

# Material Safety Data Sheet

## TIOXIDE® TR93

### 1. Product and company identification

**Product name** : TIOXIDE® TR93  
**Material uses** : Pigment, Opacifying agent  
**(M)SDS #** : 00046115  
**Validation date** : 11/6/2012.  
**Print date** : 11/5/2012.

**Supplier/Manufacturer** : Tioxide Americas LLC  
P.O. Box 4980  
The Woodlands, TX 77387

Technical Information: (800) 367-8462  
E-Mail: MSDS@huntzman.com

**In case of emergency** : Chemtrec: (800) 424-9300 or (703) 527-3887

### 2. Hazards identification

**Physical state** : Solid. [Powder.]  
**Odor** : Slight  
**Color** : White.

**OSHA/HCS status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Emergency overview** : CAUTION!  
MAY CAUSE RESPIRATORY TRACT, EYE AND SKIN IRRITATION.  
Handling and/or processing of this material may generate a dust which can cause mechanical irritation of the eyes, skin, nose and throat. Keep away from heat, sparks and flame. Prevent dust accumulation. Avoid exposure - obtain special instructions before use. Do not breathe dust. Avoid contact with eyes. Avoid prolonged or repeated contact with skin. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

See toxicological information (Section 11)

**GENERAL INFORMATION** : Read the entire MSDS for a more thorough evaluation of the hazards.

### 3. Composition/information on ingredients

<u>Name</u>	<u>CAS number</u>	<u>%</u>
Titanium dioxide	13463-67-7	60 - 100
Aluminium oxide	1344-28-1	3 - 7
Amorphous silica	7631-86-9	0.1 - 1
Zirconium dioxide	1314-23-4	0.1 - 1

## 4 . First aid measures

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
- Notes to physician** : No specific treatment. Treat symptomatically. Call medical doctor or poison control center immediately if large quantities have been ingested.

## 5 . Fire-fighting measures

- Flash point** : Not applicable
- Flammable limits** : Not applicable
- Hazardous thermal decomposition products** : At high temperature, decomposition products could include trace of alpha-ethyl acrolein and formaldehyde.
- Extinguishing media**
- Suitable** : Use dry chemical powder.
- Not suitable** : Do not use water jet.
- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## 6 . Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing dust. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
- Methods for cleaning up** : Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labeled waste container. Avoid creating dusty conditions and prevent wind dispersal. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Note: see section 1 for emergency contact information and section 13 for waste disposal. Caution: in contact with water the product can make the floor slippery. Do not wet damaged packages.

## 7. Handling and storage

**Handling** : Avoid breathing dust.

Handling systems and areas should be operated in such a way as to minimize exposure to dust.

Emptying of some flexible intermediate bulk containers (FIBC's) can generate static electricity. Check grounding and bonding requirements of the particular FIBC's before transferring material. Empty FIBC's by gravity only (do not empty pneumatically). Remove all wrapping prior to emptying FIBC's.

Offloading from bulk tankers can generate static electricity. Systems should be adequately earthed and provide an earthing point for tankers.

In the manufacture of titanium dioxide, product is packaged at temperatures of approximately 100 to 120 degrees C (212 to 248 degrees F). When pigment is shipped shortly after manufacture, it may stay hot for a very long time depending on ambient temperatures and inventory storage practices. Due to the potential of elevated pigment temperature, caution should be used. Each work environment must be assessed to determine hazards.

**Storage** : Pigments should not be stored in outside areas exposed to the weather. Standard pallets, those containing paper or plastic bags can be stacked to a maximum of three high. When FIBC's are used, they should only be stacked to a maximum of two high. In all cases, the protective cover or wrapping should remain in place during storage and only be removed immediately prior to use. Care should be taken to avoid exposure to moisture.

