



MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	Tronox® Titanium Dioxide, All Grades
Version #	02
Revision date	12-22-2009
CAS #	13463-67-7
Product Code	77891, Pigment White #6
MSDS Number	B-5017
Product use	White pigment for applications in coatings, inks, fibers, plastics, paper, glass, vitreous enamels, and ceramics.
Synonym(s)	TRONOX® Titanium Dioxide 435, CR-470, CR-800, CR-800E, CR-813, CR-822, CR-826, CR-828, CR-834, CR-880, 8300, 8400, 8670, R-KB-2, R-KB-3, R-KB-4, R-KB-5, R-KB-6, R-FD-I, R-PL-1, R-U-2, R-U-5, T-R, TR-HP-2, A-DW-1, A-K-1, 8700, R-FK-2, R-FK-3, 820, 8120.
Manufacturer/Supplier	Tronox LLC 3301 NW 150th Street Oklahoma City, OK 73134 US ChemProdSteward@tronox.com 1-405-775-5000 (24-hours)
Emergency	CHEMTREC 1-800-424-9300

2. Hazards Identification

Physical state	Solid
Appearance	White powder.
Emergency overview	CAUTION May cause eye, skin and respiratory tract irritation.
OSHA regulatory status	This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).
Potential health effects	
Routes of exposure	Inhalation. Eye contact. Skin contact.
Eyes	Dust may irritate the eyes.
Skin	Dust may irritate skin. Skin irritation occurs on contact with moist or wet skin.
Inhalation	May cause respiratory tract irritation. Dust may irritate throat and respiratory system and cause coughing.
Ingestion	May cause discomfort if swallowed.
Target organs	Eyes. Skin. Respiratory system
Chronic effects	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.
Signs and symptoms	Upper respiratory tract irritation. Coughing. Irritation of eyes and mucous membranes. Skin irritation.
Potential environmental effects	The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Titanium dioxide	13463-67-7	86 - 97
Silicon dioxide	7631-86-9	10 - 20
Aluminium hydroxide	21645-51-2	0 - 10
Zirconium oxide	1314-23-4	0 - 2

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

4. First Aid Measures

First aid procedures

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.
Skin contact	Flush skin thoroughly with water. Get medical attention if irritation develops or persists.
Inhalation	Move to fresh air. Get medical attention if any discomfort continues.
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.

Notes to physician

Treat symptomatically.

General advice

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

5. Fire Fighting Measures

Flammable properties

This product is not flammable.

Extinguishing media

Suitable extinguishing media	Use fire-extinguishing media appropriate for surrounding materials.
Unsuitable extinguishing media	No restrictions known.

Protection of firefighters

Protective equipment and precautions for firefighters	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.
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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

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 containment

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

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 of the MSDS.

Other information

Clean up in accordance with all applicable regulations.

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

Occupational exposure limits

ACGIH

Components

Components	Type	Value	Form
Aluminium hydroxide (21645-51-2)	TWA	1 mg/m ³	Respirable fraction.
Titanium dioxide (13463-67-7)	TWA	10 mg/m ³	
Zirconium oxide (1314-23-4)	STEL	10 mg/m ³	
	TWA	5 mg/m ³	

U.S. - OSHA

Components	Type	Value	Form
Silicon dioxide (7631-86-9)	TWA	6 mg/m3 20 mppcf	
Titanium dioxide (13463-67-7)	PEL TWA	15 mg/m3 10 mg/m3	Total dust. Total dust.
Zirconium oxide (1314-23-4)	PEL STEL TWA	5 mg/m3 10 mg/m3 5 mg/m3	

Canada - Alberta

Components	Type	Value	
Silicon dioxide (7631-86-9)	TWA	10 mg/m3	
Titanium dioxide (13463-67-7)	TWA	10 mg/m3	
Zirconium oxide (1314-23-4)	STEL TWA	10 mg/m3 5 mg/m3	

Canada - British Columbia

Components	Type	Value	Form
Silicon dioxide (7631-86-9)	TWA	1,5 mg/m3 4 mg/m3	Respirable. Total
Titanium dioxide (13463-67-7)	TWA	3 mg/m3 10 mg/m3	Respirable fraction. Total dust.
Zirconium oxide (1314-23-4)	STEL TWA	10 mg/m3 5 mg/m3	

Canada - Ontario

Components	Type	Value	Form
Silicon dioxide (7631-86-9)	TWA	10 mg/m3	
Titanium dioxide (13463-67-7)	TWA	10 mg/m3	Total dust.
Zirconium oxide (1314-23-4)	STEL TWA	10 mg/m3 5 mg/m3	

