



# Titanium(III) fluoride

## Apollo Scientific

Part Number: PC6990

Version No: 2.2

Safety Data Sheet

Chemwatch Hazard Alert Code: 3

Issue Date: 11/07/2023

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S.GHS.GB-NIR.EN

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

#### Product Identifier

|                               |  |
|-------------------------------|--|
| Product name                  | Titanium(III) fluoride                     |
| Chemical Name                 | titanium(III) fluoride                     |
| Synonyms                      | Not Available                              |
| Proper shipping name          | CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S. |
| Chemical formula              | F3-Ti                                      |
| Other means of identification | Not Available                              |
| CAS number                    | 13470-08-1*                                |

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

|                          |               |
|--------------------------|---------------|
| Relevant identified uses | Not Available |
|--------------------------|---------------|

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

|                         |   |  |
|-------------------------|---|--|
| Registered company name | Apollo Scientific   | Apollo Scientific Ltd  |
| Address                 | Whitefield Road, Bredbury SK62QR United Kingdom                                     | Whitefield Road, Bredbury Cheshire SK6 2QR United Kingdom (NI)     |
| Telephone               | 01614060505   | +44(0) 161 406 0505  |
| Fax                     | 0161 406 0506   | Not Available  |
| Website                 | <a href="http://www.apolloscientific.co.uk/">http://www.apolloscientific.co.uk/</a> | <a href="http://apolloscientific.co.uk">apolloscientific.co.uk</a> |
| Email                   | sales@apolloscientific.co.uk  | sales@apolloscientific.co.uk                                       |

#### Emergency telephone number

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

### SECTION 2 Hazards identification

#### Classification of the substance or mixture

|  |  |
|--|--|
| Classification according to regulation (EC) No 1272/2008 [CLP] and | H314 - Skin Corrosion/Irritation Category 1B, H312 - Acute Toxicity (Dermal) Category 4, H318 - Serious Eye Damage/Eye Irritation Category 1, H332 - Acute Toxicity (Inhalation) Category 4, H302 - Acute Toxicity (Oral) Category 4 |
|--|--|

## Titanium(III) fluoride

amendments <sup>[1]</sup>

**Legend:** 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

## Label elements

|                     |               |
|---------------------|---------------|
| Hazard pictogram(s) |               |
| Signal word         | <b>Danger</b> |

## Hazard statement(s)

|      |  |
|------|--|
| H314 | Causes severe skin burns and eye damage. |
| H312 | Harmful in contact with skin.            |
| H332 | Harmful if inhaled.                      |
| H302 | Harmful if swallowed.                    |

## Precautionary statement(s) Prevention

|      |  |
|------|--|
| P260 | Do not breathe dust/fume.  |
| P264 | Wash all exposed external body areas thoroughly after handling.                  |
| P271 | Use only outdoors or in a well-ventilated area.                                  |
| P280 | Wear protective gloves, protective clothing, eye protection and face protection. |
| P270 | Do not eat, drink or smoke when using this product.                              |

## Precautionary statement(s) Response

|                |  |
|----------------|--|
| P301+P330+P331 | IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.   |
| P303+P361+P353 | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].                         |
| 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.   |
| P363           | Wash contaminated clothing before reuse.   |
| P301+P312      | IF SWALLOWED: Call a POISON CENTER/doctor/physician/first aider if you feel unwell.  |
| P302+P352      | IF ON SKIN: Wash with plenty of water.   |
| P304+P340      | IF INHALED: Remove person to fresh air and keep comfortable for breathing.   |
| P362+P364      | Take off contaminated clothing and wash it before reuse.   |

## Precautionary statement(s) Storage

|      |                  |
|------|------------------|
| 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. |
|------|--|

## SECTION 3 Composition / information on ingredients

## Substances

| CAS No      | %[weight] | Name                          | Classification according to regulation (EC) No 1272/2008 [CLP] and amendments  | SCL / M-Factor |
|-------------|-----------|-------------------------------|--|----------------|
| 13470-08-1* | 100       | <u>Titanium(III) fluoride</u> | Skin Corrosion/Irritation Category 1B, Acute Toxicity (Dermal) Category 4, Serious Eye Damage/Eye Irritation Category 1, Acute Toxicity (Inhalation) Category 4, Acute Toxicity (Oral) Category 4; H314, H312, H332, H302 <sup>[1]</sup> | 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

## Mixtures

See section above for composition of Substances

## Titanium(III) fluoride

## SECTION 4 First aid measures

## Description of first aid measures

|              |   |
|--------------|---|
| Eye Contact  | <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>  |
| Skin Contact | <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>  |
| Inhalation   | <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>▸ Prostheses 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> |
| Ingestion    | <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>  |

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

For acute or short term repeated exposures to strong acids:

- Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.
- Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling
- Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.
- Strong acids produce a coagulation necrosis characterised by formation of a coagulum (eschar) as a result of the dessicating action of the acid on proteins in specific tissues.