## 8. Exposure controls/personal protection

Ingredient	Exposure limits
Titanium dioxide	<b>ACGIH TLV (United States, 2/2010).</b> TWA: 10 mg/m <sup>3</sup> 8 hour(s).
Aluminium oxide	<b>OSHA PEL (United States, 6/2010).</b> TWA: 15 mg/m <sup>3</sup> 8 hour(s). Form: Total dust
	<b>OSHA PEL (United States, 6/2010).</b> TWA: 5 mg/m <sup>3</sup> 8 hour(s). Form: Respirable fraction
	TWA: 15 mg/m <sup>3</sup> 8 hour(s). Form: Total dust
Zirconium dioxide	<b>ACGIH TLV (United States, 2/2010).</b> TWA: 1 mg/m <sup>3</sup> 8 hour(s). Form: Respirable fraction
	<b>ACGIH TLV (United States, 2/2010). Notes: as Zr</b> STEL: 10 mg/m <sup>3</sup> , (as Zr) 15 minute(s).
	TWA: 5 mg/m <sup>3</sup> , (as Zr) 8 hour(s).
	<b>OSHA PEL (United States, 6/2010). Notes: as Zr</b> TWA: 5 mg/m <sup>3</sup> , (as Zr) 8 hour(s).

**Recommended monitoring procedures** : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

**Engineering measures** : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

## 8 . Exposure controls/personal protection

### Personal protection

- Respiratory** : In case of inadequate ventilation wear respiratory protection. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. If operating conditions cause high dust concentrations to be produced, use dust goggles.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

## 9 . Physical and chemical properties

### General information

#### Appearance

- Physical state** : Solid. [Powder.]
- Color** : White.
- Odor** : Slight

### Important health, safety and environmental information

- pH** : 6.5 to 9 [Conc. (% w/w): 10%]
- Boiling/condensation point** : Not applicable
- Melting/freezing point** : 1800°C (3272°F)
- Flash point** : Not applicable
- Flammable limits** : Not applicable
- Auto-ignition temperature** : Not applicable
- Oxidizing properties** : None.
- Vapor pressure** : Not applicable
- Specific gravity** : Not applicable
- Partition coefficient: n-octanol/water (log Kow)** : Not applicable
- Density** : 4.05 g/cm<sup>3</sup> [20°C (68°F)]
- Vapor density** : Not applicable
- Evaporation rate (butyl acetate = 1)** : Not applicable
- VOC** : Not applicable

## 10 . Stability and reactivity

- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.
- Conditions to avoid** : Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Prevent dust accumulation.
- Materials to avoid** : None known.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## 11 . Toxicological information

### Acute toxicity

Product/ingredient name	Endpoint	Species	Result	Exposure
Titanium dioxide	LC50 Inhalation Dusts and mists	Rat - Male	>6.82 mg/L	4 hours
	LD50 Oral	Rat	>5000 mg/kg	-
Aluminium oxide	LC50 Inhalation Dusts and mists	Rat - Male, Female	>2.3 mg/L	4 hours
	LD50 Oral	Rat - Male, Female	>10000 mg/kg	-
Amorphous silica	LC50 Inhalation Dusts and mists	Rat - Male, Female	>58.8 mg/L	4 hours
	LD50 Dermal	Rabbit	>5000 mg/kg	-
Zirconium dioxide	LD50 Oral	Rat	>5000 mg/kg	-
	LD50 Oral	Rat	8800 mg/kg	-

### Irritation/Corrosion

Product/ingredient name	Test	Species	Result
Titanium dioxide	-	Rabbit	Skin - Non-irritant.
		Rabbit	Eyes - Non-irritant.
Aluminium oxide	-	Rabbit	Skin - Non-irritant.
		Rabbit	Eyes - Non-irritant.
Amorphous silica	-	Rabbit	Skin - Non-irritant.
		Rabbit	Eyes - Non-irritant.

### Conclusion/Summary

- Skin** : Aluminium oxide: Non-irritating to the skin.  
Silica: Non-irritating to the skin.
- Eyes** : Aluminium oxide: Non-irritating to the eyes.  
Silica: Non-irritating to the eyes.

