

## Tetrabutyl titanate

### Apollo Scientific

Chemwatch Hazard Alert Code: 3

Part Number: **IN3689**

Version No: 1.1

Safety Data Sheet (Conforms to Annex II of REACH (1907/2006) - Regulation 2020/878)

Issue Date: **16/09/2022**

Print Date: **31/07/2023**

S.REACH.GBR.EN

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

### 1.1. Product Identifier

|                               |  |
|-------------------------------|--|
| Product name                  | Tetrabutyl titanate                    |
| Chemical Name                 | titanium(IV) butoxide                  |
| Synonyms                      | Not Available                          |
| Proper shipping name          | FLAMMABLE LIQUID, CORROSIVE, N.O.S.    |
| Chemical formula              | C <sub>4</sub> H <sub>10</sub> O.1/4Ti |
| Other means of identification | Not Available                          |
| CAS number                    | 5593-70-4                              |
| EC number                     | 227-006-8                              |

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

|                          |  |
|--------------------------|--|
| Relevant identified uses | Not Available                                    |
| Uses advised against     | No specific uses advised against are identified. |

### 1.3. Details of the manufacturer or supplier of the safety data sheet

|                         |   |
|-------------------------|---|
| Registered company name | <b>Apollo Scientific</b>  |
| Address                 | Whitefield Road, Bredbury SK62QR United Kingdom                                     |
| Telephone               | 01614060505   |
| Fax                     | 0161 406 0506   |
| Website                 | <a href="http://www.apolloscientific.co.uk/">http://www.apolloscientific.co.uk/</a> |
| Email                   | sales@apolloscientific.co.uk  |

### 1.4. Emergency telephone number

|                                   |                      |
|-----------------------------------|----------------------|
| Association / Organisation        | <b>Not Available</b> |
| Emergency telephone numbers       | Not Available        |
| Other emergency telephone numbers | Not Available        |

## SECTION 2 Hazards identification

### 2.1. Classification of the substance or mixture

|  |  |
|--|--|
| Classification according to regulation (EC) No | H226 - Flammable Liquids Category 3, H318 - Serious Eye Damage/Eye Irritation Category 1, H335 - Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3, H315 - Skin Corrosion/Irritation Category 2 |
|--|--|

|   |  |
|---|--|
| 1272/2008 [CLP] and amendments <sup>[1]</sup> |  |
| <b>Legend:</b>                                | 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI |

## 2.2. Label elements

|                     |   |
|---------------------|---|
| Hazard pictogram(s) |  |
|---------------------|---|

|             |               |
|-------------|---------------|
| Signal word | <b>Danger</b> |
|-------------|---------------|

## Hazard statement(s)

|      |                                   |
|------|-----------------------------------|
| H226 | Flammable liquid and vapour.      |
| H318 | Causes serious eye damage.        |
| H335 | May cause respiratory irritation. |
| H315 | Causes skin irritation.           |

## Supplementary statement(s)

Not Applicable

## Precautionary statement(s) Prevention

|      |  |
|------|--|
| P210 | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. |
| P271 | Use only outdoors or in a well-ventilated area.  |
| P280 | Wear protective gloves, protective clothing, eye protection and face protection.               |
| P240 | Ground and bond container and receiving equipment.   |
| P241 | Use explosion-proof electrical/ventilating/lighting/intrinsically safe equipment.              |
| P242 | Use non-sparking tools.  |
| P243 | Take action to prevent static discharges.  |
| P261 | Avoid breathing mist/vapours/spray.  |
| P264 | Wash all exposed external body areas thoroughly after handling.                                |

## Precautionary statement(s) Response

|                |  |
|----------------|--|
| P305+P351+P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P310           | Immediately call a POISON CENTER/doctor/physician/first aider.   |
| P370+P378      | In case of fire: Use alcohol resistant foam or normal protein foam to extinguish.  |
| P302+P352      | IF ON SKIN: Wash with plenty of water.   |
| P303+P361+P353 | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].                         |
| P304+P340      | IF INHALED: Remove person to fresh air and keep comfortable for breathing.   |
| P332+P313      | If skin irritation occurs: Get medical advice/attention.   |
| P362+P364      | Take off contaminated clothing and wash it before reuse.   |

## Precautionary statement(s) Storage

|           |  |
|-----------|--|
| P403+P235 | Store in a well-ventilated place. Keep cool. |
| P405      | Store locked up.                             |

## Precautionary statement(s) Disposal

|      |  |
|------|--|
| P501 | Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation. |
|------|--|

## 2.3. Other hazards

Inhalation and/or ingestion may produce serious health damage\*.

REACH - Art.57-59: The mixture does not contain Substances of Very High Concern (SVHC) at the SDS print date.

