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

1.1. Product identifier
Name of the substance: Tronox® Titanium Dioxide, All Grades
Identification number: 236-675-5 (EC number)
Registration number: 01-2119489379-17-0021 01-2119489379-17-0022
SDS number: B-5017
Product code: 77891, Pigment White #6
Issue date: 07-January-2011
Version number: 07-March-2017
Revision date: 27-March-2015
Supersedes date:

1.2. Relevant identified uses of the substance or mixture and uses advised against
Identified uses: White pigment for applications in coatings, inks, fibers, plastics, paper.
Uses advised against: None known.

1.3. Details of the supplier of the safety data sheet
Supplier
Company name: Tronox Pigments (Holland) BV
Address: Prof. Gerbrandyweg 2
3197KK Rotterdam-Botlek
The Netherlands
E-mail: ChemProdSteward@tronox.com
Telephone: +31 181 246600

1.4. Emergency telephone number
+1-760-476-3962 (Access code: 333318)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
The substance has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.
Classification according to Regulation (EC) No 1272/2008 as amended
This substance does not meet the criteria for classification according to Regulation (EC) 1272/2008 as amended.

Hazard summary: Dust may irritate the respiratory tract, skin and eyes. Frequent inhalation of fume/dust over a long period of time may increase the risk of developing lung diseases although epidemiological studies among titanium dioxide workers could not demonstrate this.

2.2. Label elements
Label according to Regulation (EC) No. 1272/2008 as amended
Hazard pictograms: None.
Signal word: None.
Hazard statements: The substance does not meet the criteria for classification.

Precautionary statements
Prevention: Observe good industrial hygiene practices.
Response: Flush skin thoroughly with water.
Storage: Store in a sealed container.
Disposal: Dispose of waste and residues in accordance with local authority requirements.

Supplemental label information: None.

2.3. Other hazards
Not a PBT or vPvB substance or mixture.

SECTION 3: Composition/information on ingredients

3.1. Substances
**SECTION 4: First aid measures**

**General information**
Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

4.1. Description of first aid measures

**Inhalation**
Move to fresh air. Get medical attention if any discomfort continues.

**Skin contact**
Flush skin thoroughly with water. Get medical attention if irritation develops or persists.

**Eye contact**
Do not rub eyes. Immediately rinse eyes with water. Remove any contact lenses, and continue flushing eyes with running water for at least 15 minutes. Hold eyelids apart to ensure rinsing of the entire surface of the eye and lids with water. Get immediate medical attention.

**Ingestion**
Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Never give anything by mouth to an unconscious person. If ingestion of a large amount does occur, call a poison control centre immediately.

4.2. Most important symptoms and effects, both acute and delayed
Dusts may irritate the respiratory tract, skin and eyes. Coughing. Frequent inhalation of dust over a long period of time increases the risk of developing lung diseases.

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

**SECTION 5: Firefighting measures**

**General fire hazards**
The product is not flammable.

5.1. Extinguishing media

**Suitable extinguishing media**
Use fire-extinguishing media appropriate for surrounding materials.

**Unsuitable extinguishing media**
No restrictions known.

5.2. Special hazards arising from the substance or mixture
None known.

5.3. Advice for firefighters

**Selection of respiratory protection for firefighting:** follow the general fire precautions indicated in the workplace. Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

**Special protective equipment for firefighters**
Move containers from fire area if you can do so without risk. Prevent runoff from fire control or dilution from entering streams, sewers or drinking water supply.

**SECTION 6: Accidental release measures**

6.1. Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel**
Avoid inhalation of dust and contact with skin and eyes. Wear appropriate protective equipment and clothing during clean-up. Local authorities should be advised if significant spillages cannot be contained.

**For emergency responders**
Keep unnecessary personnel away. Wear appropriate personal protective equipment.

6.2. Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not contaminate water.

6.3. Methods and material for containment and cleaning up
Avoid dust formation. Collect powder using special dust vacuum cleaner with particle filter or carefully sweep into closed container. Prevent entry into waterways, sewer, basements or confined areas.

6.4. Reference to other sections
For personal protection, see Section 8 of the SDS. For waste disposal, see section 13 of the SDS.

**SECTION 7: Handling and storage**

7.1. Precautions for safe handling
Avoid inhalation of dust and contact with skin and eyes. Use only with adequate ventilation. Use Personal Protective Equipment recommended in section 8 of the SDS. Wash thoroughly after handling. Observe good industrial hygiene practices.

7.2. Conditions for safe storage, including any incompatibilities
Titanium dioxide is a stable chemical compound that does not decompose during storage but can pick up moisture from the environment if not stored properly effecting product performance. Store indoors in a dry place, away from rain and wet floors. Use on a first-in first-out basis from receipt of the shipment.