## INGESTION:

- Immediate dilution (milk or water) within 30 minutes post ingestion is recommended.
- **DO NOT attempt to neutralise the acid since exothermic reaction may extend the corrosive injury.**
- Be careful to avoid further vomit since re-exposure of the mucosa to the acid is harmful. Limit fluids to one or two glasses in an adult.
- Charcoal has no place in acid management.
- Some authors suggest the use of lavage within 1 hour of ingestion.

## SKIN:

- Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.
- Deep second-degree burns may benefit from topical silver sulfadiazine.

## EYE:

- Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjunctival cul-de-sacs. Irrigation should last at least 20-30 minutes. **DO NOT use neutralising agents or any other additives.** Several litres of saline are required.
- Cycloplegic drops, (1% cyclopentolate for short-term use or 5% homatropine for longer term use) antibiotic drops, vasoconstrictive agents or artificial tears may be indicated dependent on the severity of the injury.
- Steroid eye drops should only be administered with the approval of a consulting ophthalmologist).

[Ellenhorn and Barceloux: Medical Toxicology]

## SECTION 5 Firefighting measures

## Titanium(III) fluoride

## Extinguishing media

- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

## Special hazards arising from the substrate or mixture

|                      |             |
|----------------------|-------------|
| Fire Incompatibility | None known. |
|----------------------|-------------|

## Advice for firefighters

|                       |   |
|-----------------------|---|
| Fire Fighting         |   |
| Fire/Explosion Hazard | <ul style="list-style-type: none"><li>▸ Non combustible.</li><li>▸ Not considered to be a significant fire risk.</li><li>▸ Acids may react with metals to produce hydrogen, a highly flammable and explosive gas.</li><li>▸ Heating may cause expansion or decomposition leading to violent rupture of containers.</li><li>▸ May emit corrosive, poisonous fumes. May emit acrid smoke.</li></ul> |

## SECTION 6 Accidental release measures

## Personal precautions, protective equipment and emergency procedures

See section 8

## Environmental precautions

See section 12

## 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 contact with skin and eyes.</li><li>▸ Control personal contact with the substance, by using protective equipment.</li><li>▸ Use dry clean up procedures and avoid generating dust.</li><li>▸ Place in a suitable, labelled container for waste disposal.</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 | <ul style="list-style-type: none"><li>▸ Clear area of personnel and move upwind.</li><li>▸ Alert Fire Brigade and tell them location and nature of hazard.</li><li>▸ Wear breathing apparatus plus protective gloves.</li><li>▸ Prevent, by any means available, spillage from entering drains or water course.</li><li>▸ Stop leak if safe to do so.</li><li>▸ Contain spill with sand, earth or vermiculite.</li><li>▸ Collect recoverable product into labelled containers for recycling.</li><li>▸ Neutralise/decontaminate residue (see Section 13 for specific agent).</li><li>▸ Collect solid residues and seal in labelled drums for disposal.</li><li>▸ Wash area and prevent runoff into drains.</li><li>▸ After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.</li><li>▸ If contamination of drains or waterways occurs, advise emergency services.</li></ul> |

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

## SECTION 7 Handling and storage

## Precautions for safe handling

|               |  |
|---------------|--|
| Safe handling | <ul style="list-style-type: none"><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>▸ <b>WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material.</b></li><li>▸ Avoid smoking, naked lights or ignition sources.</li><li>▸ Avoid contact with incompatible materials.</li><li>▸ When handling, <b>DO NOT eat, drink or smoke.</b></li><li>▸ Keep containers securely sealed when not in use.</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. Launder contaminated clothing before re-use.</li></ul> |
|---------------|--|

