



The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

DuPont
Material Safety Data Sheet

Page 1

TITANIUM DIOXIDE PIGMENT (DRY AND SLURRY)
2816CR Revised 21-AUG-2002

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

Corporate MSDS Number : DU000348
Formula : TiO₂
Grade : See Tradenames and Synonyms (Remarks)

Tradenames and Synonyms

"TI-PURE" is a registered trademark of DuPont.
"RPD Vantage" is a DuPont trademark for
its Rutile Paper Dry.

Tradenames and Synonyms (Remarks)

GRADES COVERED BY THIS MSDS INCLUDE:

DuPont(TM):

R-100, R-101, R-102, R-103, R-105, R-108, R-960,
RPD-2 and "RPD Vantage".

Ti-Pure(R):

R-700, R-706, R-746, R-900, R-902, R-931, R-941, R-942 and
R-960.

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Titanium Technologies
1007 Market Street
Wilmington, DE 19898

PHONE NUMBERS

Product Information : 1-800-441-9485 (outside the U.S.
302-774-1000)
Transport Emergency : CHEMTREC 1-800-424-9300 (outside U.S.
703-527-3887)
Medical Emergency : 1-800-441-3637 (outside the U.S.
302-774-1000)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
TITANIUM DIOXIDE	13463-67-7	80-98
ALUMINUM HYDROXIDE	21645-51-2	0-9
AMORPHOUS SILICA	7631-86-9	0-16
WATER	7732-18-5	22.0-36.0

Components (Remarks)

% OF COMPONENTS (Other than Water) ARE ON A DRY BASIS.
For specific grade composition and properties see DuPont
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 DuPont 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 DuPont 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.

(HAZARDS IDENTIFICATION - Continued)

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.

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.

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 R-104 AND R-105

Due to the fact that R-104 and R-105 are hydrophobic (water repellent), do not use water in the clean-up of spills; do not flush residue to the wastewater treatment system.

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).

(HANDLING AND STORAGE - Continued)

Storage

Based on DuPont's product storage experience, we recommend the following guidelines for safely stacking pallets of 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.

* Titanium Dioxide grades R-100, R-101 and R-931 packed in bags should not be stacked more than two pallets high.

* All other Titanium Dioxide grades packaged in paper or plastic bags should not be stacked more than three 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/m ³ , total dust, 8 Hr. TWA
TLV (ACGIH)	: 10 mg/m ³ , total dust, 8 Hr. TWA, A4
AEL * (DuPont)	: 10 mg/m ³ , total dust, 8 Hr. TWA
	5 mg/m ³ , respirable dust, 8 Hr. TWA

AMORPHOUS SILICA

(Applicable Exposure Limits - Continued)

PEL (OSHA) : 80 mg/m3 / % SiO₂ - 8 Hr TWA
TLV (ACGIH) : 10 mg/m3, total dust, 8 Hr. TWA
AEL * (DuPont) : 3 mg/m3, 8 Hr. TWA, respirable dust

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

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 : 4-10
(water extract)
Odor : None
Form : Powder, solid
Color : White
Specific Gravity : 3.8-4.3

Physical Data (slurry)

Boiling Point : 100 C (212 F) @ 760 mm Hg
Vapor Pressure : Same as water (Liquid component is water.)
Vapor Density : