1 Identification

- Product name
  - Trade name: Titanium(IV) chloride, (99.99+% Ti) PURATREM
  - Item number: 22-1155
  - CAS Number: 7550-45-0
  - EINECS Number: 23-1
  - Index number: 022-001-00-5

- Details of the supplier of the safety data sheet
  - Manufacturer/Supplier: Strem Chemicals, Inc.
  - 7 Mulliken Way
  - NEWBURYPORT, MA 01950
  - USA
  - info@strem.com

- Information department: Technical Department
- Emergency telephone number:
  - EMERGENCY: CHEMTREC: +1 (800) 424-9300
  - During normal opening times: +1 (978) 499-1600

2 Hazard(s) identification

- Classification of the substance or mixture
  - GHS06 Skull and crossbones
    - Acute Tox. 1 H330 Fatal if inhaled.
  - GHS05 Corrosion
    - Skin Corr. 1B H314 Causes severe skin burns and eye damage.
  - GHS07
    - STOT SE 3 H335 May cause respiratory irritation.

- Label elements
- GHS label elements
  - The substance is classified and labeled according to the Globally Harmonized System (GHS).
- Hazard pictograms
  - GHS05
  - GHS06
  - GHS07

- Signal word Danger
Trade name: Titanium(IV) chloride, (99.99+%-Ti) PURATREM

- **Hazard-determining components of labeling:**
  titanium tetrachloride

- **Hazard statements**
  H330 Fatal if inhaled.
  H314 Causes severe skin burns and eye damage.
  H335 May cause respiratory irritation.

- **Precautionary statements**
  P231 Handle under inert gas.
  P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
  P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ 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.
  P403+P233 Store in a well-ventilated place. Keep container tightly closed.
  P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

- **Classification system:**
  - **NFPA ratings (scale 0 - 4)**
    - Health = 3
    - Fire = 0
    - Reactivity = 2

  - The substance demonstrates unusual reactivity with water.
  - **HMIS-ratings (scale 0 - 4)**
    - HEALTH 3 Health = 3
    - FIRE 0 Fire = 0
    - REACTIVITY 2 Reactivity = 2

- **Other hazards**
  - **Results of PBT and vPvB assessment**
    - PBT: Not applicable.
    - vPvB: Not applicable.

### 3 Composition/information on ingredients

- **Chemical characterization:**
  - **Substances**
    - CAS No. Description
      - 7550-45-0 titanium tetrachloride
    - Identification number(s)
      - EC number: 23-1
      - Index number: 022-001-00-5

### 4 First-aid measures

- **Description of first aid measures**
- **General information:**
  Immediately remove any clothing soiled by the product.
  Remove breathing apparatus only after contaminated clothing have been completely removed.
  In case of irregular breathing or respiratory arrest provide artificial respiration.
Safety Data Sheet
according to OSHA HCS

Trade name: Titanium(IV) chloride, (99.99+%-Ti) PURATREM

· After inhalation:
  Supply fresh air or oxygen; call for doctor.
  In case of unconsciousness place patient stably in side position for transportation.
· After skin contact: Immediately wash with water and soap and rinse thoroughly.
· After eye contact: Rinse opened eye for several minutes under running water. Then consult a doctor.
· After swallowing: Drink copious amounts of water and provide fresh air. Immediately call a doctor.
· Information for doctor:
  · Most important symptoms and effects, both acute and delayed: No further relevant information available.
  · Indication of any immediate medical attention and special treatment needed: No further relevant information available.

5 Fire-fighting measures

· Extinguishing media
  · Suitable extinguishing agents: Use fire fighting measures that suit the environment.
  · Special hazards arising from the substance or mixture
    During heating or in case of fire poisonous gases are produced.
  · Advice for firefighters
  · Protective equipment: Mouth respiratory protective device.

6 Accidental release measures

· Personal precautions, protective equipment and emergency procedures
  Mount respiratory protective device.
  Wear protective equipment. Keep unprotected persons away.
· Environmental precautions: No special measures required.
· Methods and material for containment and cleaning up:
  Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
  Use neutralizing agent.
  Dispose contaminated material as waste according to item 13.
  Ensure adequate ventilation.
· Reference to other sections
  See Section 7 for information on safe handling.
  See Section 8 for information on personal protection equipment.
  See Section 13 for disposal information.
· Protective Action Criteria for Chemicals

  · PAC-1: 0.65 ppm

  · PAC-2: 1.0 ppm

  · PAC-3: 5.7 ppm

7 Handling and storage

· Handling:
  · Precautions for safe handling
    Ensure good ventilation/exhaustion at the workplace.
    Open and handle receptacle with care.
    Prevent formation of aerosols.
Trade name: Titanium(IV) chloride, (99.99+%-Ti) PURATREM

8 Exposure controls/personal protection

- Information about protection against explosions and fires: Keep respiratory protective device available.
- Conditions for safe storage, including any incompatibilities
- Storage:
  - Requirements to be met by storerooms and receptacles: No special requirements.
  - Information about storage in one common storage facility: Not required.
- Further information about storage conditions:
  - Keep receptacle tightly sealed.
  - Store in cool, dry conditions in well sealed receptacles.
- Specific end use(s) No further relevant information available.