7.3. Specific end use(s)
White pigment for applications in coatings, inks, fibers, plastics, paper.
SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

UK. EH40 Workplace Exposure Limits (WELs)

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide (CAS 13463-67-7)</td>
<td>TWA</td>
<td>4 mg/m³</td>
<td>Respirable.</td>
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<tr>
<td></td>
<td></td>
<td>10 mg/m³</td>
<td>Inhalable</td>
</tr>
</tbody>
</table>

Biological limit values

No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures

Follow standard monitoring procedures.

Derived no effect levels (DNELs)

<table>
<thead>
<tr>
<th>Workers</th>
<th>Value</th>
<th>Assessment factor</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide (CAS 13463-67-7)</td>
<td>Long-term, Local, Inhalation 10 mg/m³</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Predicted no effect concentrations (PNECs)

<table>
<thead>
<tr>
<th>Product</th>
<th>Value</th>
<th>Assessment factor</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide (CAS 13463-67-7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshwater</td>
<td>0.184 mg/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermittent releases</td>
<td>0.193 mg/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine water</td>
<td>0.0184 mg/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sediment (freshwater)</td>
<td>1000 mg/kg</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Sediment (marine water)</td>
<td>100 mg/kg</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>Soil</td>
<td>100 mg/kg</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>STP</td>
<td>100 mg/l</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

8.2. Exposure controls

Appropriate engineering controls

Ventilate as needed to control airborne dust. Provide adequate ventilation. Observe Occupational Exposure Limits and minimise the risk of inhalation of dust.

Individual protection measures, such as personal protective equipment

General information

Personal protective equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.

Eye/face protection

Wear dust-resistant safety goggles where there is risk of eye contact.

Skin protection

- Hand protection
  Wear suitable gloves. Suitable gloves can be recommended by the glove supplier.
- Other
  Wear appropriate clothing to prevent repeated or prolonged skin contact.

Respiratory protection

In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter (type P2). Seek advice from local supervisor.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

Hygiene measures

Do not breathe dust. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Environmental exposure controls

Contain spills and prevent releases and observe national regulations on emissions.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

Physical state: Solid.
Form: Powder.
Colour: White.
Odour: Odourless.
Odour threshold: Not applicable.
pH: Not applicable.
Melting point/freezing point: 1830 - 1850 °C (3326 - 3362 °F)
Initial boiling point and boiling range: 2500 - 3000 °C (4532 - 5432 °F)
Flash point: Not available.
Evaporation rate
Flammability (solid, gas)
Not available.
Not applicable.
Upper/lower flammability or explosive limits
Flammability limit - lower
Not available.

Flammability limit - upper
Not available.

Vapour pressure
Not available.
Vapour density
Not available.
Relative density
4.1 Approx. (@ 20°C)
Solubility(ies)
Insoluble in water.
Partition coefficient
(n-octanol/water)
Not applicable.
Auto-ignition temperature
Not available.
Decomposition temperature
Not available.
Viscosity
Not applicable.
Explosive properties
Not explosive.
Oxidising properties
Not oxidising.

9.2. Other information
Bulk density
600 kg/m³ Approx. (@ 20°C)
Molecular formula
TiO₂

SECTION 10: Stability and reactivity

10.1. Reactivity
The product is stable and non reactive under normal conditions of use, storage and transport.

10.2. Chemical stability
Material is stable under normal conditions.

10.3. Possibility of hazardous reactions
Hazardous polymerisation does not occur.

10.4. Conditions to avoid
Avoid dust formation.

10.5. Incompatible materials
None known.

10.6. Hazardous decomposition products
No hazardous decomposition products are known.

SECTION 11: Toxicological information

General information
Occupational exposure to the substance or mixture may cause adverse effects.

Information on likely routes of exposure

Inhalation
Dust may irritate respiratory system.

Skin contact
Dust may irritate skin.

Eye contact
Dust may irritate the eyes.

Ingestion
Ingestion may cause irritation and malaise.

Symptoms
Dusts or powder may irritate the respiratory tract, skin and eyes. Coughing. Frequent inhalation of dust over a long period of time increases the risk of developing lung diseases.

11.1. Information on toxicological effects

Acute toxicity
May cause discomfort if swallowed.

Skin corrosion/irritation
Dust may irritate skin. Skin irritation occurs on contact with moist or wet skin.

Serious eye damage/eye irritation
Dust may irritate the eyes. Dust in the eyes: Exposed individuals may experience eye tearing, redness, and discomfort.

Respiratory sensitisation
Based on available data, the classification criteria are not met.

Skin sensitisation
Based on available data, the classification criteria are not met.

