

Material Safety Data Sheet

"ZTi" TITANIUM DIOXIDE PIGMENT

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

Formula : TiO₂

Grade : See Tradenames and Synonyms (Remarks)

Tradenames and Synonyms

"ZTi" is a registered trademark of ZTi.

Tradenames and Synonyms (Remarks)

GRADES COVERED BY THIS MSDS INCLUDE:

ZTIR-369

Company Identification

MANUFACTURER/DISTRIBUTOR

Panzhuhua ZTi Science & Technology CO., LTD.

Vanadium & Titanium Industrial Park, Panzhuhua City, Sichuan, P. R. China (617000)

PHONE NUMBERS

Tel: +86 812 5152333

Fax: +86 812 3352337

COMPOSITION/INFORMATION ON INGREDIENTS

Main Components

Material	CAS Number	Percentage
TITANIUM DIOXIDE	13463-67-7	93% min
ALUMINA	21645-51-2	2~3%
ZIRCONIA	112926-00-8	0.3~0.5%
ORGANIC		0.3-0.5%
WATER	7732-18-5	0.5% max

Material Safety Data Sheet

(COMPOSITION/INFORMATION ON INGREDIENTS - Continued)

Components (Remarks)

% OF COMPONENTS (other than water) ARE ON A DRY BASIS. For specific grade composition and properties see "ZTI" Titanium Dioxide literature.

HAZARDS IDENTIFICATION

Potential Health Effects

Eye contact may cause eye irritation with tearing, pain or blurred vision.

Repeated skin contact with Titanium Dioxide may cause drying or cracking of the skin in sensitive individuals.

Short-term overexposure by inhalation to Titanium Dioxide may cause irritation of nose, throat, and lungs with cough, difficulty breathing or shortness of breath.

Results of a ZTI epidemiology study showed that employees who had been exposed to Titanium Dioxide were at no greater risk of developing lung cancer than were employees who had not been exposed to Titanium Dioxide. No pulmonary fibrosis was found in any of the employees and no association was observed between Titanium Dioxide exposure and chronic respiratory disease or x-ray abnormalities. Based on the results of this study ZTI concludes that Titanium Dioxide will not cause lung cancer or chronic respiratory disease in humans at concentrations experienced in the workplace.

Inhalation of Amorphous Silica may cause drying of mucous membranes and irritation of nose, throat, and lungs with nosebleeds, cough, difficulty breathing or shortness of breath. Based on animal experiments, long term exposures to high doses could lead to pulmonary inflammation and subsequent development of chronic lung disease. Amorphous Silica does not induce the lung effects associated with crystalline silica.

Epidemiology studies have not shown any evidence of fibrosis in workers exposed to Amorphous Silica dust levels ranging from 2 to 7 mg/m³.

Increased susceptibility to the effects of Amorphous Silica may be observed in persons with pre-existing disease of the lungs.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

Material Safety Data Sheet

FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

The compound is not likely to be hazardous by skin contact but cleansing the skin after use is advisable.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

No specific intervention is indicated as compound is not likely to be hazardous by ingestion. However, if symptoms occur, consult a physician.

FIRE FIGHTING MEASURES

Flammable Properties

Will not burn.

Extinguishing Media

Any media as appropriate for combustibles in area.

Fire Fighting Instructions

None.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

**Material Safety Data Sheet
(ACCIDENTAL RELEASE MEASURES - Continued)**

Accidental Release Measures

For dry product, shovel into covered container for disposal. Flush residue to wastewater treatment system.

For slurry product, flush to wastewater treatment plant or settling basin, or soak up with sand or other absorbent and shovel into covered metal container for disposal.

SPECIAL INSTRUCTIONS FOR DRY PRODUCT GRADE ZTIR-369

HANDLING AND STORAGE

Handling (Personnel)

In the manufacture of titanium dioxide, product is packaged at temperatures of approximately 100 to 120 Centigrade (212 to 248 Fahrenheit). 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 while handling pigment and in solvent applications. Each work environment must be assessed to determine hazards.