Tetrabutyl titanate

## SECTION 3 Composition / information on ingredients

### 3.1. Substances

| 1. CAS No<br>2. EC No<br>3. Index No<br>4. REACH No | %[weight] | Name                | Classification according to regulation (EC) No 1272/2008 [CLP] and amendments | SCL / M-Factor | Nanoform Particle Characteristics |
|---|-----------|---------------------|---|----------------|-----------------------------------|
| Not Available                                       | 100       | Tetrabutyl titanate | Not Applicable  | Not Applicable | Not Available                     |

**Legend:** 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 3. Classification drawn from C&L; \* EU IOELVs available; [e] Substance identified as having endocrine disrupting properties

### 3.2. Mixtures

See 'Information on ingredients' in section 3.1

## SECTION 4 First aid measures

### 4.1. Description of first aid measures

|                     |   |
|---------------------|---|
| <b>Eye Contact</b>  | <p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> <li>▶ Immediately hold eyelids apart and flush the eye continuously with running water.</li> <li>▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.</li> <li>▶ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.</li> <li>▶ Transport to hospital or doctor without delay.</li> <li>▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.</li> </ul>  |
| <b>Skin Contact</b> | <p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> <li>▶ Immediately flush body and clothes with large amounts of water, using safety shower if available.</li> <li>▶ Quickly remove all contaminated clothing, including footwear.</li> <li>▶ Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.</li> <li>▶ Transport to hospital, or doctor.</li> </ul>  |
| <b>Inhalation</b>   | <ul style="list-style-type: none"> <li>▶ If fumes or combustion products are inhaled remove from contaminated area.</li> <li>▶ Lay patient down. Keep warm and rested.</li> <li>▶ Prosthesis such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.</li> <li>▶ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.</li> <li>▶ Transport to hospital, or doctor, without delay.</li> <li>▶ Inhalation of vapours or aerosols (mists, fumes) may cause lung oedema.</li> <li>▶ Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs).</li> <li>▶ As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete rest (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested.</li> <li>▶ Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered.</li> </ul> <p><b>This must definitely be left to a doctor or person authorised by him/her.</b><br/>(ICSC13719)</p> |
| <b>Ingestion</b>    | <ul style="list-style-type: none"> <li>▶ For advice, contact a Poisons Information Centre or a doctor at once.</li> <li>▶ Urgent hospital treatment is likely to be needed.</li> <li>▶ <b>If swallowed do NOT induce vomiting.</b></li> <li>▶ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.</li> <li>▶ Observe the patient carefully.</li> <li>▶ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.</li> <li>▶ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.</li> <li>▶ Transport to hospital or doctor without delay.</li> </ul>  |

### 4.2. Most important symptoms and effects, both acute and delayed

See Section 11

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

Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Immediate administration of an appropriate spray, by a doctor or a person authorised by him/her should be considered.

(ICSC24419/24421)

## SECTION 5 Firefighting measures

### 5.1. Extinguishing media

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

|                      |  |
|----------------------|--|
| Fire Incompatibility | ▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result |
|----------------------|--|

### 5.3. Advice for firefighters

|                       |  |
|-----------------------|--|
| Fire Fighting         |  |
| Fire/Explosion Hazard | <ul style="list-style-type: none"><li>▶ Liquid and vapour are highly flammable.</li><li>▶ Severe fire hazard when exposed to heat, flame and/or oxidisers.</li><li>▶ Vapour may travel a considerable distance to source of ignition.</li><li>▶ Heating may cause expansion or decomposition leading to violent rupture of containers.</li><li>▶ On combustion, may emit toxic fumes of carbon monoxide (CO).</li></ul> Combustion products include: |

## SECTION 6 Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

See section 8

### 6.2. Environmental precautions

See section 12

### 6.3. Methods and material for containment and cleaning up

|              |  |
|--------------|--|
| Minor Spills | <ul style="list-style-type: none"><li>▶ Remove all ignition sources.</li><li>▶ Clean up all spills immediately.</li><li>▶ Avoid breathing vapours and contact with skin and eyes.</li><li>▶ Control personal contact with the substance, by using protective equipment.</li><li>▶ Contain and absorb small quantities with vermiculite or other absorbent material.</li><li>▶ Wipe up.</li><li>▶ Collect residues in a flammable waste container.</li><li>▶ Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.</li><li>▶ Check regularly for spills and leaks.</li></ul> |
| Major Spills |  |

### 6.4. Reference to other sections

Personal Protective Equipment advice is contained in Section 8 of the SDS.