### Sensitizer

Product/ingredient name	Test	Route of exposure	Species	Result
Titanium dioxide	-	skin	Mouse	Not sensitizing
		skin	Guinea pig	Not sensitizing
Aluminium oxide	-	skin	Guinea pig	Not sensitizing

### Mutagenicity

## 11 . Toxicological information

Product/ingredient name	Test	Result
Titanium dioxide	Experiment: In vivo Subject: Mammalian-Animal	Negative
Amorphous silica	Experiment: In vitro Subject: Bacteria Metabolic activation: +/-	Negative
	Experiment: In vitro Subject: Mammalian-Animal Metabolic activation: +/-	Negative
	Experiment: In vitro Subject: Mammalian-Animal Metabolic activation: +/-	Negative
	Experiment: In vivo Subject: Mammalian-Animal	Negative

**Conclusion/Summary :** Titanium dioxide: Not mutagenic in a standard battery of genetic toxicological tests.  
**Aluminium oxide: Not mutagenic in a standard battery of genetic toxicological tests.**  
**Silica: Not mutagenic in a standard battery of genetic toxicological tests.**

### Carcinogenicity

Product/ingredient name	Test	Species	Exposure	Result/Result type
Amorphous silica	-	Rat - Male, Female	103 weeks; 7 days per week	Negative - Oral - NOAEL

**Conclusion/Summary :** Inhalation studies have shown that titanium dioxide and other poorly soluble low toxicity particles caused an unusual type of lung tumor in the rat at very high doses. In other common laboratory rodent and non-human primate studies, the same sequence of pathological changes that leads eventually to lung tumor in rat is not observed, although particle overload is exhibited in species such as the mouse. Detailed epidemiology studies have also shown no causative link between titanium dioxide exposure and cancer risk in human and no lung cancer hazard at workplace exposure concentration. Based on available data, the classification criteria are not met. In February 2006 IARC concluded, "There is inadequate evidence in humans for the carcinogenicity of titanium dioxide." Based on rat inhalation studies IARC concluded that there is, "sufficient evidence in experimental animals for the carcinogenicity of titanium dioxide," IARC's overall evaluation was that, "Titanium dioxide is possibly carcinogenic to humans (Group 2b)". This conclusion was based on IARC's guidelines which require such a classification if two or more independent studies in one species carried out at different times or in different laboratories or under different protocols show evidence of tumors.

### Carcinogenic class

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Titanium dioxide	A4	2B	-	+	-	None.
Aluminium oxide	A4	-	-	-	-	-
Amorphous silica	A4	3	-	-	-	-
Zirconium dioxide	A4	-	-	-	-	-

### Reproductive toxicity

Product/ingredient name	Test	Species	Result/Result type	Maternal toxicity	Fertility	Developmental effects

## 11 . Toxicological information

Aluminium oxide	-	Rat - Male, Female	Oral: 1000 mg/kg NOAEL	-	-	-
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**Conclusion/Summary** : Titanium dioxide: No known significant effects or critical hazards.

### Teratogenicity

Product/ingredient name	Test	Species	Result/Result type
Aluminium oxide	-	Rat	Negative - Oral
Amorphous silica	-	Rat	Negative - Oral

**Conclusion/Summary** : Titanium dioxide: No known significant effects or critical hazards.

### Potential acute health effects

- Inhalation** : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.
- Ingestion** : No known significant effects or critical hazards.
- Skin contact** : Slightly irritating to the skin.
- Eye contact** : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

### Potential chronic health effects

- General** : Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation.
- Target organs** : Contains material which may cause damage to the following organs: lungs.
- Carcinogenicity** : Contains material which may cause cancer, based on animal data. Risk of cancer depends on duration and level of exposure.
- Mutagenicity** : No known significant effects or critical hazards.
- Teratogenicity** : No known significant effects or critical hazards.
- Developmental effects** : No known significant effects or critical hazards.
- Fertility effects** : No known significant effects or critical hazards.