- Additional information about design of technical systems: No further data; see item 7.
- Control parameters
  - Components with limit values that require monitoring at the workplace:
    - 7550-45-0 titanium tetrachloride
      - WEEL Long-term value: 0.5 mg/m³
  - Additional information: The lists that were valid during the creation were used as basis.
- Exposure controls
  - Personal protective equipment:
    - General protective and hygienic measures:
      - Keep away from foodstuffs, beverages and feed.
      - Immediately remove all soiled and contaminated clothing.
      - Wash hands before breaks and at the end of work.
      - Store protective clothing separately.
      - Avoid contact with the eyes and skin.
    - Breathing equipment:
      - In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
    - Protection of hands:
      - Protective gloves
        - The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
        - Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
        - Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation
  - Material of gloves
    - The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
  - Penetration time of glove material
    - The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
### 9 Physical and chemical properties

- **Appearance:**
  - **Form:** Liquid
  - **Color:** Light yellow
  - **Odor:** Pungent
  - **Odor threshold:** Not determined.
  - **pH-value:** Not determined.

- **Change in condition**
  - **Melting point/Melting range:** Undetermined.
  - **Boiling point/Boiling range:** 136 °C (277 °F)

- **Flash point:** Not applicable.

- **Flammability (solid, gaseous):** Not determined.

- **Ignition temperature:**
  - **Decomposition temperature:** Not determined.
  - **Auto igniting:** Not determined.
  - **Danger of explosion:** Product does not present an explosion hazard.

- **Explosion limits:**
  - **Lower:** Not determined.
  - **Upper:** Not determined.

- **Vapor pressure at 21 °C (70 °F):** 10 hPa (8 mm Hg)

- **Density at 20 °C (68 °F):** 1.726 g/cm³ (14.40347 lbs/gal)
  - **Relative density:** Not determined.
  - **Vapor density:** Not determined.
  - **Evaporation rate:** Not determined.

- **Solubility in / Miscibility with Water:** Not miscible or difficult to mix.

- **Partition coefficient (n-octanol/water):** Not determined.

- **Viscosity:**
  - **Dynamic:** Not determined.
  - **Kinematic:** Not determined.

- **Solvent content:**
  - **Organic solvents:** 0.0 %
  - **VOC content:** 0.0 g/l / 0.00 lb/gl

(Contd. on page 6)
Trade name: Titanium(IV) chloride, (99.99+%-Ti) PURATREM

10 Stability and reactivity

- Reactivity: No further relevant information available.
- Chemical stability:
  - Thermal decomposition / conditions to be avoided: No decomposition if used according to specifications.
- Possibility of hazardous reactions: No dangerous reactions known.
- Conditions to avoid: No further relevant information available.
- Incompatible materials: No further relevant information available.
- Hazardous decomposition products: No dangerous decomposition products known.

11 Toxicological information

- Information on toxicological effects
  - Acute toxicity:

<table>
<thead>
<tr>
<th>Route</th>
<th>LD50/LC50 values that are relevant for classification:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalative</td>
<td>LC50/4 h 100 mg/l (mouse) 400 mg/l (rat)</td>
</tr>
</tbody>
</table>

7550-45-0 titanium tetrachloride

- Oral LD50 460 mg/kg (rat)

- Primary irritant effect:
  - on the skin: Caustic effect on skin and mucous membranes.
  - on the eye: Strong caustic effect.
  - Sensitization: No sensitizing effects known.
- Additional toxicological information:
  Swallowing will lead to a strong caustic effect on mouth and throat and to the danger of perforation of esophagus and stomach.

- Carcinogenic categories
  - IARC (International Agency for Research on Cancer)
    Substance is not listed.
  - NTP (National Toxicology Program)
    Substance is not listed.
  - OSHA-Ca (Occupational Safety & Health Administration)
    Substance is not listed.

12 Ecological information

- Toxicity
  - Aquatic toxicity: No further relevant information available.
  - Persistence and degradability: No further relevant information available.
- Behavior in environmental systems:
  - Bioaccumulative potential: No further relevant information available.
  - Mobility in soil: No further relevant information available.
- Additional ecological information:
  - General notes: Must not reach bodies of water or drainage ditch undiluted or unneutralized.

