SAFETY DATA SHEET

1. Identification of the chemical and information about the manufacturer or supplier

1.1 Identification of the chemical products

1.1.1 Technical name Tronox® Titanium Dioxide, All Grades

Other means of identification

SDS number B-5017
Product code 77891, Pigment White #6
CAS number 13463-67-7

1.1.2 Recommended use of the chemical and restrictions on use

Recommended use White pigment for applications in coatings, inks, fibers, plastics, paper.
Limitations on use None known.

1.2 Manufacturer/Importer/Supplier/Distributor information

1.2.1 Manufacturer

Company name Tronox LLC
Address 3301 NW 150th Street
Oklahoma City, OK 73134
USA
Email ChemProdSteward@tronox.com
Telephone +1-405-775-5000 (24-hours)
Emergency telephone number +1-877-358-7421
+1-760-476-3962 (Access code: 333318)

2. Hazard(s) identification

2.1. Hazard identification of chemical product as a whole (classification according to GOST 12.1.007-76 and GHS)

Classification according to GOST 12.1.007-76 This product is classified as low-hazard (4th hazard class) in accordance with GOST 12.1.007.

GHS classification

Physical hazards Not classified.
Health hazards Not classified.
Environmental hazards Not classified.

2.2 Labeling elements in compliance with GOST 31340-2013

2.2.1 Signal word None.
2.2.2 Symbols None.
2.2.3 Hazard statement The substance does not meet the criteria for classification.

Precautionary statement

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.

Other 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.

Supplemental information None.

3. Composition/information on ingredients

3.1 Information on product as a whole

3.1.1 Chemical name (IUPAC) Titanium dioxide
3.1.2 Chemical formula TiO2 (13463-67-7)
White pigment for applications in coatings, inks, fibers, plastics, paper.

### 3.1.3 General description of the composition (taking into account the brand assortment; preparation method)

### 3.2 Components

<table>
<thead>
<tr>
<th>Components</th>
<th>Concentration by weight (%)</th>
<th>MAC, mg/m³</th>
<th>TSEL, mg/m³</th>
<th>Hazard classification</th>
<th>CAS-No.</th>
<th>EC No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide</td>
<td>&gt;80 - &lt;99</td>
<td>Fiber or dust.</td>
<td>Aerosol.</td>
<td>10</td>
<td>13463-67-7</td>
<td>236-675-5</td>
</tr>
</tbody>
</table>

Class 4 (low-hazard substance)

### 4. First-aid measures

#### 4.1. Observed symptoms

4.1.1 In case of exposure via inhalation

Dust may irritate respiratory system.

4.1.2 In contact with skin

Dust may irritate skin.

4.1.3 In contact with eyes

Dust may irritate the eyes.

4.1.4 In case of exposure via ingestion

Ingestion may cause irritation and malaise.

#### 4.2 First-aid measures to be provided to victims

4.2.1 In case of exposure via inhalation

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

4.2.2 In contact with skin

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

4.2.3 In contact with eyes

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.

4.2.4 In case of exposure via 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 center immediately.

4.2.5 Contraindications

None known.

#### 4.5 Contraindications

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

### 5. Fire-fighting and explosion safety measures and means

#### 5.1 General characteristics of fire-explosion properties

The product is not flammable.

#### 5.2 Fire-explosion indicators

The product is a difficultly burning material according to GOST 12.1.044.

#### 5.3 Combustion and/or thermal destruction products and hazards arising from these

None known.

#### 5.4 Recommended extinguishing media

Use fire-extinguishing media appropriate for surrounding materials.

#### 5.5 Forbidden extinguishing media

No restrictions known.

#### 5.6 Special protective equipment 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.

#### 5.7 Specific extinguishing methods

Not available.

#### Special fire fighting procedures

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.

### 6. Accident and emergency prevention and response measures and their consequences

#### 6.1 Measures to prevent harmful effects on people, environment, buildings, constructions, etc. in case of accidents and emergencies

6.1.1 General required actions in case of an accident or emergency

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.

6.1.2 Personal protection equipment in case of the accident

Wear appropriate personal protective equipment.
6.2 Procedures for the elimination of accidents and emergencies

6.2.1 Procedures in case of leaks, spills, splashes
Clean up in accordance with all applicable regulations.

6.2.2 Actions in case of fire
For detailed information, see section 5.

Methods and materials 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. For waste disposal, see section 13 of the SDS.

