SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Identification of the substance/preparation
Tronox® Titanium Dioxide, All Grades

Use of the substance/preparation
White pigment for applications in coatings, inks, fibers, plastics, paper, glass, vitreous enamels, and ceramics.

Version No.
01

Revision date
22-December-2009

Synonym(s)

CAS No.
13463-67-7

Product code
77891, Pigment White #6

SDS Number
B-5017

Manufacturer/Supplier
Tronox Pigments (Holland) BV
Prof. Gerbrandyweg 2
3197KK Rotterdam-Bottek
The Netherlands
ChemProdSteward@tronox.com
+31 181 246600
Emergency: CHEMTREC 1-800-424-9300

2. HAZARDS IDENTIFICATION

This preparation is not classified as dangerous according to Directive 1999/45/EC and its amendments.

Physical hazards
Not classified as a physical hazard.

Health hazards
Prolonged exposure may cause chronic effects.

Environmental hazards
Not classified as an environmental hazard.

Specific hazards
Dusts or powder 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.

Main symptoms
Upper respiratory tract irritation. Coughing. Irritation of eyes and mucous membranes. Skin irritation.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS No.</th>
<th>Percent</th>
<th>EC-No.</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide</td>
<td>13463-67-7</td>
<td>86 - 97</td>
<td>236-675-5</td>
<td></td>
</tr>
<tr>
<td>Silicon dioxide</td>
<td>7631-86-9</td>
<td>10 - 20</td>
<td>231-545-4</td>
<td></td>
</tr>
<tr>
<td>Aluminium hydroxide</td>
<td>21645-51-2</td>
<td>0 - 10</td>
<td>244-492-7</td>
<td></td>
</tr>
<tr>
<td>Zirconium oxide</td>
<td>1314-23-4</td>
<td>0 - 2</td>
<td>215-227-2</td>
<td></td>
</tr>
</tbody>
</table>

Composition comments
Components listed make up an inseparable chemically reacted pigment.

4. 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
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 centre. Never give anything by mouth to an unconscious person. If ingestion of a large amount does occur, call a poison control centre immediately.

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

Notes to physician
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use fire-extinguishing media appropriate for surrounding materials.
Extinguishing media which must not be used for safety reasons

No restrictions known.

Unusual fire & explosion hazards

This product is not flammable.

Specific hazards

None known.

Fire fighting equipment/instructions

Firefighters should wear full protective clothing including self contained breathing apparatus. Selection of respiratory protection for fire fighting: follow the general fire precautions indicated in the workplace.

Specific methods

In the event of fire, cool tanks with water spray. Move container from fire area if it can be done without risk.

6. ACCIDENTAL RELEASE MEASURES

Containment procedures

Collect and dispose of spillage as indicated in Section 13. Prevent entry into waterways, sewer, basements or confined areas.

Personal precautions

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.

Environmental precautions

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

Methods for cleaning up

Avoid dust formation. Collect powder using special dust vacuum cleaner with particle filter or carefully sweep into closed container. For waste disposal, see Section 13.

7. HANDLING AND STORAGE

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 MSDS. Wash thoroughly after handling. Observe good industrial hygiene practices.

Storage

Store in tightly closed original container in a dry and cool place. Store in a closed container away from incompatible materials.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure limit values

France

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide (13463-67-7)</td>
<td>VME</td>
<td>10 mg/m3</td>
</tr>
</tbody>
</table>

Germany

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium hydroxide (21645-51-2)</td>
<td>AGW</td>
<td>10 mg/m3</td>
<td>Inhalable dust.</td>
</tr>
<tr>
<td>Silicon dioxide (7631-86-9)</td>
<td>AGW</td>
<td>3 mg/m3</td>
<td>Respirable dust.</td>
</tr>
<tr>
<td>Titanium dioxide (13463-67-7)</td>
<td>AGW</td>
<td>4 mg/m3</td>
<td>Inhalable fraction.</td>
</tr>
<tr>
<td>Zirconium oxide (1314-23-4)</td>
<td>AGW</td>
<td>10 mg/m3</td>
<td>Inhaleable dust.</td>
</tr>
<tr>
<td>Zirconium oxide (1314-23-4)</td>
<td>AGW</td>
<td>3 mg/m3</td>
<td>Respirable dust.</td>
</tr>
</tbody>
</table>

Italy

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium hydroxide (21645-51-2)</td>
<td>TWA</td>
<td>1 mg/m3</td>
<td>Respirable fraction.</td>
</tr>
<tr>
<td>Titanium dioxide (13463-67-7)</td>
<td>TWA</td>
<td>10 mg/m3</td>
<td></td>
</tr>
<tr>
<td>Zirconium oxide (1314-23-4)</td>
<td>STEL</td>
<td>10 mg/m3</td>
<td></td>
</tr>
<tr>
<td>Zirconium oxide (1314-23-4)</td>
<td>TWA</td>
<td>5 mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

Portugal

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon dioxide (7631-86-9)</td>
<td>TWA</td>
<td>10 mg/m3</td>
</tr>
<tr>
<td>Titanium dioxide (13463-67-7)</td>
<td>TWA</td>
<td>10 mg/m3</td>
</tr>
<tr>
<td>Zirconium oxide (1314-23-4)</td>
<td>STEL</td>
<td>10 mg/m3</td>
</tr>
<tr>
<td>Zirconium oxide (1314-23-4)</td>
<td>TWA</td>
<td>5 mg/m3</td>
</tr>
</tbody>
</table>

