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

1.1. Product identifier

<table>
<thead>
<tr>
<th>Product form</th>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Substance name</td>
<td>TITANIUM TETRACHLORIDE, 99%</td>
</tr>
<tr>
<td>Product code</td>
<td>INTI065</td>
</tr>
<tr>
<td>Formula</td>
<td>Cl₄Ti</td>
</tr>
<tr>
<td>Synonyms</td>
<td>TITANIUM IV CHLORIDE</td>
</tr>
<tr>
<td>Chemical family</td>
<td>METAL COMPOUND</td>
</tr>
</tbody>
</table>

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

1.2.1. Relevant identified uses

Use of the substance/mixture: Chemical intermediate

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

GELEST, INC.
11 East Steel Road
Morrisville, PA 19067
USA
T 215-547-1015 - F 215-547-2484 - (M-F): 8:00 AM - 5:30 PM EST
info@gelest.com - www.gelest.com

GELEST INC.
Fritz-Klatte-Strasse 8
65933 Frankfurt
Germany
T +49 (0) 69 3535106-500 - F +49 (0) 69 3535106-501 - (M-F): 8:00 AM - 4:00 PM
info@gelestde.com - www.gelestde.com

1.4. Emergency telephone number

Emergency number: CHEMTREC: 1-800-424-9300 (USA); +1 703-527-3887 (International)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

| Skin corrosion/irritation, Category 1B | H314 |
| Serious eye damage/eye irritation, Category 1 | H318 |

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]

<table>
<thead>
<tr>
<th>Hazard pictograms (CLP)</th>
<th></th>
</tr>
</thead>
</table>

Signal word (CLP): Danger

Hazard statements (CLP): H314 - Causes severe skin burns and eye damage.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P260 - Do not breathe mist, vapours.
P264 - Wash hands thoroughly after handling.
TITANIUM TETRACHLORIDE, 99%
Safety Data Sheet

EUH-statements: EUH014 - Reacts violently with water.

2.3. Other hazards
Other hazards not contributing to the classification: Hydrogen chloride may be formed by reaction with water and moisture in air. The US OSHA PEL (TWA) for hydrogen chloride is 5 ppm.

SECTION 3: Composition/information on ingredients

3.1. Substances

<table>
<thead>
<tr>
<th>Substance type</th>
<th>Name</th>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>EC Index-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mono-constituent</td>
<td>TITANIUM TETRACHLORIDE, 99%</td>
<td>7550-45-0</td>
<td>231-441-9</td>
<td>022-001-00-5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>Classification according to Regulation (EC) No. 1272/2008 [CLP]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium tetrachloride</td>
<td>(CAS-No.) 7550-45-0</td>
<td>99 - 100</td>
<td>Skin Corr. 1B, H314</td>
</tr>
<tr>
<td></td>
<td>(EC-No.) 231-441-9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(EC Index-No.) 022-001-00-5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Full text of H-statements: see section 16

3.2. Mixtures
Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general: Remove contaminated clothing and shoes. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). If possible show this sheet; if not available show packaging or label.

First-aid measures after inhalation: Remove person to fresh air and keep comfortable for breathing. If you feel unwell, seek medical advice.

First-aid measures after skin contact: Wash with plenty of water/… Get immediate medical advice/attention.

First-aid measures after eye contact: Immediately flush eyes thoroughly with water for at least 15 minutes. 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: Fatal if inhaled. May cause respiratory irritation. May cause pulmonary edema, respiratory tract inflammation, and pulmonary fibrosis.
Symptoms/effects after skin contact: Causes (severe) skin burns.
Symptoms/effects after eye contact: Causes serious eye damage.
Symptoms/effects after ingestion: Harmful if swallowed. Swallowing a small quantity of this material will result in serious health hazard.

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: Alcohol-resistant foam. Carbon dioxide. Dry chemical. Use of high expansion foam (100:1) is recommended to cover flames.

5.2. Special hazards arising from the substance or mixture
Fire hazard: Irritating dense white fumes of titanium dioxide and hydrogen chloride develop when material is exposed to water or open flame.
Explosion hazard: Titanium tetrachloride is not flammable. The following information is provided to assist if titanium tetrachloride is present in a fire situation.
5.3. Advice for firefighters

Firefighting instructions: Use only dry media to extinguish flames. Water spray or fog should only be used to knock down hydrogen chloride vapors in areas downwind from the fire.

