CHEMICAL PRODUCT SAFETY DATA SHEET

Prepared in accordance with GB/T 16483 and GB/T 17519.

1. Chemical product and company identification

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

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.

Product code 77891, Pigment White #6

Manufacturer

Company name Tronox LLC

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Recommended use and Limitations on use

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

Issue date 07-January-2011

Revision date 19-February-2015

Supersedes date 04-December-2012

SDS No B-5017

2. Hazards identification

Emergency overview May cause eye, skin and respiratory tract irritation.

GHS-classification

Not classified.

Label elements

Pictograms 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.

Physical and chemical hazards No unusual fire or explosion hazards noted.

Health 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.

Environmental hazards The product is 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

Substance/mixture Mixture

Chemical name	CAS Number	Concentration (%)
Titanium dioxide	13463-67-7	80 - 97
Silicon dioxide	7631-86-9	0 - 15

Chemical name		
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 and health effects 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.

Expected acute symptoms and delayed symptoms 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.

Personal protection for first-aid responders 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

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

Extinguishing media to avoid No restrictions known.

Specific hazards None known.

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.

Protection of fire-fighters 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.

6. Accidental release measures

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. Use personal protection recommended in Section 8 of the SDS.

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

Clean-up methods and materials and containment measures 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.

Prevention of secondary hazards Avoid release to the environment.

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

Storage 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

Exposure limits

China

Components	Type	Value	Form
Titanium dioxide (CAS 13463-67-7)	TWA	8 mg/m3	Total dust.
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.

Control parameters Follow standard monitoring procedures.

Engineering measures 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

Respiratory protection In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter. Seek advice from local supervisor.

Hand protection Wear suitable gloves. Suitable gloves can be recommended by the glove supplier.

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

Skin and body protection Risk of contact: Wear appropriate clothing to prevent repeated or prolonged skin contact.

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.

Color White.

Odor Odorless.

Odor threshold Not applicable.

pH Not applicable.

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

Boiling point, initial boiling point, and boiling range 4532 - 5432 °F (2500 - 3000 °C)

Flash point Not available.

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)

Density Not available.

Solubility(ies)

Solubility (water) Insoluble in water.

Partition coefficient (n-octanol/water) Not applicable.

Auto-ignition temperature Not available.

Decomposition temperature Not available.

Flammability (solid, gas) Not applicable.

Other data

Bulk density 600 kg/m³ Approx. (@ 20°C)

Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.
Viscosity	Not applicable.

10. Stability and reactivity

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

Acute toxicity May cause discomfort if swallowed.

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

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

Titanium dioxide (CAS 13463-67-7)	2B Possibly carcinogenic to humans.

Toxic to reproduction	None known.
Specific target organ toxicity following single exposure	None known.
Specific target organ toxicity following 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.
Other 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.

Bioaccumulation 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.

Other hazardous effects Not established.

13. Disposal considerations

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.

Local disposal regulations 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.

14. Transport information

CNDG

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

Inventory of Existing Chemical Substances in China

Country(s) or region	Inventory name	On inventory (yes/no)*
China	Inventory of Existing Chemical Substances in China (IECSC)	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).

Applicable regulations

Guidance on the compilation of safety data sheet for chemical products (GB/T 17519–2013)
Inventory of Existing Chemical Substances in China
Regulations on the Control over Safety of Dangerous Chemicals
Regulations on Labor Protection in Workplaces Where Toxic Products Are Used
Measures for the Safe Use of Chemicals in Workplaces
Safety Data Sheet for Chemical Products Content and Order of Sections (GB16483-2008)
General Rules for Preparation of Precautionary Labels for Chemicals (GB15258-2009)
Packing Symbol of Dangerous Goods(GB190-2009)
Packing - Pictorial Marking for Handling of Goods (GB/T191-2009)
The Principle of Classification of Transport Packaging Groups of Dangerous Goods (GB/T15098-2008)
General Specifications for Transport Packages of Dangerous Goods (GB 12463-2009)
Dangerous Chemical Products
Very Toxic Chemicals
Highly Toxic Chemicals List
Regulation for Administration of Precursor Chemicals
Regulations on the Administration of Controlled Chemicals
Explosive Precursor Hazardous Chemicals
National List of Ozone Depleting Substances
Occupational exposure limits for hazardous agents in the workplace (GBZ 2.1-2007)
List of Dangerous Goods (GB 12268-2012)
Classification and code of dangerous goods (GB6944-2012)
Identification of Major Hazard Installations for Hazardous Chemicals (GB18218-2009)
Regulations on Road Transport of Dangerous Goods
Regulations on Rail Road Transport of Dangerous Goods
UN Recommendations on the Transport of Dangerous Goods (UN RTDG)
National Catalogue of Hazardous Wastes
National Catalogue of Hazardous Waste, Appendix A

Occupational exposure limits for hazardous agents in the workplace (GBZ 2.1-2007)

Titanium dioxide (CAS 13463-67-7)
Zirconium dioxide (CAS 1314-23-4)

Restricted Import/Export Toxic Chemical List (MEP and GCA Announcement No. 2008-66, Dec. 1, 2008, amended through MEP and Customs Notice No. 2011-91, December 28, 2011)

Not regulated.

Classification and code of dangerous goods (GB 6944-2012)

Not regulated.

UN Recommendations on the Transport of Dangerous Goods (UN RTDG)

Not regulated.

16. Other information

References

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

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.

Issued by

Company name Tronox LLC

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.

Disclaimer

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