The following caution is provided for grades packaged in plastic bags:

CAUTION: Plastic bag material may cause static ignition hazard in the presence of flammable or explosive vapor/air mixtures. Do not handle or use bags in the presence of flammable or explosive vapor/air mixtures. For dry product avoid breathing dust. If slurry product is allowed to dry, avoid breathing dust. Use dust filter respirator if exposure limits are exceeded (see Personal Protective Equipment).

Storage

Based on ZTI's product storage experience, we recommend the following guidelines for safely stacking pallets of "ZTI TiO₂" Titanium Dioxide:

* Mid-size containers (1102 lb./500 kg.) and semi-bulk containers (2204 lb./1000 kg.) for all grades should not be stacked more than two pallets high.

**Material Safety Data Sheet
(HANDLING AND STORAGE - Continued)**

* "ZTI" Titanium Dioxide ZTiR-369 are packed in bags should not be stacked more than two pallets high.

* All other "ZTI" Titanium Dioxide grades packaged in paper or plastic bags should not be stacked more than three pallets high.

Protect containers of dry product from damage. Keep slurry product from freezing.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Good general ventilation should be provided to keep dust concentrations below the exposure limits.

Personal Protective Equipment

If exposure limits are exceeded for dust or dried-down product, NIOSH approved air purifying respirators equipped with particulate filters (properly fitted dust masks) should be used. Protective gloves should be worn to prevent prolonged skin contact with alkaline slurries. For dry product or dried-down product use a protective barrier cream and/or protective gloves to prevent skin contamination. Eye protection (minimum: safety glasses with side shields) is also required when handling titanium dioxide.

Exposure Guidelines

Applicable Exposure Limits

TITANIUM DIOXIDE

PEL (OSHA) : 15 mg/m³, total dust, 8 Hr. TWA

TLV (ACGIH) : 10 mg/m³, total dust, 8 Hr. TWA, A4

AEL * (ZTI) : 10 mg/m³, total dust, 8 Hr. TWA

5 mg/m³, respirable dust, 8 Hr. TWA

AMORPHOUS SILICA

PEL (OSHA) : 80 mg/m³ / % SiO₂ - 8 Hr TWA

TLV (ACGIH) : 10 mg/m³, total dust, 8 Hr. TWA

AEL * (ZTI) : 3 mg/m³, 8 Hr. TWA, respirable dust

* AEL is ZTI's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

Material Safety Data Sheet

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Physical Data (dry product)

Boiling Point : Not applicable

Vapor Pressure : Not volatile

Vapor Density : Not volatile

Melting Point : Not applicable

Evaporation Rate : Not volatile

Solubility in Water : Insoluble

pH : 5-8

(water extract)

Odor : None

Form : Powder, solid

Color : White

Specific Gravity : 3.8-4.1

STABILITY AND REACTIVITY

Chemical Stability

Stable.

Incompatibility with Other Materials

None reasonably foreseeable.

Decomposition

Decomposition will not occur.

Polymerization

Polymerization will not occur.

Material Safety Data Sheet

TOXICOLOGICAL INFORMATION

Animal Data

Some (but not all) grades of "ZTI" Titanium Dioxide contain Amorphous Silica.

"ZTi" Titanium Dioxide

Oral ALD : >24,000 mg/kg in rats

Dermal ALD : >10,000 mg/m³ in rabbits

Inhalation 4-hour ALC: >6.82 mg/L in rats

Amorphous Silica

Oral LD50 : >10,000 mg/kg in rats

The product contains Titanium Dioxide which is a slight (HMIS scale) or moderate (ZTI scale) eye irritant and a slight skin irritant, but is not a skin sensitizer in animals.