Titanium(III) fluoride

|                   |  |
|-------------------|--|
|                   | <ul style="list-style-type: none"><li>▶ Use good occupational work practice.</li><li>▶ Observe manufacturer's storage and handling recommendations contained within this SDS.</li><li>▶ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.</li></ul>  |
| Other information | <ul style="list-style-type: none"><li>▶ Store in original containers.</li><li>▶ Keep containers securely sealed.</li><li>▶ Store in a cool, dry, well-ventilated area.</li><li>▶ Store away from incompatible materials and foodstuff containers.</li><li>▶ Protect containers against physical damage and check regularly for leaks.</li><li>▶ Observe manufacturer's storage and handling recommendations contained within this SDS.</li></ul> |

Conditions for safe storage, including any incompatibilities

|                         |  |
|-------------------------|--|
| Suitable container      | <ul style="list-style-type: none"><li>▶ <b>DO NOT use aluminium or galvanised containers</b></li><li>▶ Check regularly for spills and leaks</li><li>▶ Lined metal can, lined metal pail/ can.</li><li>▶ Plastic pail.</li><li>▶ Polyliner drum.</li><li>▶ Packing as recommended by manufacturer.</li><li>▶ Check all containers are clearly labelled and free from leaks.</li></ul> <p>For low viscosity materials</p> <ul style="list-style-type: none"><li>▶ Drums and jerricans must be of the non-removable head type.</li><li>▶ Where a can is to be used as an inner package, the can must have a screwed enclosure.</li></ul> <p>For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):</p> <ul style="list-style-type: none"><li>▶ Removable head packaging;</li><li>▶ Cans with friction closures and</li><li>▶ low pressure tubes and cartridges</li></ul> <p>may be used.</p> <p>-</p> <p>Where combination packages are used, and the inner packages are of glass, porcelain or stoneware, there must be sufficient inert cushioning material in contact with inner and outer packages unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.</p>  |
| Storage incompatibility | <ul style="list-style-type: none"><li>▶ Inorganic acids are generally soluble in water with the release of hydrogen ions. The resulting solutions have pH's of less than 7.0.</li><li>▶ Inorganic acids neutralise chemical bases (for example: amines and inorganic hydroxides) to form salts - neutralisation can generate dangerously large amounts of heat in small spaces.</li><li>▶ The dissolution of inorganic acids in water or the dilution of their concentrated solutions with additional water may generate significant heat.</li><li>▶ The addition of water to inorganic acids often generates sufficient heat in the small region of mixing to cause some of the water to boil explosively. The resulting "bumping" can spatter the acid.</li><li>▶ Inorganic acids react with active metals, including such structural metals as aluminum and iron, to release hydrogen, a flammable gas.</li><li>▶ Inorganic acids can initiate the polymerisation of certain classes of organic compounds.</li><li>▶ Inorganic acids react with cyanide compounds to release gaseous hydrogen cyanide.</li><li>▶ Inorganic acids generate flammable and/or toxic gases in contact with dithiocarbamates, isocyanates, mercaptans, nitrides, nitriles, sulfides, and strong reducing agents. Additional gas-generating reactions occur with sulfites, nitrites, thiosulfates (to give H2S and SO3), dithionites (SO2), and even carbonates.</li><li>▶ Acids often catalyse (increase the rate of) chemical reactions.</li><li>▶ Moisture sensitive</li><li>▶ Store under argon</li></ul> |

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Not Available

Emergency Limits

| Ingredient             | TEEL-1   | TEEL-2    | TEEL-3    |
|------------------------|----------|-----------|-----------|
| Titanium(III) fluoride | 14 mg/m3 | 150 mg/m3 | 920 mg/m3 |

| Ingredient             | Original IDLH | Revised IDLH  |
|------------------------|---------------|---------------|
| Titanium(III) fluoride | Not Available | Not Available |

## Titanium(III) fluoride

## Occupational Exposure Banding

| Ingredient             | Occupational Exposure Band Rating  | Occupational Exposure Band Limit |
|------------------------|--|----------------------------------|
| Titanium(III) fluoride | E  | $\leq 0.01 \text{ mg/m}^3$       |
| <b>Notes:</b>          | Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health. |                                  |