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

7. Storage and handling requirements of chemicals during loading and unloading

7.1 Safety precautions when handling chemical products

7.1.1 Technical safety measures
Avoid dust formation.

7.1.2 Environmental protection measures
Avoid inhalation of dust and contact with skin and eyes. Use Personal Protective Equipment recommended in section 8 of the SDS. Wash thoroughly after handling.

7.1.3 Recommended safe handling and transportation advice
Observe good industrial hygiene practices.

Local and general ventilation
Use with adequate ventilation.

7.2 Chemical storage requirements
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.

7.2.1 Terms and conditions for safe storage
Keep in original container.

7.2.2 Packaging
Store in a well-ventilated place.

7.3 Safety measures and storage requirements at domestic use

8. Equipment for monitoring exposure and personal protective equipment

8.1 Parameters of the working area that require monitoring
No exposure limits noted for ingredient(s).

Occupational exposure limits
Russian Federation. Hygiene Norm GN 2.2.5.1313-03. Executive No. 76 of 30 April 2003. Maximum allowable concentration (MAC) of harmful substances in the air of working zones, as amended.

<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>Ceiling</td>
<td>4 mg/m³</td>
<td>Fiber or dust.</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>10 mg/m³</td>
<td>Aerosol.</td>
</tr>
</tbody>
</table>

8.2 Measures to ensure the content of harmful substances in the working area below the exposure level concentration
No exposure standards allocated.

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

8.3 Worker personal protective equipment

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

8.3.2 Respiratory protection
Use dust respirator ШБ-1 “Lepestok” in accordance with GOST 12.4.028. Seek advice from local supervisor.

8.3.3 Protective equipment

Eye/face protection
Wear dust-resistant safety goggles where there is risk of eye contact.

Hand protection
 Wear suitable gloves. (GOST 12.4.103). Suitable gloves can be recommended by the glove supplier.

Other
Risk of contact: Wear appropriate clothing to prevent repeated or prolonged skin contact.

Thermal hazards
Wear appropriate thermal protective clothing, when necessary.

8.3.4 Personal protection equipment in case of domestic use
Not applicable.
General hygiene considerations  
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

9.1 Physical appearance

<table>
<thead>
<tr>
<th>Physical state</th>
<th>Solid.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Powder.</td>
</tr>
<tr>
<td>Color</td>
<td>White.</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless.</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

9.2 Parameters characterizing basic properties of the product

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid.</td>
</tr>
<tr>
<td>Form</td>
<td>Powder.</td>
</tr>
<tr>
<td>Color</td>
<td>White.</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless.</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>3326 - 3362 °F (1830 - 1850 °C)</td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>4532 - 5432 °F (2500 - 3000 °C)</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not available.</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Upper/lower flammability or explosive limits</td>
<td></td>
</tr>
<tr>
<td>Flammability limit - lower (%)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flammability limit - upper (%)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>Not available.</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Solubility(ies)</td>
<td></td>
</tr>
<tr>
<td>Solubility (water)</td>
<td>Insoluble in water.</td>
</tr>
<tr>
<td>Partition coefficient (n-octanol/water)</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Other data</td>
<td></td>
</tr>
<tr>
<td>Bulk density</td>
<td>600 kg/m³ Approx. (@ 20°C)</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not explosive.</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Molecular formula</td>
<td>TiO2</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>Not oxidizing.</td>
</tr>
</tbody>
</table>

10. Stability and reactivity

10.1 Chemical stability
Material is stable under normal conditions.
No hazardous decomposition products are known.

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

10.3 Conditions to avoid
Avoid dust formation.

11. Toxicological information

11.1 General exposure characteristics
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.

11.2 Routes of exposure
Inhalation. Eye contact. Skin contact.

11.3 Affected/target organs, tissues and systems of humans
| Specific target organ toxicity - single exposure | None known. |
| Specific target organ toxicity - repeated exposure | None known. |
11.4 Information on health hazards in case of direct exposure to the product and its effect

**Effect on upper respiratory tract irritation**
Dust may irritate the respiratory system.

**Respiratory or skin sensitization**

Hygiene Norm GN 2.2.5.1313-03. Executive No. 76 of 30 April 2003. Maximum allowable concentration (MAC) of harmful substances in the air of working zones, as amended.

Titanium dioxide (CAS 13463-67-7) Allergenic.