## SECTION 7 Handling and storage

### 7.1. Precautions for safe handling

|               |   |
|---------------|---|
| Safe handling | <ul style="list-style-type: none"><li>▶ Containers, even those that have been emptied, may contain explosive vapours.</li><li>▶ Do NOT cut, drill, grind, weld or perform similar operations on or near containers.</li><li>▶ Avoid all personal contact, including inhalation.</li><li>▶ Wear protective clothing when risk of exposure occurs.</li><li>▶ Use in a well-ventilated area.</li><li>▶ Prevent concentration in hollows and sumps.</li><li>▶ <b>DO NOT enter confined spaces until atmosphere has been checked.</b></li><li>▶ Avoid smoking, naked lights, heat or ignition sources.</li><li>▶ When handling, <b>DO NOT eat, drink or smoke.</b></li><li>▶ Vapour may ignite on pumping or pouring due to static electricity.</li><li>▶ <b>DO NOT use plastic buckets.</b></li><li>▶ Earth and secure metal containers when dispensing or pouring product.</li><li>▶ Use spark-free tools when handling.</li><li>▶ Avoid contact with incompatible materials.</li><li>▶ Keep containers securely sealed.</li><li>▶ Avoid physical damage to containers.</li><li>▶ Always wash hands with soap and water after handling.</li><li>▶ Work clothes should be laundered separately.</li><li>▶ Use good occupational work practice.</li><li>▶ Observe manufacturer's storage and handling recommendations contained within this SDS.</li></ul> |
|---------------|---|

|                                      |   |
|--------------------------------------|---|
|                                      | <ul style="list-style-type: none"> <li>Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.</li> </ul>  |
| <b>Fire and explosion protection</b> | See section 5   |
| <b>Other information</b>             | <ul style="list-style-type: none"> <li>Store in original containers in approved flame-proof area.</li> <li>No smoking, naked lights, heat or ignition sources.</li> <li><b>DO NOT store in pits, depression, basement or areas where vapours may be trapped.</b></li> <li>Keep containers securely sealed.</li> <li>Store away from incompatible materials in a cool, dry well ventilated area.</li> <li>Protect containers against physical damage and check regularly for leaks.</li> <li>Observe manufacturer's storage and handling recommendations contained within this MSDS.</li> <li>Tank storage: Tanks must be specifically designed for use with this product. Bulk storage tanks should be diked (bunded). Locate tanks away from heat and other sources of ignition. Cleaning, inspection and maintenance of storage tanks is a specialist operation, which requires the implementation of strict procedures and precautions.</li> <li>Keep in a cool place. Electrostatic charges will be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment to reduce the risk. The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flammable.</li> <li>For containers, or container linings use mild steel, stainless steel. Examples of suitable materials are: high density polyethylene (HDPE), polypropylene (PP), and Viton (FMK), which have been specifically tested for compatibility with this product.</li> <li>For container linings, use amine-adduct cured epoxy paint.</li> <li>For seals and gaskets use: graphite, PTFE, Viton A, Viton B.</li> <li>Unsuitable material: Some synthetic materials may be unsuitable for containers or container linings depending on the material specification and intended use. Examples of materials to avoid are: natural rubber (NR), nitrile rubber (NBR), ethylene propylene rubber (EPDM), polymethyl methacrylate (PMMA), polystyrene, polyvinyl chloride (PVC), polyisobutylene. However, some may be suitable for glove materials.</li> <li>Do not cut, drill, grind, weld or perform similar operations on or near containers. Containers, even those that have been emptied, can contain explosive vapours.</li> </ul> |

## 7.2. Conditions for safe storage, including any incompatibilities

|  |  |
|--|--|
| <b>Suitable container</b>  | <ul style="list-style-type: none"> <li>Packing as supplied by manufacturer.</li> <li>Plastic containers may only be used if approved for flammable liquid.</li> <li>Check that containers are clearly labelled and free from leaks.</li> <li>For low viscosity materials (i) : Drums and jerry cans must be of the non-removable head type. (ii) : Where a can is to be used as an inner package, the can must have a screwed enclosure.</li> <li>For materials with a viscosity of at least 2680 cSt. (23 deg. C)</li> <li>For manufactured product having a viscosity of at least 250 cSt. (23 deg. C)</li> <li>Manufactured product that requires stirring before use and having a viscosity of at least 20 cSt (25 deg. C): (i) Removable head packaging; (ii) Cans with friction closures and (iii) low pressure tubes and cartridges may be used.</li> <li>Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages</li> <li>In addition, where inner packagings are glass and contain liquids of packing group I there must be sufficient inert absorbent to absorb any spillage, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.</li> </ul> |
| <b>Storage incompatibility</b>   | <ul style="list-style-type: none"> <li>Avoid reaction with oxidising agents</li> <li>Air Sensitive</li> <li>Moisture sensitive</li> <li>Store under argon</li> </ul>   |
| <b>Hazard categories in accordance with Regulation (EC) No 1272/2008</b>   | P5a: Flammable Liquids, P5b: Flammable Liquids, P5c: Flammable Liquids   |
| <b>Qualifying quantity (tonnes) of dangerous substances as referred to in Article 3(10) for the application of</b> | <p>P5a Lower- / Upper-tier requirements: 10 / 50</p> <p>P5b Lower- / Upper-tier requirements: 50 / 200</p> <p>P5c Lower- / Upper-tier requirements: 5 000 / 50 000</p>   |