## Exposure controls

|  |  |                                 |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
|--|--|---------------------------------|------------------------|------------------------|---|---------------------------------|--|----------------------------------|----------------------------------|-------------------------------|---|----------------------------------|
| Appropriate engineering controls   | <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>Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.</p> <p>An approved self contained breathing apparatus (SCBA) may be required in some situations.</p> <p>Provide adequate ventilation in warehouse or closed storage area. 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> |                                 |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
|  | Type of Contaminant:   | Air Speed:                      |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
|  | solvent, vapours, degreasing etc., evaporating from tank (in still air).   | 0.25-0.5 m/s<br>(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.)      |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
| grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).   | 2.5-10 m/s<br>(500-2000 f/min.)  |                                 |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
| <p>Within each range the appropriate value depends on:</p> <table><tr><td>Lower end of the range</td><td>Upper end of the range</td></tr><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></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> |  |                                 |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
| Individual protection measures, such as personal protective equipment  |   |                                 |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |
| Eye and face protection  | <ul style="list-style-type: none"><li>▶ Safety glasses with unperforated side shields may be used where continuous eye protection is desirable, as in laboratories; spectacles are not sufficient where complete eye protection is needed such as when handling bulk-quantities, where there is a danger of splashing, or if the material may be under pressure.</li><li>▶ Chemical goggles. Whenever there is a danger of the material coming in contact with the eyes; goggles must be properly fitted. [AS/NZS 1337.1, EN166 or national equivalent]</li><li>▶ Full face shield (20 cm, 8 in minimum) may be required for supplementary but never for primary protection of eyes; these afford face protection.</li><li>▶ Alternatively a gas mask may replace splash goggles and face shields.</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</li></ul>   |                                 |                        |                        |   |                                 |  |                                  |                                  |                               |   |                                  |

## Titanium(III) fluoride

|                              |  |
|------------------------------|--|
|                              | 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]. |
| <b>Skin protection</b>       | See Hand protection below  |
| <b>Hands/feet protection</b> | ▸ Elbow length PVC gloves  |
| <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> </ul>  |

## Respiratory protection

Type -P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

| Required Minimum Protection Factor | Half-Face Respirator | Full-Face Respirator | Powered Air Respirator |
|------------------------------------|----------------------|----------------------|------------------------|
| up to 10 x ES                      | P1<br>Air-line*      | -<br>-               | PAPR-P1<br>-           |
| up to 50 x ES                      | Air-line**           | P2                   | PAPR-P2                |
| up to 100 x ES                     | -                    | P3                   | -                      |
|                                    |                      | Air-line*            | -                      |
| 100+ x ES                          | -                    | Air-line**           | PAPR-P3                |

\* - Negative pressure demand \*\* - Continuous flow

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO<sub>2</sub>), G = Agricultural chemicals, K = Ammonia(NH<sub>3</sub>), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

## SECTION 9 Physical and chemical properties

## Information on basic physical and chemical properties

|   |               |  |                |
|---|---------------|--|----------------|
| <b>Appearance</b>                                   | Not Available |  |                |
| <b>Physical state</b>                               | Solid         | <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>          | 1200          | <b>Viscosity (cSt)</b>                         | Not Available  |
| <b>Initial boiling point and boiling range (°C)</b> | Not Available | <b>Molecular weight (g/mol)</b>                | Not Available  |
| <b>Flash point (°C)</b>                             | Not Available | <b>Taste</b>                                   | Not Available  |
| <b>Evaporation rate</b>                             | Not Available | <b>Explosive properties</b>                    | Not Available  |
| <b>Flammability</b>                                 | Not Available | <b>Oxidising properties</b>                    | Not Available  |
| <b>Upper Explosive Limit (%)</b>                    | Not Available | <b>Surface Tension (dyn/cm or mN/m)</b>        | Not Applicable |
| <b>Lower Explosive Limit (%)</b>                    | Not Available | <b>Volatile Component (%vol)</b>               | Not Available  |
| <b>Vapour pressure (kPa)</b>                        | Not Available | <b>Gas group</b>                               | Not Available  |
| <b>Solubility in water</b>                          | Not Available | <b>pH as a solution (1%)</b>                   | Not Available  |

Titanium(III) fluoride

|                          |               |         |               |
|--------------------------|---------------|---------|---------------|
| Vapour density (Air = 1) | Not Available | VOC g/L | Not Available |
|--------------------------|---------------|---------|---------------|

SECTION 10 Stability and reactivity

|                                    |   |
|------------------------------------|---|
| Reactivity                         | See section 7                                   |
| Chemical stability                 | ▸ Contact with alkaline material liberates heat |
| Possibility of hazardous reactions | See section 7                                   |
| Conditions to avoid                | See section 7                                   |
| Incompatible materials             | See section 7                                   |
| Hazardous decomposition products   | See section 5                                   |