(Contd. on page 7)
Trade name: Titanium(IV) chloride, (99.99+%-Ti) PURATREM

13 Disposal considerations

- Waste treatment methods
  - **Recommendation:**
    Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

- Uncleaned packagings:
  - **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

- **UN-Number**
  - DOT, IMDG, IATA
  - UN1838

- **UN proper shipping name**
  - DOT
  - IMDG, IATA
  - Titanium tetrachloride
    - TITANIUM TETRACHLORIDE

- **Transport hazard class(es)**
  - **DOT**
    - Class
    - 6.1 Toxic substances
    - Label
    - 6.1, 8

  - **IMDG**
    - Class
    - 6.1 Toxic substances
    - Label
    - 6.1/8

  - **IATA**
    - Class
    - 6.1 Toxic substances
    - Label
    - 6.1 (8)

- **Packing group**
  - DOT, IMDG, IATA
  - 1
Trade name: Titanium(IV) chloride, (99.99+-%-Ti) PURATREM

<table>
<thead>
<tr>
<th>Environmental hazards:</th>
<th>Marine pollutant: No</th>
</tr>
</thead>
<tbody>
<tr>
<td>· Special precautions for user</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>· Poison inhalation hazard:</td>
<td>Yes</td>
</tr>
<tr>
<td>· Danger code (Kemler):</td>
<td>X80</td>
</tr>
<tr>
<td>· EMS Number:</td>
<td>F-A,S-B</td>
</tr>
<tr>
<td>· Segregation groups</td>
<td>Acids, heavy metals and their salts (including their organometallic compounds)</td>
</tr>
<tr>
<td>· Stowage Category</td>
<td>D</td>
</tr>
<tr>
<td>· Stowage Code</td>
<td>SW2 Clear of living quarters.</td>
</tr>
<tr>
<td>· Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>· Transport/Additional information:</td>
<td></td>
</tr>
<tr>
<td>· DOT</td>
<td></td>
</tr>
<tr>
<td>· Quantity limitations</td>
<td>On passenger aircraft/rail: Forbidden</td>
</tr>
<tr>
<td></td>
<td>On cargo aircraft only: Forbidden</td>
</tr>
<tr>
<td>· Hazardous substance:</td>
<td>1000 lbs, 454 kg</td>
</tr>
<tr>
<td>· UN &quot;Model Regulation&quot;:</td>
<td>UN 1838 TITANIUM TETRACHLORIDE, 6.1 (8), I</td>
</tr>
</tbody>
</table>

15 Regulatory information

| Safety, health and environmental regulations/legislation specific for the substance or mixture |
| Sara |
| · Section 355 (extremely hazardous substances): |
| Substance is listed. |
| · Section 313 (Specific toxic chemical listings): |
| Substance is listed. |
| · TSCA (Toxic Substances Control Act): |
| Substance is listed. |
| · Proposition 65 |
| · Chemicals known to cause cancer: |
| Substance is not listed. |
| · Chemicals known to cause reproductive toxicity for females: |
| Substance is not listed. |
| · Chemicals known to cause reproductive toxicity for males: |
| Substance is not listed. |
| · Chemicals known to cause developmental toxicity: |
| Substance is not listed. |
| · Carcinogenic categories |
| · EPA (Environmental Protection Agency) |
| Substance is not listed. |
| · TLV (Threshold Limit Value established by ACGIH) |
| Substance is not listed. |
Trade name: Titanium(IV) chloride, (99.99+%-Ti) PURATREM

- NIOSH-Ca (National Institute for Occupational Safety and Health)
  Substance is not listed.

- GHS label elements
  The substance is classified and labeled according to the Globally Harmonized System (GHS).

- Hazard pictograms
  
  ![GHS05](image1) ![GHS06](image2) ![GHS07](image3)

- Signal word Danger

- Hazard-determining components of labeling:
  titanium tetrachloride

- Hazard statements
  H330 Fatal if inhaled.
  H314 Causes severe skin burns and eye damage.
  H335 May cause respiratory irritation.

- Precautionary statements
  P231 Handle under inert gas.
  P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor.
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  P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
  P403+P233 Store in a well-ventilated place. Keep container tightly closed.
  P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

- Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- Department issuing SDS: Technical Department.
- Contact: Technical Director
- Date of preparation / last revision 02/01/2018 /-

- Abbreviations and acronyms:
  ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
  IMDG: International Maritime Code for Dangerous Goods
  DOT: US Department of Transportation
  IATA: International Air Transport Association
  ACGIH: American Conference of Governmental Industrial Hygienists
  EINECS: European Inventory of Existing Commercial Chemical Substances
  CAS: Chemical Abstracts Service (division of the American Chemical Society)
  NFPA: National Fire Protection Association (USA)
  HMIS: Hazardous Materials Identification System (USA)
  VOC: Volatile Organic Compounds (USA, EU)
  LC50: Lethal concentration, 50 percent
  LD50: Lethal dose, 50 percent
  PBT: Persistent, Bioaccumulative and Toxic
  vPvB: very Persistent and very Bioaccumulative
  NIOSH: National Institute for Occupational Safety
  OSHA: Occupational Safety & Health
  TLV: Threshold Limit Value
<table>
<thead>
<tr>
<th>PEL: Permissible Exposure Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>REL: Recommended Exposure Limit</td>
</tr>
<tr>
<td>Acute Tox. 1: Acute toxicity – Category 1</td>
</tr>
<tr>
<td>Skin Corr. 1B: Skin corrosion/irritation – Category 1B</td>
</tr>
<tr>
<td>STOT SE 3: Specific target organ toxicity (single exposure) – Category 3</td>
</tr>
</tbody>
</table>

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