Protection during firefighting: Do not enter fire area without proper protective equipment, including respiratory protection. Avoid all eye and skin contact and do not breathe vapour and mist.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

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.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling: Avoid all eye and skin contact and do not breathe vapour and mist. Provide good ventilation in process area to prevent formation of vapour.

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

Storage conditions: Keep container tightly closed. Store in sealed corrosion resistant containers.


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>Material</th>
<th>Romania OEL TWA (mg/m³)</th>
<th>Romania OEL STEL (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium tetrachloride (7550-45-0)</td>
<td>1 mg/m³</td>
<td>3 mg/m³</td>
</tr>
</tbody>
</table>

8.2. Exposure controls

Appropriate engineering controls:
Handle in an enclosing hood with exhaust 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:
In case of insufficient ventilation, wear suitable respiratory equipment
SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

- **Physical state**: Liquid
- **Appearance**: Clear liquid. Forms dense white fumes on contact with air.
- **Molecular mass**: 189.71 g/mol
- **Colour**: Straw.
- **Odour**: Acrid. Similar to hydrogen chloride.
- **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**: No data available
- **Freezing point**: -24 °C
- **Boiling point**: 136.4 °C
- **Flash point**: 104 °C
- **Auto-ignition temperature**: Not ignitable
- **Decomposition temperature**: No data available
- **Flammability (solid, gas)**: No data available
- **Vapour pressure**: 1.27 kPa @ 20°C
- **Relative vapour density at 20 °C**: 1.07
- **Relative density**: 1.73
- **% Volatiles**: 100 %
- **Solubility**: Reacts violently with water.
- **Log Pow**: No data available
- **Log Kow**: No data available
- **Viscosity, kinematic**: 0.5 cSt
- **Viscosity, dynamic**: No data available
- **Explosive properties**: No data available
- **Oxidising properties**: No data available
- **Explosive limits**: No data available

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 corrosion resistant containers stored under a dry inert atmosphere.

10.3. Possibility of hazardous reactions

Reacts with water and moisture in air, liberating dense white fumes of titanium dioxide and hydrogen chloride.

10.4. Conditions to avoid

No additional information available

10.5. Incompatible materials

Acids. alcohols. Moisture. Oxidizing agent. Water :

10.6. Hazardous decomposition products

Hydrogen chloride. Titanium dioxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

**Acute toxicity**: Not classified

<table>
<thead>
<tr>
<th>Compound</th>
<th>Route</th>
<th>Toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TITANIUM TETRACHLORIDE, 99% (7550-45-0)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50 oral rat</td>
<td></td>
<td>1780 mg/kg</td>
</tr>
<tr>
<td><strong>Titanium tetrachloride (7550-45-0)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50 oral rat</td>
<td></td>
<td>464 mg/kg</td>
</tr>
<tr>
<td>LD50 dermal rabbit</td>
<td></td>
<td>3160 mg/kg</td>
</tr>
<tr>
<td>LC50 inhalation rat (mg/l)</td>
<td></td>
<td>0.4 mg/l/4h</td>
</tr>
</tbody>
</table>
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
Reproductive toxicity: Not classified
STOT-single exposure: Not classified
STOT-repeated exposure: Not classified
Aspiration hazard: Not classified
Symptoms/effects after inhalation: Fatal if inhaled. May cause respiratory irritation. May cause pulmonary edema, respiratory tract inflammation, and pulmonary fibrosis.
Symptoms/effects after skin contact: Causes (severe) skin burns.
Symptoms/effects after eye contact: Causes serious eye damage.
Symptoms/effects after ingestion: Harmful if swallowed. Swallowing a small quantity of this material will result in serious health hazard.
Reason for classification: Expert judgment

SECTION 12: Ecological information

12.1. Toxicity
Acute aquatic toxicity: Not classified
Chronic aquatic toxicity: Not classified

12.2. Persistence and degradability
No additional information available

12.3. Bioaccumulative potential
No additional information available

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
Other adverse effects: This substance may be hazardous to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Product/Packaging disposal recommendations: Dispose of contents/container to licensed waste disposal facility. Dispose in a safe manner in accordance with local/national regulations.
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) : 1838
UN-No. (IMDG) : 1838
UN-No. (IATA) : 1838
UN-No. (ADN) : 1838
UN-No. (RID) : 1838

