (mg/m <sup>3</sup> )	6255 mg/m <sup>3</sup> (calculated)
Ireland	OEL (15 min ref) (ppm)	1500 ppm (calculated)
Lithuania	IPRV (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup>



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n-Heptane (142-82-5)		
Lithuania	IPRV (ppm)	500 ppm
Lithuania	TPRV (mg/m <sup>3</sup> )	3128 mg/m <sup>3</sup>
Lithuania	TPRV (ppm)	750 ppm
Malta	OEL TWA (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup>
Malta	OEL TWA (ppm)	500 ppm
Norway	Grenseverdier (AN) (mg/m <sup>3</sup> )	800 mg/m <sup>3</sup>
Norway	Grenseverdier (AN) (ppm)	200 ppm
Norway	Grenseverdier (Korttidsverdi) (mg/m <sup>3</sup> )	800 mg/m <sup>3</sup>
Norway	Grenseverdier (Korttidsverdi) (ppm)	200 ppm
Poland	NDS (mg/m <sup>3</sup> )	1200 mg/m <sup>3</sup>
Poland	NDSch (mg/m <sup>3</sup> )	2000 mg/m <sup>3</sup>
Romania	OEL TWA (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup>
Romania	OEL TWA (ppm)	500 ppm
Slovakia	NPHV (priemerná) (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup>
Slovakia	NPHV (priemerná) (ppm)	500 ppm
Sweden	nivågränsvärde (NVG) (mg/m <sup>3</sup> )	800 mg/m <sup>3</sup>
Sweden	nivågränsvärde (NVG) (ppm)	200 ppm
Sweden	kortidsvärde (KTV) (mg/m <sup>3</sup> )	1200 mg/m <sup>3</sup>
Sweden	kortidsvärde (KTV) (ppm)	300 ppm
Canada (Quebec)	VECD (mg/m <sup>3</sup> )	2050 mg/m <sup>3</sup>
Canada (Quebec)	VECD (ppm)	500 ppm
Canada (Quebec)	VEMP (mg/m <sup>3</sup> )	1640 mg/m <sup>3</sup>
Canada (Quebec)	VEMP (ppm)	400 ppm
Australia	TWA (mg/m <sup>3</sup> )	1640 mg/m <sup>3</sup>
Australia	TWA (ppm)	400 ppm
Australia	STEL (mg/m <sup>3</sup> )	2050 mg/m <sup>3</sup>
Australia	STEL (ppm)	500 ppm
Portugal	OEL TWA (mg/m <sup>3</sup> )	2085 mg/m <sup>3</sup> (indicative limit value)
Portugal	OEL TWA (ppm)	500 ppm (indicative limit value)
Portugal	OEL STEL (ppm)	500 ppm

## 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 or face shield. 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

Physical state	: Liquid
Appearance	: Liquid.
Molecular mass	: 260.62 g/mol

# TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane

## Safety Data Sheet

Colour	: Pale yellow.
Odour	: No data available
Odour threshold	: No data available
Refractive index	: No additional information available
pH	: No data available
Relative evaporation rate (butylacetate=1)	: No data available
Melting point	: < 15 °C
Freezing point	: No data available
Boiling point	: 98 °C (initial, heptane)
Flash point	: -4 °C
Auto-ignition temperature	: 225 °C
Decomposition temperature	: No data available
Flammability (solid, gas)	: Highly flammable liquid and vapour.
Vapour pressure	: No data available
Relative vapour density at 20 °C	: 2.97 (heptane)
Relative density	: 0.91
% Volatiles	: > 70 %
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
Oxidising properties	: No data available
Explosive limits	: 1.25 - 6.9 vol % (lower; upper: heptane)

### 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

Hydrogen chloride. Isopropanol. Organic acid vapors. Titanium oxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Acute toxicity : Not classified

<b>Isopropanol (67-63-0)</b>	
LD50 oral rat	1870 mg/kg
LD50 dermal rabbit	4059 mg/kg
LC50 inhalation rat (mg/l)	72600 mg/m <sup>3</sup> (Exposure time: 4 h)
ATE CLP (oral)	4396 mg/kg bodyweight
ATE CLP (dermal)	12800 mg/kg bodyweight
<b>n-Heptane (142-82-5)</b>	
LD50 oral mouse	5000 mg/kg
LD50 dermal rabbit	3000 mg/kg
LC50 inhalation rat (mg/l)	103 g/m <sup>3</sup> (Exposure time: 4 h)
Toxicity information	1000 ppm Inhalation (heptane)-human, TCLo



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Skin corrosion/irritation	: Causes severe skin burns and eye damage.
Serious eye damage/irritation	: Causes serious eye damage.
Respiratory or skin sensitisation	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified

None of the components in this product at concentrations >0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

Isopropanol (67-63-0)	
IARC group	3 - Not classifiable
Reproductive toxicity	: Not classified
STOT-single exposure	: May cause drowsiness or dizziness.
STOT-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/effects after inhalation	: May cause drowsiness or dizziness. May cause irritation to the respiratory tract. Exposure at high levels may have narcotic effects. Heptane can cause vertigo, incoordination and stupor at 5000ppm. Vapor inhalation of heptane may lead to impairment of coordination mental alertness, and reaction times, leading to accident proneness.
Symptoms/effects after skin contact	: Causes (severe) skin burns.
Symptoms/effects after eye contact	: Causes serious eye damage.
Symptoms/effects after ingestion	: May be harmful if swallowed.
Reason for classification	: Expert judgment

## SECTION 12: Ecological information

### 12.1. Toxicity

Ecology - general	: Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.
Acute aquatic toxicity	: Not classified
Chronic aquatic toxicity	: Very toxic to aquatic life with long lasting effects.

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])
n-Heptane (142-82-5)	
LC50 fish 1	375 mg/l (Exposure time: 96 h - Species: Cichlid fish)

### 12.2. Persistence and degradability

No additional information available

### 12.3. Bioaccumulative potential

Isopropanol (67-63-0)	
Log Pow	0.05 (at 25 °C)
n-Heptane (142-82-5)	
Log Pow	4.66

### 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

Sewage disposal recommendations	: Do not dispose of waste into sewer.
Product/Packaging disposal recommendations	: 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 vapours are flammable.
Ecology - waste materials	: Avoid release to the environment.

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### SECTION 14: Transport information

#### 14.1. UN number

In accordance with ADR / RID / IMDG / IATA / ADN

#### 14.1. UN number

UN-No. (ADR)	: 2924
UN-No. (IMDG)	: 2924
UN-No. (IATA)	: 2924
UN-No. (ADN)	: 2924
UN-No. (RID)	: 2924

#### 14.2. UN proper shipping name

Proper Shipping Name (ADR)	: FLAMMABLE LIQUID, CORROSIVE, N.O.S.
Proper Shipping Name (IMDG)	: FLAMMABLE LIQUID, CORROSIVE, N.O.S.
Proper Shipping Name (IATA)	: Flammable liquid, corrosive, n.o.s.
Proper Shipping Name (ADN)	: FLAMMABLE LIQUID, CORROSIVE, N.O.S.
Proper Shipping Name (RID)	: FLAMMABLE LIQUID, CORROSIVE, N.O.S.
Transport document description (ADR)	: UN 2924 FLAMMABLE LIQUID, CORROSIVE, N.O.S. (TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane), 3 (8), II, (D/E), ENVIRONMENTALLY HAZARDOUS
Transport document description (IMDG)	: UN 2924 FLAMMABLE LIQUID, CORROSIVE, N.O.S. (TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane), 3 (8), II, MARINE POLLUTANT/ENVIRONMENTALLY HAZARDOUS
Transport document description (IATA)	: UN 2924 Flammable liquid, corrosive, n.o.s. (TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane), 3 (8), II, ENVIRONMENTALLY HAZARDOUS
Transport document description (ADN)	: UN 2924 FLAMMABLE LIQUID, CORROSIVE, N.O.S. (TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane), 3 (8), II, ENVIRONMENTALLY HAZARDOUS
Transport document description (RID)	: UN 2924 FLAMMABLE LIQUID, CORROSIVE, N.O.S. (TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane), 3 (8), II, ENVIRONMENTALLY HAZARDOUS

#### 14.3. Transport hazard class(es)

##### ADR

Transport hazard class(es) (ADR)	: 3 (8)
Danger labels (ADR)	: 3, 8



##### IMDG

Transport hazard class(es) (IMDG)	: 3 (8)
Danger labels (IMDG)	: 3, 8



##### IATA

Transport hazard class(es) (IATA)	: 3 (8)
Hazard labels (IATA)	: 3, 8



##### ADN

Transport hazard class(es) (ADN)	: 3 (8)
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# TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane

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Danger labels (ADN) : 3, 8



### RID

Transport hazard class(es) (RID) : 3 (8)