Canada - Quebec

Components	Type	Value	Form
Silicon dioxide (7631-86-9)	TWA	6 mg/m3	Respirable dust.
Titanium dioxide (13463-67-7)	TWA	10 mg/m3	Total dust.
Zirconium oxide (1314-23-4)	STEL TWA	10 mg/m3 5 mg/m3	

Mexico

Components	Type	Value	
Silicon dioxide (7631-86-9)	TWA	10 mg/m3	
Titanium dioxide (13463-67-7)	STEL TWA	20 mg/m3 10 mg/m3	
Zirconium oxide (1314-23-4)	STEL TWA	10 mg/m3 5 mg/m3	

Engineering controls

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

Personal protective equipment**Eye / face protection**

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

Skin protection

Risk of contact: Wear protective gloves. 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. Seek advice from local supervisor.

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 & Chemical Properties

Appearance	White powder.
Color	White.
Odor	Odorless.
Odor threshold	Not available.
Physical state	Solid
Form	Powder.
pH	5 - 8.5 (10% slurry)
Melting point	3326 - 3362 °F (1830 - 1850 °C)
Freezing point	Not available.
Boiling point	4532 - 5432 °F (2500 - 3000 °C)
Flash point	Not available.
Evaporation rate	Not available.
Flammability	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Specific gravity	4.1 Approx. (@ 20°C)
Solubility (water)	Insoluble
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Bulk density	600 kg/m ³ Approx. (@ 20°C)

10. Chemical Stability & Reactivity Information

Chemical stability	Material is stable under normal conditions.
Conditions to avoid	Avoid dust formation.
Incompatible materials	None known.
Hazardous decomposition products	No hazardous decomposition products are known.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Components	Test Results
Aluminium hydroxide (21645-51-2)	Acute Oral LD50 Rat: > 5000 mg/kg
Local effects	Dusts may irritate the respiratory tract, skin and eyes.
Sensitization	Not a skin sensitizer.
Chronic effects	Frequent inhalation of dust over a long period of time may increase the risk of developing chronic lung diseases and skin irritation.

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.

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)

ACGIH Carcinogens

Aluminium hydroxide (CAS 21645-51-2)	A4 Not classifiable as a human carcinogen.
Titanium dioxide (CAS 13463-67-7)	A4 Not classifiable as a human carcinogen.
Zirconium oxide (CAS 1314-23-4)	A4 Not classifiable as a human carcinogen.

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.

Epidemiology	Not available.
Mutagenicity	Not available.
Neurological effects	Not available.
Reproductive effects	Not available.
Teratogenicity	Not available.
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 / Accumulation	Bioaccumulation is unlikely to be significant because of the low water solubility of this product.
Partition coefficient (n-octanol/water)	Not available.
Mobility in environmental media	The product is insoluble in water and will sediment in water systems.

13. Disposal Considerations

Waste codes	Not regulated.
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.

14. Transport Information

DOT
Not regulated as dangerous goods.

IATA
Not regulated as dangerous goods.

IMDG
Not regulated as dangerous goods.

TDG
Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

CERCLA/SARA Hazardous Substances - Not applicable.

CERCLA (Superfund) reportable quantity (lbs)

None

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

Section 302 extremely hazardous substance No

Section 311 hazardous chemical Yes

Drug Enforcement Agency (DEA) Not controlled

WHMIS status Controlled

WHMIS classification D2A - Other Toxic Effects-VERY TOXIC

WHMIS labeling



Inventory status

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
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 that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - California Hazardous Substances (Director's): Listed substance

Silicon dioxide (CAS 7631-86-9) Listed.
Zirconium oxide (CAS 1314-23-4) Listed.

US - Massachusetts RTK - Substance: Listed substance

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

US - New Jersey RTK - Substances: Listed substance

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

US - Pennsylvania RTK - Hazardous Substances: Listed substance

Silicon dioxide (CAS 7631-86-9) Listed.

16. Other Information

Recommended use	White pigment for applications in coatings, inks, fibers, plastics, paper, glass, vitreous enamels, and ceramics.
Further information	HMIS® is a registered trade and service mark of the NPCA. 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.
HMIS® ratings	Health: 1 Flammability: 0 Physical hazard: 0
NFPA ratings	Health: 1 Flammability: 0 Instability: 0
Disclaimer	The information in the sheet was written based on the best knowledge and experience currently available.
Issue date	12-22-2009