## 7.3. Specific end use(s)

See section 1.2

## SECTION 8 Exposure controls / personal protection

### 8.1. Control parameters

| Ingredient    | DNELs<br>Exposure Pattern Worker                     | PNECs<br>Compartment      |
|---------------|--|---------------------------|
| Not Available | Inhalation 127 mg/m <sup>3</sup> (Systemic, Chronic) | 0.08 mg/L (Water (Fresh)) |

Continued...

| Ingredient | DNELs<br>Exposure Pattern Worker  | PNECs<br>Compartment   |
|------------|---|--|
|            | <p><i>Dermal 37.5 mg/kg bw/day (Systemic, Chronic) *</i></p> <p><i>Inhalation 152 mg/m<sup>3</sup> (Systemic, Chronic) *</i></p> <p><i>Oral 3.75 mg/kg bw/day (Systemic, Chronic) *</i></p> | <p>0.008 mg/L (Water - Intermittent release)</p> <p>2.25 mg/L (Water (Marine))</p> <p>0.069 mg/kg sediment dw (Sediment (Fresh Water))</p> <p>0.007 mg/kg sediment dw (Sediment (Marine))</p> <p>0.017 mg/kg soil dw (Soil)</p> <p>65 mg/L (STP)</p> |

\* Values for General Population

**Occupational Exposure Limits (OEL)**

**INGREDIENT DATA**

| Source        | Ingredient    | Material name | TWA           | STEL          | Peak          | Notes         |
|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Not Available | Not Available | Not Available | Not Available | Not Available | Not Available | Not Available |

Not Applicable


**Emergency Limits**

| Ingredient          | TEEL-1        | TEEL-2        | TEEL-3        |
|---------------------|---------------|---------------|---------------|
| Tetrabutyl titanate | Not Available | Not Available | Not Available |

| Ingredient          | Original IDLH | Revised IDLH  |
|---------------------|---------------|---------------|
| Tetrabutyl titanate | Not Available | Not Available |

**8.2. Exposure controls**

| <b>8.2.1. Appropriate engineering controls</b>  | <p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use. Employers may need to use multiple types of controls to prevent employee overexposure.</p> <p>For flammable liquids and flammable gases, local exhaust ventilation or a process enclosure ventilation system may be required. Ventilation equipment should be explosion-resistant.</p> <p>Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.</p> |                              |   |  |  |   |                                  |  |   |                                  |
|---|---|------------------------------|---|--|--|---|----------------------------------|--|---|----------------------------------|
|   | <table border="1" style="width: 100%;"> <thead> <tr> <th>Type of Contaminant:</th> <th>Air Speed:</th> </tr> </thead> <tbody> <tr> <td>solvent, vapours, degreasing etc., evaporating from tank (in still air).</td> <td>0.25-0.5 m/s (50-100 f/min.)</td> </tr> <tr> <td>aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)</td> <td>0.5-1 m/s (100-200 f/min.)</td> </tr> <tr> <td>direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)</td> <td>1-2.5 m/s (200-500 f/min.)</td> </tr> </tbody> </table>   | Type of Contaminant:         | Air Speed:  | solvent, vapours, degreasing etc., evaporating from tank (in still air). | 0.25-0.5 m/s (50-100 f/min.)                               | aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation) | 0.5-1 m/s (100-200 f/min.)       | direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion) | 1-2.5 m/s (200-500 f/min.)                |                                  |
|   | Type of Contaminant:  | Air Speed:                   |   |  |  |   |                                  |  |   |                                  |
|   | solvent, vapours, degreasing etc., evaporating from tank (in still air).  | 0.25-0.5 m/s (50-100 f/min.) |   |  |  |   |                                  |  |   |                                  |
| aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)   | 0.5-1 m/s (100-200 f/min.)  |                              |   |  |  |   |                                  |  |   |                                  |
| direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)  | 1-2.5 m/s (200-500 f/min.)  |                              |   |  |  |   |                                  |  |   |                                  |
| <p>Within each range the appropriate value depends on:</p> <table border="1" style="width: 100%;"> <thead> <tr> <th>Lower end of the range</th> <th>Upper end of the range</th> </tr> </thead> <tbody> <tr> <td>1: Room air currents minimal or favourable to capture</td> <td>1: Disturbing room air currents</td> </tr> <tr> <td>2: Contaminants of low toxicity or of nuisance value only.</td> <td>2: Contaminants of high toxicity</td> </tr> <tr> <td>3: Intermittent, low production.</td> <td>3: High production, heavy use</td> </tr> <tr> <td>4: Large hood or large air mass in motion</td> <td>4: Small hood-local control only</td> </tr> </tbody> </table>  | Lower end of the range  | Upper end of the range       | 1: Room air currents minimal or favourable to capture | 1: Disturbing room air currents  | 2: Contaminants of low toxicity or of nuisance value only. | 2: Contaminants of high toxicity  | 3: Intermittent, low production. | 3: High production, heavy use  | 4: Large hood or large air mass in motion | 4: Small hood-local control only |
| Lower end of the range  | Upper end of the range  |                              |   |  |  |   |                                  |  |   |                                  |
| 1: Room air currents minimal or favourable to capture   | 1: Disturbing room air currents   |                              |   |  |  |   |                                  |  |   |                                  |
| 2: Contaminants of low toxicity or of nuisance value only.  | 2: Contaminants of high toxicity  |                              |   |  |  |   |                                  |  |   |                                  |
| 3: Intermittent, low production.  | 3: High production, heavy use   |                              |   |  |  |   |                                  |  |   |                                  |
| 4: Large hood or large air mass in motion   | 4: Small hood-local control only  |                              |   |  |  |   |                                  |  |   |                                  |
| <p>Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.</p> |   |                              |   |  |  |   |                                  |  |   |                                  |

