SAFETY DATA SHEET

1. Identification

Product identifier **Tronox® Titanium Dioxide, All Grades**

Other means of identification

SDS number B-5017

Product code 77891, Pigment White #6

Synonyms CR-470, CR-800E, CR-813, CR-822, CR-826, CR-828, CR-834, 8120, CR-880, 8300, 8400, 8410, 8670, 8800, 8870, 8140, 41J.

Recommended use White pigment for applications in coatings, inks, fibers, plastics, paper.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

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

Physical hazards Not classified.

Health hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Hazard symbol None.

Signal word None.

Hazard statement The product 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.

Hazard(s) not otherwise classified (HNOC) None known.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Titanium dioxide	13463-67-7	80 - 97
Silicon dioxide	7631-86-9	0 - 15
Aluminum hydroxide	21645-51-2	0 - 10
Zirconium dioxide	1314-23-4	0 - 2

Composition comments Components listed make up an inseparable chemically reacted pigment. Silicon dioxide is present in finished product as amorphous silica.

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 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 center immediately.

Most important symptoms/effects, 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.

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

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

5. Fire-fighting measures

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

Unsuitable extinguishing media No restrictions known.

Specific hazards arising from the chemical None known.

Special protective equipment and precautions 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.

Fire fighting equipment/instructions 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.

General fire hazards The product is not flammable.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures 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.

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.

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

7. Handling and storage

Precautions for safe handling Avoid inhalation of dust and contact with skin and eyes. Use only with adequate ventilation. Wash thoroughly after handling. Observe good industrial hygiene practices.

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.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Titanium dioxide (CAS 13463-67-7)	PEL	15 mg/m3	Total dust.
Zirconium dioxide (CAS 1314-23-4)	PEL	5 mg/m3	

US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value
Silicon dioxide (CAS 7631-86-9)	TWA	0.8 mg/m3
		20 mppcf

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Aluminum hydroxide (CAS 21645-51-2)	TWA	1 mg/m3	Respirable fraction.
Titanium dioxide (CAS 13463-67-7)	TWA	10 mg/m3	
Zirconium dioxide (CAS 1314-23-4)	STEL	10 mg/m3	
	TWA	5 mg/m3	

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Silicon dioxide (CAS 7631-86-9)	TWA	6 mg/m3
Zirconium dioxide (CAS 1314-23-4)	STEL	10 mg/m3
	TWA	5 mg/m3

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

Exposure guidelines 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.

Individual protection measures, such as 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 Risk of contact: Wear appropriate clothing to prevent repeated or prolonged skin contact.

Respiratory protection When engineering controls are not sufficient to lower exposure levels below the applicable exposure limit, use a NIOSH approved respirator for dusts. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever work place conditions warrant a respirator's use. In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter. Seek advice from local supervisor.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

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

Appearance White powder.

Physical state Solid.

Form Powder.

Color White.

Odor Odorless.

Odor threshold Not applicable.

pH Not applicable.

Melting point/freezing point 3326 - 3362 °F (1830 - 1850 °C)

Initial boiling point and boiling range 4532 - 5432 °F (2500 - 3000 °C)

Flash point Not available.

Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	4.1 Approx. (@ 20°C)
Solubility(ies)	
Solubility (water)	Insoluble in water.
Partition coefficient (n-octanol/water)	Not applicable.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not applicable.
Other information	
Bulk density	600 kg/m³ Approx. (@ 20°C)
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Avoid dust formation.
Incompatible materials	None known.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

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 related to the physical, chemical and toxicological 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.

Information on toxicological effects

Acute toxicity	May cause discomfort if swallowed.

Components	**Species**	**Test Results**
Aluminum hydroxide (CAS 21645-51-2)		
Acute		
Oral		
LD50	Rat	> 5000 mg/kg

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 or skin sensitization

Respiratory sensitization	None known.
Skin sensitization	Not a skin sensitizer.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
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. Boffetta et. al. Mortality among workers employed in the titanium dioxide production industry in Europe. Cancer Causes Control. 2004 Sep;15(7):697-706. Fryzek et. al. A cohort mortality study among titanium dioxide manufacturing workers in the United States. J Occup Environ Med. 2003 Apr;45(4):400-9. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. IARC Monographs, Volume 93 (Summary)

IARC Monographs. Overall Evaluation of Carcinogenicity

Silicon dioxide (CAS 7631-86-9)	3 Not classifiable as to carcinogenicity to humans.
Titanium dioxide (CAS 13463-67-7)	2B Possibly carcinogenic to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity	None known.
Specific target organ toxicity - single exposure	None known.
Specific target organ toxicity - repeated exposure	None known.
Aspiration hazard	Not classified.
Chronic effects	Frequent inhalation of dust over a long period of time may increase the risk of developing chronic lung diseases and skin irritation.
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.
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. 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.
Local disposal regulations	Dispose of in accordance with local regulations.
Hazardous waste code	Not regulated.
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.

14. Transport information

DOT

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. Regulatory information

US federal regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations Titanium dioxide is listed as a carcinogen by the State of California under Proposition 65. This listing is a qualified listing which applies only to airborne, unbound, particles of respirable size and does not require warnings on products containing titanium dioxide such as plastics, paper, and paint.

US. Massachusetts RTK - Substance List

Silicon dioxide (CAS 7631-86-9)
Titanium dioxide (CAS 13463-67-7)
Zirconium dioxide (CAS 1314-23-4)

US. New Jersey Worker and Community Right-to-Know Act

Silicon dioxide (CAS 7631-86-9)
Titanium dioxide (CAS 13463-67-7)

US. Pennsylvania Worker and Community Right-to-Know Law

Silicon dioxide (CAS 7631-86-9)
Titanium dioxide (CAS 13463-67-7)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Titanium dioxide (CAS 13463-67-7)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No

Country(s) or region	Inventory name	On inventory (yes/no)*
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*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, including date of preparation or last revision

Issue date 21-November-2012

Revision date 18-February-2015

Version # 04

Further information Synonyms:
CR-470, CR-800E, CR-813, CR-822, CR-826, CR-828, CR-834, 8120, CR-880, 8300, 8400, 8410, 8670, 8800, 8870, 8140, 41J.

HMIS® ratings Health: 1
Flammability: 0
Physical hazard: 0

List of abbreviations

GHS: Globally Harmonized System of Classification and Labeling of Chemicals.
LD50: Lethal Dose, 50%.
LC50: Lethal Concentration, 50%.
NIOSH: National Institute for Occupational Safety & Health.

References 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.

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.

This SDS contains revisions in the following section(s): This safety data sheet contains revisions in the following section(s): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16