14.2. UN proper shipping name
Proper Shipping Name (ADR) : TITANIUM TETRACHLORIDE
Proper Shipping Name (IMDG) : TITANIUM TETRACHLORIDE
Proper Shipping Name (IATA) : Titanium tetrachloride
Proper Shipping Name (ADN) : TITANIUM TETRACHLORIDE
Proper Shipping Name (RID) : TITANIUM TETRACHLORIDE
Transport document description (ADR) : UN 1838 TITANIUM TETRACHLORIDE, 6.1 (8), I, (C/D)
Transport document description (IMDG) : UN 1838 TITANIUM TETRACHLORIDE, 6.1 (8), I
| Transport document description (IATA) | UN 1838 Titanium tetrachloride, 6.1 |
| Transport document description (ADN)  | UN 1838 TITANIUM TETRACHLORIDE, 6.1 (8), I |
| Transport document description (RID)  | UN 1838 TITANIUM TETRACHLORIDE, 6.1 (8), I |

### 14.3. Transport hazard class(es)

**ADR**
- Transport hazard class(es) (ADR) : 6.1 (8)
- Danger labels (ADR) : 6.1, 8

**IMDG**
- Transport hazard class(es) (IMDG) : 6.1 (8)
- Danger labels (IMDG) : 6.1, 8

**IATA**
- Transport hazard class(es) (IATA) : 6.1 (8)

**ADN**
- Transport hazard class(es) (ADN) : 6.1 (8)
- Danger labels (ADN) : 6.1, 8

**RID**
- Transport hazard class(es) (RID) : 6.1 (8)
- Danger labels (RID) : 6.1, 8

### 14.4. Packing group

- Packing group (ADR) : I
- Packing group (IMDG) : I
- Packing group (IATA) : Not applicable
- Packing group (ADN) : I
- Packing group (RID) : I

### 14.5. Environmental hazards

- Dangerous for the environment : No
- Marine pollutant : No
- Other information : No supplementary information available
### 14.6. Special precautions for user

#### - Overland transport

<table>
<thead>
<tr>
<th>Classification code (ADR)</th>
<th>TC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special provisions (ADR)</td>
<td>354</td>
</tr>
<tr>
<td>Limited quantities (ADR)</td>
<td>0</td>
</tr>
<tr>
<td>Excepted quantities (ADR)</td>
<td>E0</td>
</tr>
<tr>
<td>Packing instructions (ADR)</td>
<td>P602</td>
</tr>
<tr>
<td>Special packing provisions (ADR)</td>
<td>B4</td>
</tr>
<tr>
<td>Mixed packing provisions (ADR)</td>
<td>MP8, MP17</td>
</tr>
<tr>
<td>Portable tank and bulk container instructions (ADR)</td>
<td>T20</td>
</tr>
<tr>
<td>Portable tank and bulk container special provisions (ADR)</td>
<td>TP2, TP37</td>
</tr>
<tr>
<td>Tank code (ADR)</td>
<td>L10CH</td>
</tr>
<tr>
<td>Tank special provisions (ADR)</td>
<td>TU14, TU15, TE19, TE21</td>
</tr>
<tr>
<td>Vehicle for tank carriage</td>
<td>AT</td>
</tr>
<tr>
<td>Transport category (ADR)</td>
<td>1</td>
</tr>
<tr>
<td>Special provisions for carriage - Loading, unloading and handling (ADR)</td>
<td>CV1, CV13, CV28</td>
</tr>
<tr>
<td>Special provisions for carriage - Operation (ADR)</td>
<td>S9, S14</td>
</tr>
<tr>
<td>Hazard identification number (Kemler No.)</td>
<td>X668</td>
</tr>
<tr>
<td>Orange plates</td>
<td>X668 1838</td>
</tr>
</tbody>
</table>