|   |   |
|---|---|
|   | <ul style="list-style-type: none"> <li>· Adequate ventilation is typically taken to be that which limits the average concentration to no more than 25% of the LEL within the building, room or enclosure containing the dangerous substance.</li> <li>· Ventilation for plant and machinery is normally considered adequate if it limits the average concentration of any dangerous substance that might potentially be present to no more than 25% of the LEL. However, an increase up to a maximum 50% LEL can be acceptable where additional safeguards are provided to prevent the formation of a hazardous explosive atmosphere. For example, gas detectors linked to emergency shutdown of the process might be used together with maintaining or increasing the exhaust ventilation on solvent evaporating ovens and gas turbine enclosures.</li> <li>· Temporary exhaust ventilation systems may be provided for non-routine higher-risk activities, such as cleaning, repair or maintenance in tanks or other confined spaces or in an emergency after a release. The work procedures for such activities should be carefully considered.. The atmosphere should be continuously monitored to ensure that ventilation is adequate and the area remains safe. Where workers will enter the space, the ventilation should ensure that the concentration of the dangerous substance does not exceed 10% of the LEL (irrespective of the provision of suitable breathing apparatus)</li> </ul> |
| <b>8.2.2. Individual protection measures, such as personal protective equipment</b> |    |
| <b>Eye and face protection</b>  | <ul style="list-style-type: none"> <li>▸ Chemical goggles. [AS/NZS 1337.1, EN166 or national equivalent]</li> <li>▸ Full face shield may be required for supplementary but never for primary protection of eyes.</li> <li>▸ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].</li> </ul>   |
| <b>Skin protection</b>  | See Hand protection below   |
| <b>Hands/feet protection</b>  | <ul style="list-style-type: none"> <li>▸ Wear chemical protective gloves, e.g. PVC.</li> <li>▸ Wear safety footwear or safety gumboots, e.g. Rubber</li> <li>▸ When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.</li> </ul>  |
| <b>Body protection</b>  | See Other protection below  |
| <b>Other protection</b>   | <ul style="list-style-type: none"> <li>▸ Overalls.</li> <li>▸ PVC Apron.</li> <li>▸ PVC protective suit may be required if exposure severe.</li> <li>▸ Eyewash unit.</li> <li>▸ Ensure there is ready access to a safety shower.</li> <li>▸ Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.</li> <li>▸ For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets).</li> <li>▸ Non sparking safety or conductive footwear should be considered. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot an shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.</li> </ul>   |

### 8.2.3. Environmental exposure controls

See section 12

## SECTION 9 Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

|  |               |  |               |
|--|---------------|--|---------------|
| <b>Appearance</b>                          | Not Available |  |               |
| <b>Physical state</b>                      | Liquid        | <b>Relative density (Water = 1)</b>            | Not Available |
| <b>Odour</b>                               | Not Available | <b>Partition coefficient n-octanol / water</b> | Not Available |
| <b>Odour threshold</b>                     | Not Available | <b>Auto-ignition temperature (°C)</b>          | Not Available |
| <b>pH (as supplied)</b>                    | Not Available | <b>Decomposition temperature (°C)</b>          | Not Available |
| <b>Melting point / freezing point (°C)</b> | -55           | <b>Viscosity (cSt)</b>                         | Not Available |

Continued...