Spain

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon dioxide (7631-86-9)</td>
<td>TWA</td>
<td>10 mg/m3</td>
</tr>
<tr>
<td>Titanium dioxide (13463-67-7)</td>
<td>TWA</td>
<td>10 mg/m3</td>
</tr>
</tbody>
</table>
### Components

<table>
<thead>
<tr>
<th>Components</th>
<th>STEL</th>
<th>Value</th>
<th>TWA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium oxide (1314-23-4)</td>
<td>10 mg/m3</td>
<td>5 mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

### United Kingdom

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon dioxide (7631-86-9)</td>
<td>TWA</td>
<td>6 mg/m3</td>
<td>Inhalable dust.</td>
</tr>
<tr>
<td>Titanium dioxide (13463-67-7)</td>
<td>TWA</td>
<td>2,4 mg/m3</td>
<td>Respirable dust.</td>
</tr>
<tr>
<td>Zirconium oxide (1314-23-4)</td>
<td>STEL</td>
<td>10 mg/m3</td>
<td>Inhalable</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>4 mg/m3</td>
<td>Respirable.</td>
</tr>
</tbody>
</table>

### Exposure controls

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

### Occupational exposure controls

#### 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.

#### Hand protection

Risk of contact: Wear suitable gloves. Nitrile gloves are recommended. Suitable gloves can be recommended by the glove supplier.

#### Eye protection

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

#### Skin and body protection

Wear appropriate clothing to prevent repeated or prolonged skin contact.

#### General

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

### 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.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

#### Appearance

White powder.

#### Physical state

Solid

#### Form

Powder.

#### Colour

White.

#### Odour

Odourless.

#### Odour threshold

Not available.

#### pH

5 - 8.5 (10% slurry)

#### Boiling point

2500 - 3000 °C (4532 - 5432 °F)

#### Flash point

Not available.

#### Flammability

Not available.

#### Flammability limits in air, upper, % by volume

Not available.

#### Flammability limits in air, lower, % by volume

Not available.

#### Vapour pressure

Not available.

#### Relative density

Not available.

#### Solubility (water)

Insoluble

#### Partition coefficient (n-octanol/water)

Not available.

#### Viscosity

Not available.

#### Vapour density

Not available.

#### Evaporation rate

Not available.

#### Melting point

1830 - 1850 °C (3326 - 3362 °F)

#### Freezing point

Not available.

#### Auto-ignition temperature

Not available.

#### Bulk density

600 kg/m³ Approx. (@ 20°C)
10. STABILITY AND REACTIVITY

Conditions to avoid
Avoid dust formation.

Hazardous decomposition products
No hazardous decomposition products are known.

Stability
Material is stable under normal conditions.

Materials to avoid
None known.

Hazardous polymerisation
Hazardous polymerisation does not occur.

11. TOXICOLOGICAL INFORMATION

<table>
<thead>
<tr>
<th>Toxicological data</th>
<th>Components</th>
<th>Test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium hydroxide (21645-51-2)</td>
<td>Inhilation. Eye contact. Skin contact.</td>
<td>Acute Oral LD50 Rat: &gt; 5000 mg/kg</td>
</tr>
</tbody>
</table>

Routes of exposure
Inhilation. Eye contact. Skin contact.

Chronic toxicity
Frequent inhalation of dust over a long period of time may increase the risk of developing chronic lung diseases and skin irritation.

Sensitisation
Not a skin sensitiser.

Carcinogenicity
Suspected of causing cancer. IARC has classified TiO2 as 2B Possibly carcinogenic to humans. However, the only evidence of carcinogenicity is in rodents 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)

<table>
<thead>
<tr>
<th>IARC Monographs. Overall Evaluation of Carcinogenicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon dioxide (CAS 7631-86-9) 3 Not classifiable as to carcinogenicity to humans.</td>
</tr>
<tr>
<td>Titanium dioxide (CAS 13463-67-7) 2B Possibly carcinogenic to humans.</td>
</tr>
</tbody>
</table>

Mutagenicity
No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Teratogenicity
Not available.

Reproductivity
Contains no ingredient listed as toxic to reproduction.

Epidemiology
Not available.

Neurotoxicity
Not available.

Local effects
Dusts may irritate the respiratory tract, skin and eyes.

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

12. ECOLOGICAL INFORMATION

Ecotoxicity
The product is not expected to be hazardous to the environment.

Environmental effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

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

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

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

13. DISPOSAL CONSIDERATIONS

Disposal instructions
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.

Waste from residues / unused products
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 wastecodes
06 11 99

14. TRANSPORT INFORMATION

ADR
Not regulated as dangerous goods.
15. REGULATORY INFORMATION

Regulatory information
The product does not need to be labelled in accordance with EC directives or respective national laws. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006.

16. OTHER INFORMATION

Inventory status

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
</tbody>
</table>

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

Recommended use
White pigment for applications in coatings, inks, fibers, plastics, paper, glass, vitreous enamels, and ceramics.

Further information
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.

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

Disclaimer
The information in the sheet was written based on the best knowledge and experience currently available.

Issue date
22-December-2009