### **Medical conditions aggravated by over-exposure**

Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

## 12 . Ecological information

**Environmental effects** : No known significant effects or critical hazards.

### Persistence and degradability

- Conclusion/Summary** : Not applicable, inorganic substance / preparation.
- Other adverse effects** : No known significant effects or critical hazards.

### Other ecological information

- BOD5** : Not determined.

## 12 . Ecological information

**COD** : Not determined.

**TOC** : Not determined.

## 13 . Disposal considerations

**Waste disposal** : The generation of waste should be avoided or minimized wherever possible. Waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

## 14 . Transport information

### Proper shipping name

**DOT** : Not regulated.

**TDG** : Not regulated.

**IMDG** : Not regulated.

**IATA** : Not regulated.

Regulatory information	UN number	Classes	PG*	Label	Additional information
<b>DOT Classification</b>	Not regulated.	-	-		-
<b>TDG Classification</b>	Not regulated.	-	-		-
<b>IMDG Class</b>	Not regulated.	-	-		-
<b>IATA-DGR Class</b>	Not regulated.	-	-		-

PG\* : Packing group

## 15 . Regulatory information

### United States

**HCS Classification** :

#### U.S. Federal regulations

**TSCA 8(b) inventory** : **United States inventory (TSCA 8b)**: All components are listed or exempted.

**TSCA 5(a)2 final significant new use rule (SNUR)** : No ingredients listed.



## 15 . Regulatory information

- TSCA 5(e) substance consent order** : No ingredients listed.
- TSCA 12(b) export notification** : No ingredients listed.
- SARA 302/304/311/312** : No ingredients listed.
- Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)** : No ingredients listed.
- Clean Air Act - Ozone Depleting Substances (ODS)** : This product does not contain nor is it manufactured with ozone depleting substances.
- SARA 313** : No ingredients listed.
- CERCLA Hazardous substances** : No ingredients listed.

### State regulations

- PENNSYLVANIA - RTK** : Titanium dioxide, Aluminium oxide, Amorphous silica
- California Prop. 65** : Titanium dioxide (airborne, unbound particles of respirable size) is known to the state of California to cause cancer. This listing does not cover titanium dioxide when it remains bound within a product matrix.

<u>Ingredient name</u>	<u>Cancer</u>	<u>Reproductive</u>
Titanium dioxide	Yes.	No.

### International regulations

- Canada**
- WHMIS (Canada)** : Class D-2A: Material causing other toxic effects (Very toxic).
- CEPA DSL** : All components are listed or exempted.

**This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.**

- International lists** :
  - Australia inventory (AICS)**: All components are listed or exempted.
  - China inventory (IECSC)**: All components are listed or exempted.
  - Japan inventory**: All components are listed or exempted.
  - Korea inventory**: All components are listed or exempted.
  - New Zealand Inventory of Chemicals (NZIoC)**: All components are listed or exempted.
  - Philippines inventory (PICCS)**: All components are listed or exempted.

## 16 . Other information

- Label requirements** : MAY CAUSE RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
- Hazardous Material Information System (U.S.A.)** :

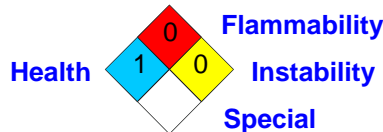
Health	1
Flammability	0
Physical hazards	0

## 16 . Other information

### Personal protection

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.) :



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☑ Indicates information that has changed from previously issued version.

#### Notice to reader

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**IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE APPLICABILITY OF SUCH INFORMATION AND RECOMMENDATIONS AND THE SUITABILITY OF ANY PRODUCT FOR ITS OWN PARTICULAR PURPOSE.**

**THE PRODUCT MAY PRESENT HAZARDS AND SHOULD BE USED WITH CAUTION. WHILE CERTAIN HAZARDS ARE DESCRIBED IN THIS PUBLICATION, NO GUARANTEE IS MADE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.**

*Hazards, toxicity and behaviour of the products may differ when used with other materials and are dependent upon the manufacturing circumstances or other processes. Such hazards, toxicity and behaviour should be determined by the user and made known to handlers, processors and end users.*

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