Germ cell mutagenicity
Based on available data, the classification criteria are not met.
Carcinogenicity

Suspected of causing cancer. IARC has classified TiO2 as 2B Possibly carcinogenic to humans. However, the only evidence of carcinogenicity is in rats exposed to very high concentrations. Two major epidemiology studies among titanium dioxide workers in the US and in EUROPE could not demonstrate an elevated lung cancer risk.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. IARC Monographs, Volume 93 (Summary)

IARC Monographs. Overall Evaluation of Carcinogenicity
Titanium dioxide (CAS 13463-67-7) 2B Possibly carcinogenic to humans.

Reproductive toxicity
Based on available data, the classification criteria are not met.

Specific target organ toxicity - single exposure
Based on available data, the classification criteria are not met.

Specific target organ toxicity - repeated exposure
Based on available data, the classification criteria are not met.

Aspiration hazard
Not classified.

Mixture versus substance information
Not available.

Other information
No other specific acute or chronic health impact noted.

SECTION 12: Ecological information

12.1. Toxicity
The product is not expected to be hazardous to the environment.

12.2. Persistence and degradability
The degradability of the product has not been stated.

12.3. Bioaccumulative potential
Bioaccumulation is unlikely to be significant because of the low water solubility of this product.

Partition coefficient n-octanol/water (log Kow)
Not available.

Bioconcentration factor (BCF)
Not available.

12.4. Mobility in soil
The product is insoluble in water and will sediment in water systems.

12.5. Results of PBT and vPvB assessment
Not a PBT or vPvB substance or mixture.

12.6. Other adverse effects
Not established.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Residual waste
Dispose of in accordance with local regulations.

Contaminated packaging
Since emptied containers may retain product residue, follow label warnings even after container is emptied.

EU waste code
06 11 99
Waste codes should be assigned by the user based on the application for which the product was used.

Disposal methods/information
Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal. Dispose of this material and its container to hazardous or special waste collection point. Do not allow this material to drain into sewers/water supplies.

Special precautions
Dispose of in accordance with local regulations.

SECTION 14: Transport information

ADR
14.1. - 14.6.: Not regulated as dangerous goods.

RID
14.1. - 14.6.: Not regulated as dangerous goods.

ADN
14.1. - 14.6.: Not regulated as dangerous goods.

IATA
14.1. - 14.6.: Not regulated as dangerous goods.

IMDG
14.1. - 14.6.: Not regulated as dangerous goods.
14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

SECTION 15: Regulatory information

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

EU regulations

- Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended
  Not listed.
  Not listed.
- Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended
  Not listed.
- Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended
  Not listed.
- Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended
  Not listed.
- Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended
  Not listed.
  Not listed.
- Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA
  Not listed.

Authorisations

- Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorisation, as amended
  Not listed.

Restrictions on use

- Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended
  Not listed.
- Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work, as amended.
  Not listed.

Other EU regulations

- Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended
  Not listed.

Other regulations

The product is classified and labelled in accordance with Regulation (EC) 1272/2008 (CLP Regulation) as amended. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006, as amended.

National regulations

Follow national regulation for work with chemical agents.

15.2. Chemical safety assessment

SECTION 16: Other information

List of abbreviations

DNEL: Derived No-Effect Level.
PNEC: Predicted No-Effect Concentration.
PBT: Persistent, bioaccumulative and toxic.
vPvB: Very Persistent and very Bioaccumulative.
GHS: Globally Harmonized System of Classification and Labeling of Chemicals.
NIOSH: National Institute for Occupational Safety & Health.
TWA: Time weighted average.

References

HSDB® - Hazardous Substances Data Bank
IARC Monographs. Overall Evaluation of Carcinogenicity

Information on evaluation method leading to the classification of mixture

The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available.

Full text of any H-statements not written out in full under Sections 2 to 15

None.
<table>
<thead>
<tr>
<th><strong>This SDS contains revisions in the following section(s):</strong></th>
<th>This safety data sheet contains revisions in the following section(s): 1, 2, 3, 8, 9, 11, 15, 16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Training information</strong></td>
<td>Follow training instructions when handling this material.</td>
</tr>
<tr>
<td><strong>Further information</strong></td>
<td>Nanoparticle Statement- The average primary particle size of this product is larger than the nanoparticle size range as described by ISO/TC 229 and should not be considered as manufactured nanoparticles or nanomaterials. As with other particulate materials there will be a distribution of particle sizes around the average and a small portion of these may be covered by the nanoparticle definition. In this product, the primary particle size is in the 200-300 nm range. However, the primary particle size does not represent the size of particles in this product as supplied since these tend to aggregate or agglomerate into larger particles.</td>
</tr>
<tr>
<td><strong>Disclaimer</strong></td>
<td>The information in the sheet was written based on the best knowledge and experience currently available.</td>
</tr>
</tbody>
</table>