SECTION 11 Toxicological information

Information on toxicological effects

|              |   |
|--------------|---|
| Inhaled      | Inhalation of dusts, generated by the material, during the course of normal handling, may be harmful.<br>The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.<br>Corrosive acids can cause irritation of the respiratory tract, with coughing, choking and mucous membrane damage. There may be dizziness, headache, nausea and weakness.   |
| Ingestion    | Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.<br>Ingestion of acidic corrosives may produce burns around and in the mouth, the throat and oesophagus. Immediate pain and difficulties in swallowing and speaking may also be evident.   |
| Skin Contact | Skin contact with the material may be harmful; systemic effects may result following absorption.<br>Skin contact with acidic corrosives may result in pain and burns; these may be deep with distinct edges and may heal slowly with the formation of scar tissue.<br>Open cuts, abraded or irritated skin should not be exposed to this material<br>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.<br>Examine the skin prior to the use of the material and ensure that any external damage is suitably protected. |
| Eye          | If applied to the eyes, this material causes severe eye damage.<br>Direct eye contact with acid corrosives may produce pain, tears, sensitivity to light and burns. Mild burns of the epithelia generally recover rapidly and completely.   |
| Chronic      | Repeated or prolonged exposure to acids may result in the erosion of teeth, swelling and/or ulceration of mouth lining. Irritation of airways to lung, with cough, and inflammation of lung tissue often occurs.<br>Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems.<br>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.  |

|         |  |
|---------|--|
| Legend: | 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS.<br>Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances |
|---------|--|

|                        |   |
|------------------------|---|
| Titanium(III) fluoride | 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. |
|------------------------|---|

|                           |   |                 |   |
|---------------------------|---|-----------------|---|
| Acute Toxicity            | ✓ | Carcinogenicity | ✗ |
| Skin Irritation/Corrosion | ✓ | Reproductivity  | ✗ |



## Titanium(III) fluoride

|                                   |   |                          |   |
|-----------------------------------|---|--------------------------|---|
| Serious Eye Damage/Irritation     | ✓ | STOT - Single Exposure   | ✗ |
| Respiratory or Skin sensitisation | ✗ | STOT - Repeated Exposure | ✗ |
| Mutagenicity                      | ✗ | Aspiration Hazard        | ✗ |

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

## SECTION 12 Ecological information

## Toxicity

|                |  |
|----------------|--|
| <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 |
|----------------|--|

Prevent, by any means available, spillage from entering drains or water courses.

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

## Persistence and degradability

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

## Bioaccumulative potential

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

## Mobility in soil

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


## SECTION 13 Disposal considerations

## Waste treatment methods

|                                     |   |
|-------------------------------------|---|
| <b>Product / Packaging disposal</b> | <ul style="list-style-type: none"> <li>Containers may still present a chemical hazard/ danger when empty.</li> <li>Return to supplier for reuse/ recycling if possible.</li> </ul> <p>Otherwise:</p> <ul style="list-style-type: none"> <li>If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.</li> <li>Where possible retain label warnings and SDS and observe all notices pertaining to the product.</li> </ul> <p>Recycle wherever possible.</p> <ul style="list-style-type: none"> <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: Mixing or slurring in water; Neutralisation with soda-lime or soda-ash followed by: burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or Incineration in a licensed apparatus (after admixture with suitable combustible material)</li> <li>Decontaminate empty containers with 5% aqueous sodium hydroxide or soda ash, followed by water. Observe all label safeguards until containers are cleaned and destroyed.</li> </ul> |
|-------------------------------------|---|

## SECTION 14 Transport information

## Labels Required

|                         |   |
|-------------------------|---|
|                         |  |
| <b>Marine Pollutant</b> | NO  |

Titanium(III) fluoride

Land transport (ADR-RID)

|                              |  |                |
|------------------------------|--|----------------|
| UN number or ID number       | 3260                                       |                |
| UN proper shipping name      | CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S. |                |
| Transport hazard class(es)   | Class                                      | 8              |
|                              | Subsidiary risk                            | Not Applicable |
| Packing group                | II   |                |
| Environmental hazard         | Not Applicable                             |                |
| Special precautions for user | Hazard identification (Kemler)             | 80             |
|                              | Classification code                        | C2             |
|                              | Hazard Label                               | 8              |
|                              | Special provisions                         | 274            |
|                              | Limited quantity                           | 1 kg           |
|                              | Tunnel Restriction Code                    | 2 (E)          |