This product may contain Amorphous Silica which is a mild eye irritant and is a negligible to slight skin irritant when tested as a 50% aqueous paste in animals. Amorphous Silica dust is not expected to be a skin irritant. Animal testing indicates Amorphous Silica is not a skin sensitizer.

In short term inhalation studies of Titanium Dioxide mixtures containing 6% Aluminum Hydroxide and 8% Silicon Dioxide, a slight fibrogenic response occurred in animals exposed to 1,300 mg/m³ for 4 weeks respirable dust. A typical dust cell reaction but no fibrogenic response was noted in animals similarly exposed to Titanium Dioxide, or Titanium Dioxide mixtures containing from 1% to 3% Aluminum Hydroxide, and 2.7 to 6% Silicon Dioxide. Repeated inhalation exposure to Amorphous Silica caused pulmonary changes including reversible inflammation. Long-term exposure caused pulmonary changes including reversible inflammation, vascular obstruction and emphysema. Guinea pigs exposed to Aluminum Hydroxide by inhalation exhibited no evidence of injurious effects but did show progressive accumulation of aluminum in the lungs.

Repeated and long term ingestion of Titanium Dioxide caused no significant toxicological effects. Single, repeated and long-term exposure by ingestion to Amorphous Silica caused no significant toxicological effects. Ingestion of Aluminum Hydroxide caused growth impairment, and bone changes due to phosphate depletion in animals but ingestion of phosphate eliminates these changes; no evidence of other toxicity was noted.

Material Safety Data Sheet

(TOXICOLOGICAL INFORMATION - Continued)

In lifetime inhalation studies of respirable Titanium Dioxide at levels up to 250 mg/m³, no compound-related clinical signs of toxicity were seen in the exposed animals. Slight pulmonary fibrosis was seen at 50 and 250 mg/m³ respirable dust levels but not at 10mg/m³. There was no evidence of cancer in animals exposed to 10 or 50 mg/m³ respirable Titanium Dioxide. Microscopic lung tumors were seen in 17 percent of the rats exposed to 250 mg/m³ respirable Titanium Dioxide. The lung tumors seen in the rat were different from common human lung cancers, relative to anatomic type and location, occurred only at dust levels which overwhelmed the animals lung clearance mechanism and, therefore, are of questionable biological relevance for man.

In lifetime animal feeding tests at levels up to 50,000 ppm, Titanium Dioxide showed no evidence of cancer or other significant adverse effects in either rats or mice. No animal data are available to define the developmental or reproductive toxicity of Titanium Dioxide. Tests have shown that Titanium Dioxide does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. Animal testing indicates Amorphous Silica does not have carcinogenic or reproductive effects. Amorphous Silica has not produced genetic damage in bacterial cultures.

ECOLOGICAL INFORMATION

Ecotoxicological Information

Aquatic Toxicity

96 hour LC50, fathead minnows: >1,000 mg/L

DISPOSAL CONSIDERATIONS

Waste Disposal

Comply with Federal, State, and local regulations. If approved, remove to land disposal area.

TRANSPORTATION INFORMATION

Shipping Information

Not Regulated as a hazardous material by DOT, IMO, or IATA.

Shipping Containers:

Tank Cars

Tank Trucks

Flexible Intermediate Bulk Containers

Tote Bins

Bags

Material Safety Data Sheet

REGULATORY INFORMATION

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes

Chronic : No

Fire : No

Reactivity : No

Pressure : No

LISTS:

Extremely Hazardous Substance -No

CERCLA Hazardous Substance -No

Toxic Chemical -No

CANADIAN WHMIS CLASSIFICATION

Not Regulated

OTHER INFORMATION

NFPA, NPCA-HMIS

NPCA-HMIS Rating

Health : 1

Flammability : 0

Reactivity : 0

Personal Protection rating to be supplied by user depending on use conditions.

Additional Information

MEDICAL USE: CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications see ZTI CAUTION Bulletin.

For more specific information on composition and properties, see ZTI Titanium Dioxide literature.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS