SAFETY DATA SHEET

1. Chemical product and company identification

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

Other identification

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/Supplier

Company name Tronox LLC
3301 NW 150th Street
Oklahoma City, OK 73134

Country USA

Email ChemProdSteward@tronox.com

Telephone +1-405-775-5000 (24-hours)

Emergency telephone number +1-760-476-3960 (Access code 333318)

Recommended use and Limitations on use

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

SDS number B-5017

2. Hazards identification

GHS classification

Physical hazards Not classified.

Health hazards Not classified.

Environmental hazards Not classified.

Label elements

Pictogram 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.

Other hazards None known.

3. Composition / information on ingredients

Substance or mixture Mixture

Chemical property

Chemical name	CAS Number	Concentration (%)
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

First aid measures for different exposure routes

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 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.
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	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.
Spill clean-up methods	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.

7. Handling and storage

Handling

Technical measures	Avoid dust formation.
Local and general ventilation	Use with adequate ventilation.
Precautions	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.
Safe handling advice	Observe good industrial hygiene practices.

Storage

Technical measures	Store in a well-ventilated place.
Suitable storage conditions	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.
Incompatible materials	None known.
Safe packaging materials	Keep in original container.

8. Exposure controls/personal protection

Exposure limits

Indonesia. OELs (Minister of Manpower and Transmigration Regulation No. Per.13/MEN/X/2011 concerning Threshold Limit Values, Annex II)

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

Occupational exposure limits

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	

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 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.

Auto-ignition temperature 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.

Evaporation rate Not available.

Relative density 4.1 Approx. (@ 20°C)

Density Not available.

Solubility(ies)

Solubility (water) Insoluble in water.

Solubility (other) Not available.

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

Decomposition temperature Not available.

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

Viscosity Not applicable.

Other data

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.
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

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)

ACGIH Carcinogens

Aluminum 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 dioxide (CAS 1314-23-4)	A4 Not classifiable as a human carcinogen.

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 - 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.
Interactive effects	Not available.
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 available.

13. Disposal considerations

Disposal methods/information 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

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. Regulatory information

Applicable regulations

Classified in accordance with Minister of Industry of the Republic of Indonesia Regulation Number 23/M-IND/PER/4/2013 concerning the Amendment to Minister of Industry Regulation Number 87/M-IND/PER/9/2009 on Globally Harmonized System of Classification and Labelling of Chemicals.

CWC (Law of RI No. 9 of 2008 re: Prohibition on the Use of Chemicals as Chemical Weapon, March 10, 2008)

Not regulated.

Dangerous Substances that Must be Registered (Regulation of the Minister of Health of the Republic of Indonesia)

Not regulated.

Import Control of Dangerous Substances (Decree of the Ministry of Industry and Trade No. 254/MPP/KEP/7/2000, Attachment I)

Not regulated.

Precursor Chemicals (Ministry of Industry and Trade Decree No. 647/MPP/Kep/10/2004 concerning Regulation on Import of Precursors, Attachment 1)

Not regulated.

Prohibited Substances (Government Regulation No. 74 of 2001 regarding Management of Hazardous and Poisonous Substances, Attachment II, Table 1)

Not regulated.

Restricted Substances (Government Regulation No. 74 of 2001 regarding Management of Hazardous and Poisonous Substances, Attachment II, Table 2)

Not regulated.

Toxic and Hazardous Materials List (Decree of the Ministry of Industry on the Safeguarding of Toxic and Hazardous Materials in Industrial Plants, No. 148/M/SK/4/1985)

Not regulated.

Hazardous Substances Approved for Use (Government Regulation No. 74 of 2001 regarding Management of Hazardous and Poisonous Substances, Attachment I)

Listed substances

Not regulated.

Listed substances / Allowed until 2040

Not regulated.

16. Other information

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

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.
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