## Tetrabutyl titanate

|  |               |                                   |               |
|--|---------------|-----------------------------------|---------------|
| Initial boiling point and boiling range (°C) | 206/10mm      | Molecular weight (g/mol)          | Not Available |
| Flash point (°C)                             | 41            | Taste                             | Not Available |
| Evaporation rate                             | Not Available | Explosive properties              | Not Available |
| Flammability                                 | Flammable.    | Oxidising properties              | Not Available |
| Upper Explosive Limit (%)                    | Not Available | Surface Tension (dyn/cm or mN/m)  | Not Available |
| Lower Explosive Limit (%)                    | Not Available | Volatile Component (%vol)         | Not Available |
| Vapour pressure (kPa)                        | Not Available | Gas group                         | Not Available |
| Solubility in water                          | Not Available | pH as a solution (1%)             | Not Available |
| Vapour density (Air = 1)                     | 1             | VOC g/L                           | Not Available |
| Nanoform Solubility                          | Not Available | Nanoform Particle Characteristics | Not Available |
| Particle Size                                | Not Available |                                   |               |

## 9.2. Other information

Not Available

## SECTION 10 Stability and reactivity

|  |  |
|--|--|
| 10.1.Reactivity                          | See section 7.2  |
| 10.2. Chemical stability                 | <ul style="list-style-type: none"> <li>▸ Unstable in the presence of incompatible materials.</li> <li>▸ Product is considered stable.</li> <li>▸ Hazardous polymerisation will not occur.</li> </ul> |
| 10.3. Possibility of hazardous reactions | See section 7.2  |
| 10.4. Conditions to avoid                | See section 7.2  |
| 10.5. Incompatible materials             | See section 7.2  |
| 10.6. Hazardous decomposition products   | See section 5.3  |

## SECTION 11 Toxicological information

## 11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008 Information on toxicological effects

|              |  |
|--------------|--|
| Inhaled      | <p>The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.</p> <p>The material has <b>NOT</b> been classified by EC Directives or other classification systems as "harmful by inhalation". This is because of the lack of corroborating animal or human evidence.</p> <p>Inhalation of quantities of liquid mist may be extremely hazardous, even lethal due to spasm, extreme irritation of larynx and bronchi, chemical pneumonitis and pulmonary oedema.</p>   |
| Ingestion    | <p>The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.</p> <p>The material has <b>NOT</b> been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.</p>  |
| Skin Contact | <p>The material can produce chemical burns following direct contact with the skin.</p> <p>Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p> |
| Eye          | <p>The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.</p>  |
| Chronic      | <p>Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems.</p> <p>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.</p>   |

|                     |          |            |
|---------------------|----------|------------|
| Tetrabutyl titanate | TOXICITY | IRRITATION |
|---------------------|----------|------------|

Continued...



|                |   |               |
|----------------|---|---------------|
|                | Oral (Rat) LD50: >2000 mg/kg <sup>[1]</sup>   | Not Available |
| <b>Legend:</b> | 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances |               |

|                            |   |
|----------------------------|---|
| <b>Tetrabutyl titanate</b> | Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production. |
|----------------------------|---|

|  |   |                                 |   |
|--|---|---------------------------------|---|
| <b>Acute Toxicity</b>                    | ✗ | <b>Carcinogenicity</b>          | ✗ |
| <b>Skin Irritation/Corrosion</b>         | ✓ | <b>Reproductivity</b>           | ✗ |
| <b>Serious Eye Damage/Irritation</b>     | ✓ | <b>STOT - Single Exposure</b>   | ✓ |
| <b>Respiratory or Skin sensitisation</b> | ✗ | <b>STOT - Repeated Exposure</b> | ✗ |
| <b>Mutagenicity</b>                      | ✗ | <b>Aspiration Hazard</b>        | ✗ |

**Legend:** ✗ – Data either not available or does not fill the criteria for classification  
 ✓ – Data available to make classification

## 11.2 Information on other hazards

### 11.2.1. Endocrine disrupting properties

No evidence of endocrine disrupting properties were found in the current literature.

### 11.2.2. Other information

See Section 11.1

## SECTION 12 Ecological information

### 12.1. Toxicity

|                            | Endpoint   | Test Duration (hr) | Species                       | Value    | Source |
|----------------------------|--|--------------------|-------------------------------|----------|--------|
| <b>Tetrabutyl titanate</b> | LC50   | 96h                | Fish                          | 1740mg/l | 2      |
|                            | EC50   | 72h                | Algae or other aquatic plants | 400mg/l  | 2      |
|                            | EC50   | 48h                | Crustacea                     | 590mg/l  | 2      |
|                            | EC50   | 96h                | Algae or other aquatic plants | 225mg/l  | 2      |
|                            | NOEC(ECx)  | 504h               | Crustacea                     | 4mg/l    | 2      |
| <b>Legend:</b>             | Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data |                    |                               |          |        |

**DO NOT** discharge into sewer or waterways.

### 12.2. Persistence and degradability

| Ingredient | Persistence: Water/Soil               | Persistence: Air                      |
|------------|---------------------------------------|---------------------------------------|
|            | No Data available for all ingredients | No Data available for all ingredients |

### 12.3. Bioaccumulative potential

| Ingredient | Bioaccumulation                       |
|------------|---------------------------------------|
|            | No Data available for all ingredients |

### 12.4. Mobility in soil

| Ingredient | Mobility                              |
|------------|---------------------------------------|
|            | No Data available for all ingredients |

## 12.5. Results of PBT and vPvB assessment

|                         | P   | B   | T   |
|-------------------------|-----|-----|-----|
| Relevant available data | Yes | Yes | Yes |
| PBT                     | ✗   | ✗   | ✗   |
| vPvB                    | ✗   | ✗   | ✗   |
| PBT Criteria fulfilled? | No  |     |     |
| vPvB                    | No  |     |     |

## 12.6. Endocrine disrupting properties

No evidence of endocrine disrupting properties were found in the current literature.