<table>
<thead>
<tr>
<th>Respiratory sensitization</th>
<th>None known.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin sensitization</td>
<td>Not a skin sensitizer.</td>
</tr>
<tr>
<td>Skin corrosion/irritation</td>
<td>Dust may irritate skin. Skin irritation occurs on contact with moist or wet skin.</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>Dust may irritate the eyes. Dust in the eyes: Exposed individuals may experience eye tearing, redness, and discomfort.</td>
</tr>
<tr>
<td>Aspiration hazard</td>
<td>Not classified.</td>
</tr>
</tbody>
</table>

11.5 Information on long-term hazardous health effects

**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.

<table>
<thead>
<tr>
<th>Reproductive toxicity</th>
<th>None known.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutagenicity</td>
<td>No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.</td>
</tr>
<tr>
<td>Cumulativeness</td>
<td>Cumulative properties are moderate.</td>
</tr>
<tr>
<td>Chronic effects</td>
<td>Frequent inhalation of dust over a long period of time may increase the risk of developing chronic lung diseases and skin irritation.</td>
</tr>
</tbody>
</table>

11.6 Acute toxicity data
May cause discomfort if swallowed.

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

12. Environmental impact information

12.1 General description of the impact on the environment
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

12.2 Routes of exposure to environment
Adverse effects may be caused by large spill in the environment as a result of accidents during transportation, storage, use, handling, depressurization of the container or/and the uncontrolled waste disposal.

12.3 The most important characteristics of the environmental impact

12.3.1 Hygienic standards
Not applicable.

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

12.3.3 Biomigration and transformation of the environment due to the biodegradation or other processes

| Persistence and degradability | The degradability of the product has not been stated. |
| Bioaccumulative potential     | Bioaccumulation is unlikely to be significant because of the low water solubility of this product. |
| Mobility in soil              | The product is insoluble in water and will sediment in water systems. |
| Mobility in general           | The product is insoluble in water and will sediment in water systems. |

Other adverse effects
Not established.

13. Recommendations for waste (residues) disposal

13.1 Safety precautions when handling the waste generated during use, storage, transportation
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.
13.2 Information on the location and disposal methods, recycling or disposal of product waste, including packaging
Dispose of in accordance with local regulations.

13.3 Recommendation on the waste disposal generated during its domestic use
Since emptied containers may retain product residue, follow label warnings even after container is emptied.

Waste from residues / unused products
Dispose of in accordance with local regulations.

14. Transport information

ADR
Not regulated as dangerous goods.

IATA
Not regulated as dangerous goods.

IMDG
Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable.

15. National and international regulatory information

15.1 National legislation
15.1.1 Laws of the Russian Federation
On technical regulation.
On sanitary and epidemiological welfare of the population.
On Environmental Protection.
On Air Protection.

15.1.2 Information about the documentation, regulatory requirements for the protection of human health and environment
Sanitary-Epidemiological Rules, 1.2.2353-08, Chemical substances, mixtures and products which are carcinogenic factors, 21 April 2008
Not listed.

Hygiene Norm GN 2.2.5.1313-03, Executive No. 76 of 30 April 2003. Maximum allowable concentration (MAC) of harmful substances in the air of working zones, as amended.

Titanium dioxide (CAS 13463-67-7) Aerosol with fibrogenic action.
Allergenic.
Slightly hazardous.
Personal protective equipment for skin and eyes required.

15.2 International Conventions and Agreements
Stockholm Convention
Not applicable.

Rotterdam Convention
Not applicable.

Montreal Protocol
Not applicable.

Kyoto protocol
Not applicable.

Basel Convention
Not applicable.

International Inventories

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<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>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Tronox® Titanium Dioxide, All Grades

2835 Version #: 05 Revision date: 07-March-2017 Issue date: 17-June-2013
<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s). A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

### 16. Other information

**References**
- HSDB® - Hazardous Substances Data Bank
- IARC Monographs. Overall Evaluation of Carcinogenicity
- GOST 9808-84 Pigment titanium dioxide. Specifications.
- GOST 19433-88. Dangerous goods. Classification and marking.
- GOST 30333-2007 Chemical production safety passport. General requirements.
- GOST 31340-2013 Labeling of chemicals. General requirements.
- GOST 32419-2013 Classification of chemical products. General requirements.
- GOST 32424-2013 Classification of chemicals for environmental hazards. General principles.

**Issued by**

**Company name**

Tronox LLC

**Disclaimer**

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

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.

**Issue date**

17-June-2013

**Revision date**

07-March-2017