Danger labels (RID) : 3, 8



### 14.4. Packing group

Packing group (ADR) : II

Packing group (IMDG) : II

Packing group (IATA) : II

Packing group (ADN) : II

Packing group (RID) : II

### 14.5. Environmental hazards

Dangerous for the environment : Yes

Marine pollutant : Yes

Other information : No supplementary information available

### 14.6. Special precautions for user

#### - Overland transport

Classification code (ADR) : FC

Special provisions (ADR) : 274

Limited quantities (ADR) : 1I

Excepted quantities (ADR) : E2

Packing instructions (ADR) : P001, IBC02

Mixed packing provisions (ADR) : MP19

Portable tank and bulk container instructions (ADR) : T11

Portable tank and bulk container special provisions (ADR) : TP2, TP27

Tank code (ADR) : L4BH

Vehicle for tank carriage : FL

Transport category (ADR) : 2

Special provisions for carriage - Operation (ADR) : S2, S20

Hazard identification number (Kemler No.) : 338

Orange plates :



Tunnel restriction code (ADR) : D/E

#### - Transport by sea

Special provisions (IMDG) : 274

Limited quantities (IMDG) : 1 L

Excepted quantities (IMDG) : E2

Packing instructions (IMDG) : P001

IBC packing instructions (IMDG) : IBC02

Tank instructions (IMDG) : T11

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Tank special provisions (IMDG)	: TP2, TP27
EmS-No. (Fire)	: F-E
EmS-No. (Spillage)	: S-C
Stowage category (IMDG)	: B
Stowage and handling (IMDG)	: SW2
Properties and observations (IMDG)	: Causes burns to skin, eyes and mucous membranes.

### - Air transport

PCA Excepted quantities (IATA)	: E2
PCA Limited quantities (IATA)	: Y340
PCA limited quantity max net quantity (IATA)	: 0.5L
PCA packing instructions (IATA)	: 352
PCA max net quantity (IATA)	: 1L
CAO packing instructions (IATA)	: 363
CAO max net quantity (IATA)	: 5L
Special provisions (IATA)	: A3
ERG code (IATA)	: 3CH

### - Inland waterway transport

Classification code (ADN)	: FC
Special provisions (ADN)	: 274
Limited quantities (ADN)	: 1 L
Excepted quantities (ADN)	: E2
Carriage permitted (ADN)	: T
Equipment required (ADN)	: PP, EP, EX, A
Ventilation (ADN)	: VE01
Number of blue cones/lights (ADN)	: 1

### - Rail transport

Classification code (RID)	: FC
Special provisions (RID)	: 274
Limited quantities (RID)	: 1L
Excepted quantities (RID)	: E2
Packing instructions (RID)	: P001, IBC02
Mixed packing provisions (RID)	: MP19
Portable tank and bulk container instructions (RID)	: T11
Portable tank and bulk container special provisions (RID)	: TP2, TP27
Tank codes for RID tanks (RID)	: L4BH
Transport category (RID)	: 2
Colis express (express parcels) (RID)	: CE7
Hazard identification number (RID)	: 338

### 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

Contains no REACH substances with Annex XVII restrictions

Contains no substance on the REACH candidate list

Contains no REACH Annex XIV substances

Contains no substance 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.

Substance(s) are 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.

Contains no REACH Annex XIV substances

% Volatiles : > 70 %

# TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane

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### 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 : None of the components are listed  
SZW-lijst van mutagene stoffen : None of the components are listed  
NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Borstvoeding : None of the components are listed  
NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Vruchtbaarheid : None of the components are listed  
NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Ontwikkeling : None of the components are listed

#### Denmark

Classification remarks : Emergency management guidelines for the storage of flammable liquids must be followed  
Danish National Regulations : Young people below the age of 18 years are not allowed to use the product

### 15.2. Chemical safety assessment

No chemical safety assessment has been carried out

## 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:

Aquatic Acute 1	Hazardous to the aquatic environment — Acute Hazard, Category 1
Aquatic Chronic 1	Hazardous to the aquatic environment — Chronic Hazard, Category 1
Asp. Tox. 1	Aspiration hazard, Category 1
Eye Dam. 1	Serious eye damage/eye irritation, Category 1
Eye Irrit. 2	Serious eye damage/eye irritation, Category 2
Flam. Liq. 2	Flammable liquids, Category 2
Flam. Sol. 2	Flammable solids, Category 2
Skin Corr. 1B	Skin corrosion/irritation, Category 1B
Skin Irrit. 2	Skin corrosion/irritation, Category 2
STOT SE 3	Specific target organ toxicity — Single exposure, Category 3, Narcosis
H225	Highly flammable liquid and vapour.
H228	Flammable solid.
H304	May be fatal if swallowed and enters airways.
H314	Causes severe skin burns and eye damage.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

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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# TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane

Safety Data Sheet

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The logo for Gelest features the word "Gelest" in a serif font. The letters "Gele" are light blue, and the letters "st" are white. The "st" is positioned inside a light blue triangle that points to the right.