## 12.7. Other adverse effects

No evidence of ozone depleting properties were found in the current literature.

## SECTION 13 Disposal considerations

### 13.1. Waste treatment methods

|                              |   |
|------------------------------|---|
| Product / Packaging disposal | <ul style="list-style-type: none"> <li>Recycle wherever possible.</li> <li>Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.</li> <li>Treat and neutralise at an approved treatment plant. Treatment should involve: Neutralisation followed by: burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or Incineration in a licensed apparatus.</li> <li>Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.</li> </ul> |
| Waste treatment options      | Not Available   |
| Sewage disposal options      | Not Available   |

## SECTION 14 Transport information

### Labels Required

|                  |   |
|------------------|---|
|                  |   |
| Marine Pollutant | NO  |
| HAZCHEM          | •3WE  |

### Land transport (ADR-RID)

|                                    |  |                                |     |                     |    |              |      |
|------------------------------------|--|--------------------------------|-----|---------------------|----|--------------|------|
| 14.1. UN number or ID number       | 2924   |                                |     |                     |    |              |      |
| 14.2. UN proper shipping name      | FLAMMABLE LIQUID, CORROSIVE, N.O.S.  |                                |     |                     |    |              |      |
| 14.3. Transport hazard class(es)   | <table border="1"> <tr> <td>Class</td> <td>3</td> </tr> <tr> <td>Subsidiary risk</td> <td>8</td> </tr> </table>  | Class                          | 3   | Subsidiary risk     | 8  |              |      |
| Class                              | 3  |                                |     |                     |    |              |      |
| Subsidiary risk                    | 8  |                                |     |                     |    |              |      |
| 14.4. Packing group                | II   |                                |     |                     |    |              |      |
| 14.5. Environmental hazard         | Not Applicable   |                                |     |                     |    |              |      |
| 14.6. Special precautions for user | <table border="1"> <tr> <td>Hazard identification (Kemler)</td> <td>338</td> </tr> <tr> <td>Classification code</td> <td>FC</td> </tr> <tr> <td>Hazard Label</td> <td>3 +8</td> </tr> </table> | Hazard identification (Kemler) | 338 | Classification code | FC | Hazard Label | 3 +8 |
| Hazard identification (Kemler)     | 338  |                                |     |                     |    |              |      |
| Classification code                | FC   |                                |     |                     |    |              |      |
| Hazard Label                       | 3 +8   |                                |     |                     |    |              |      |

|                         |         |
|-------------------------|---------|
| Special provisions      | 274     |
| Limited quantity        | 1 L     |
| Tunnel Restriction Code | 2 (D/E) |

**Air transport (ICAO-IATA / DGR)**

|                                    |   |         |
|------------------------------------|---|---------|
| 14.1. UN number                    | 2924  |         |
| 14.2. UN proper shipping name      | Flammable liquid, corrosive, n.o.s. *                     |         |
| 14.3. Transport hazard class(es)   | ICAO/IATA Class   | 3       |
|                                    | ICAO / IATA Subrisk                                       | 8       |
|                                    | ERG Code  | 3CH     |
| 14.4. Packing group                | II  |         |
| 14.5. Environmental hazard         | Not Applicable  |         |
| 14.6. Special precautions for user | Special provisions  | A3 A803 |
|                                    | Cargo Only Packing Instructions                           | 363     |
|                                    | Cargo Only Maximum Qty / Pack                             | 5 L     |
|                                    | Passenger and Cargo Packing Instructions                  | 352     |
|                                    | Passenger and Cargo Maximum Qty / Pack                    | 1 L     |
|                                    | Passenger and Cargo Limited Quantity Packing Instructions | Y340    |
|                                    | Passenger and Cargo Limited Maximum Qty / Pack            | 0.5 L   |

**Sea transport (IMDG-Code / GGVSee)**

|                                    |                                     |          |
|------------------------------------|-------------------------------------|----------|
| 14.1. UN number                    | 2924                                |          |
| 14.2. UN proper shipping name      | FLAMMABLE LIQUID, CORROSIVE, N.O.S. |          |
| 14.3. Transport hazard class(es)   | IMDG Class                          | 3        |
|                                    | IMDG Subrisk                        | 8        |
| 14.4. Packing group                | II                                  |          |
| 14.5. Environmental hazard         | Not Applicable                      |          |
| 14.6. Special precautions for user | EMS Number                          | F-E, S-C |
|                                    | Special provisions                  | 274      |
|                                    | Limited Quantities                  | 1 L      |