- Tunnel restriction code (ADR) | C/D
- EAC code | 4WE
- APP code | B

#### - Transport by sea

<table>
<thead>
<tr>
<th>Special provisions (IMDG)</th>
<th>354</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited quantities (IMDG)</td>
<td>0</td>
</tr>
<tr>
<td>Excepted quantities (IMDG)</td>
<td>E0</td>
</tr>
<tr>
<td>Packing instructions (IMDG)</td>
<td>P602</td>
</tr>
<tr>
<td>Tank instructions (IMDG)</td>
<td>T20</td>
</tr>
<tr>
<td>Tank special provisions (IMDG)</td>
<td>TP2, TP13, TP37</td>
</tr>
<tr>
<td>EmS-No. (Fire)</td>
<td>F-A</td>
</tr>
<tr>
<td>EmS-No. (Spillage)</td>
<td>S-B</td>
</tr>
<tr>
<td>Stowage category (IMDG)</td>
<td>D</td>
</tr>
<tr>
<td>Stowage and handling (IMDG)</td>
<td>SW2</td>
</tr>
<tr>
<td>Properties and observations (IMDG)</td>
<td>Colourless liquid. Reacts violently with water, evolving hydrogen chloride, an irritating and corrosive gas apparent as white fumes. In the presence of moisture, highly corrosive to most metals. Highly toxic if swallowed, by skin contact or by inhalation. Causes burns to skin, eyes and mucous membranes.</td>
</tr>
</tbody>
</table>

#### - Air transport

<table>
<thead>
<tr>
<th>PCA Limited quantities (IATA)</th>
<th>Forbidden</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA limited quantity max net quantity (IATA)</td>
<td>Forbidden</td>
</tr>
<tr>
<td>PCA packing instructions (IATA)</td>
<td>Forbidden</td>
</tr>
<tr>
<td>PCA max net quantity (IATA)</td>
<td>Forbidden</td>
</tr>
<tr>
<td>CAO packing instructions (IATA)</td>
<td>Forbidden</td>
</tr>
<tr>
<td>CAO max net quantity (IATA)</td>
<td>Forbidden</td>
</tr>
<tr>
<td>Special provisions (IATA)</td>
<td>A2</td>
</tr>
<tr>
<td>ERG code (IATA)</td>
<td>6C</td>
</tr>
</tbody>
</table>

#### - Inland waterway transport

<table>
<thead>
<tr>
<th>Classification code (ADN)</th>
<th>TC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special provisions (ADN)</td>
<td>354</td>
</tr>
<tr>
<td>Limited quantities (ADN)</td>
<td>0</td>
</tr>
<tr>
<td>Excepted quantities (ADN)</td>
<td>E0</td>
</tr>
</tbody>
</table>
TITANIUM TETRACHLORIDE, 99%
Safety Data Sheet

Equipment required (ADN): PP, EP, TOX, A
Ventilation (ADN): VE02
Number of blue cones/lights (ADN): 2

- Rail transport
  Classification code (RID): TC3
  Special provisions (RID): 354
  Limited quantities (RID): 0
  Excepted quantities (RID): E0
  Packing instructions (RID): P602
  Mixed packing provisions (RID): MP8, MP17
  Portable tank and bulk container instructions (RID): T20
  Portable tank and bulk container special provisions (RID): TP2, TP37
  Tank codes for RID tanks (RID): L10CH
  Special provisions for RID tanks (RID): TU14, TU15, TU38, TE21, TE22
  Transport category (RID): 1
  Special provisions for carriage - Loading, unloading and handling (RID): CW13, CW28, CW31
  Hazard identification number (RID): X668

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 TETRACHLORIDE, 99% is not on the REACH Candidate List
TITANIUM TETRACHLORIDE, 99% is not on the REACH Annex XIV List
TITANIUM TETRACHLORIDE, 99% is not subject to REGULATION (EU) No 649/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 concerning the export and import of hazardous chemicals.

% Volatiles: 100 %

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. 2285)

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
Danish National Regulations: Young people below the age of 18 years are not allowed to use the product

15.2. Chemical safety assessment
No additional information available

SECTION 16: Other information

Print date: 10/04/2019
EN (English)
SDS ID: INTI065
### 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:**

| Eye Dam. 1 | Serious eye damage/eye irritation, Category 1 |
| Skin Corr. 1B | Skin corrosion/irritation, Category 1B |
| H314 | Causes severe skin burns and eye damage. |
| H318 | Causes serious eye damage. |
| EUH014 | Reacts violently with water. |

**SDS EU (REACH Annex II) - Custom**

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