Air transport (ICAO-IATA / DGR)

|                              |   |                |
|------------------------------|---|----------------|
| UN number                    | 3260  |                |
| UN proper shipping name      | Corrosive solid, acidic, inorganic, n.o.s. *              |                |
| Transport hazard class(es)   | ICAO/IATA Class   | 8              |
|                              | ICAO / IATA Subrisk                                       | Not Applicable |
|                              | ERG Code  | 8L             |
| Packing group                | II  |                |
| Environmental hazard         | Not Applicable  |                |
| Special precautions for user | Special provisions  | A3 A803        |
|                              | Cargo Only Packing Instructions                           | 863            |
|                              | Cargo Only Maximum Qty / Pack                             | 50 kg          |
|                              | Passenger and Cargo Packing Instructions                  | 859            |
|                              | Passenger and Cargo Maximum Qty / Pack                    | 15 kg          |
|                              | Passenger and Cargo Limited Quantity Packing Instructions | Y844           |
|                              | Passenger and Cargo Limited Maximum Qty / Pack            | 5 kg           |

Sea transport (IMDG-Code / GGVSee)

|                              |  |                |
|------------------------------|--|----------------|
| UN number                    | 3260                                       |                |
| UN proper shipping name      | CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S. |                |
| Transport hazard class(es)   | IMDG Class                                 | 8              |
|                              | IMDG Subrisk                               | Not Applicable |
| Packing group                | II   |                |
| Environmental hazard         | Not Applicable                             |                |
| Special precautions for user | EMS Number                                 | F-A, S-B       |
|                              | Special provisions                         | 274            |
|                              | Limited Quantities                         | 1 kg           |

Inland waterways transport (ADN)

|                            |  |                |
|----------------------------|--|----------------|
| UN number                  | 3260                                       |                |
| UN proper shipping name    | CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S. |                |
| Transport hazard class(es) | 8  | Not Applicable |
| Packing group              | II   |                |

Titanium(III) fluoride

|                              |                     |        |
|------------------------------|---------------------|--------|
| Environmental hazard         | Not Applicable      |        |
| Special precautions for user | Classification code | C2     |
|                              | Special provisions  | 274    |
|                              | Limited quantity    | 1 kg   |
|                              | Equipment required  | PP, EP |
|                              | Fire cones number   | 0      |

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

Not Applicable

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

| Product name           | Group         |
|------------------------|---------------|
| Titanium(III) fluoride | Not Available |

Transport in bulk in accordance with the IGC Code

| Product name           | Ship Type     |
|------------------------|---------------|
| Titanium(III) fluoride | Not Available |

SECTION 15 Regulatory information

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

Titanium(III) fluoride is found on the following regulatory lists

Europe EC Inventory

European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

National Inventory Status

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

SECTION 16 Other information

|               |            |
|---------------|------------|
| Revision Date | 11/07/2023 |
| Initial Date  | 11/07/2023 |

SDS Version Summary

| Version | Date of | Sections Updated |
|---------|---------|------------------|
|---------|---------|------------------|

**Titanium(III) fluoride**

|     | Update     |  |
|-----|------------|--|
| 1.2 | 11/07/2023 | Toxicological information - Acute Health (inhaled), Toxicological information - Acute Health (skin), Toxicological information - Acute Health (swallowed), Physical and chemical properties - Appearance, CAS Number, Disposal considerations - Disposal, Composition / information on ingredients - Ingredients, Korean MSDS Number, Accidental release measures - Spills (major), Accidental release measures - Spills (minor), Identification of the substance / mixture and of the company / undertaking - Supplier Information, Identification of the substance / mixture and of the company / undertaking - Synonyms |

**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

AIIC: 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

**Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]**

| Classification according to regulation (EC) No 1272/2008 [CLP] and amendments | Classification Procedure |
|---|--------------------------|
| Skin Corrosion/Irritation Category 1B, H314                                   | Expert judgement         |
| Acute Toxicity (Dermal) Category 4, H312                                      | On basis of test data    |
| Serious Eye Damage/Eye Irritation Category 1, H318                            | Calculation method       |

| Classification according to regulation (EC) No 1272/2008 [CLP] and amendments | Classification Procedure |
|---|--------------------------|
| Acute Toxicity (Inhalation)<br>Category 4, H332                               | On basis of test data    |
| Acute Toxicity (Oral)<br>Category 4, H302                                     | On basis of test data    |