**Inland waterways transport (ADN)**

|                                    |                                     |               |
|------------------------------------|-------------------------------------|---------------|
| 14.1. UN number                    | 2924                                |               |
| 14.2. UN proper shipping name      | FLAMMABLE LIQUID, CORROSIVE, N.O.S. |               |
| 14.3. Transport hazard class(es)   | 3                                   | 8             |
|                                    |                                     |               |
| 14.4. Packing group                | II                                  |               |
| 14.5. Environmental hazard         | Not Applicable                      |               |
| 14.6. Special precautions for user | Classification code                 | FC            |
|                                    | Special provisions                  | 274           |
|                                    | Limited quantity                    | 1 L           |
|                                    | Equipment required                  | PP, EP, EX, A |
|                                    | Fire cones number                   | 1             |

## 14.7. Maritime transport in bulk according to IMO instruments

### 14.7.1. Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

### 14.7.2. Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

| Product name | Group |
|--------------|-------|
|--------------|-------|

### 14.7.3. Transport in bulk in accordance with the IGC Code

| Product name | Ship Type |
|--------------|-----------|
|--------------|-----------|

## SECTION 15 Regulatory information

### 15.1. Safety, health and environmental regulations / legislation specific for the substance or mixture

This safety data sheet is in compliance with the following EU legislation and its adaptations - as far as applicable - : Directives 98/24/EC, - 92/85/EEC, - 94/33/EC, - 2008/98/EC, - 2010/75/EU; Commission Regulation (EU) 2020/878; Regulation (EC) No 1272/2008 as updated through ATPs.

#### Information according to 2012/18/EU (Seveso III):

| Seveso Category |               |
|-----------------|---------------|
|                 | P5a, P5b, P5c |

### 15.2. Chemical safety assessment

For further information please look at the Chemical Safety Assessment and Exposure Scenarios prepared by your Supply Chain if available.

## ECHA SUMMARY

Not Applicable

### National Inventory Status

| National Inventory                              | Status   |
|---|--|
| Australia - AIIC / Australia Non-Industrial Use | Not Available  |
| Canada - DSL                                    | Not Available  |
| Canada - NDSL                                   | Not Available  |
| China - IECSC                                   | Not Available  |
| Europe - EINEC / ELINCS / NLP                   | Not Available  |
| Japan - ENCS                                    | Not Available  |
| Korea - KECI                                    | Not Available  |
| New Zealand - NZIoC                             | Not Available  |
| Philippines - PICCS                             | Not Available  |
| USA - TSCA                                      | Not Available  |
| Taiwan - TCSI                                   | Not Available  |
| Mexico - INSQ                                   | Not Available  |
| Vietnam - NCI                                   | Not Available  |
| Russia - FBEPH                                  | Not Available  |
| <b>Legend:</b>                                  | <p><i>Yes = All CAS declared ingredients are on the inventory</i></p> <p><i>No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.</i></p> |

## SECTION 16 Other information

|                      |            |
|----------------------|------------|
| <b>Revision Date</b> | 16/09/2022 |
| <b>Initial Date</b>  | 16/09/2022 |

## Full text Risk and Hazard codes

### Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch

Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:

EN 166 Personal eye-protection

EN 340 Protective clothing

EN 374 Protective gloves against chemicals and micro-organisms

EN 13832 Footwear protecting against chemicals

EN 133 Respiratory protective devices

## Definitions and abbreviations

PC - TWA: Permissible Concentration-Time Weighted Average

PC - STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit,

IDLH: Immediately Dangerous to Life or Health Concentrations

ES: Exposure Standard

OSF: Odour Safety Factor

NOAEL :No Observed Adverse Effect Level

LOAEL: Lowest Observed Adverse Effect Level

TLV: Threshold Limit Value

LOD: Limit Of Detection

OTV: Odour Threshold Value

BCF: BioConcentration Factors

BEI: Biological Exposure Index

AIIIC: Australian Inventory of Industrial Chemicals

DSL: Domestic Substances List

NDSL: Non-Domestic Substances List

IECSC: Inventory of Existing Chemical Substance in China

EINECS: European INventory of Existing Commercial chemical Substances

ELINCS: European List of Notified Chemical Substances

NLP: No-Longer Polymers

ENCS: Existing and New Chemical Substances Inventory

KECI: Korea Existing Chemicals Inventory

NZIoC: New Zealand Inventory of Chemicals

PICCS: Philippine Inventory of Chemicals and Chemical Substances

TSCA: Toxic Substances Control Act

TCSI: Taiwan Chemical Substance Inventory

INSQ: Inventario Nacional de Sustancias Químicas

NCI: National Chemical Inventory

FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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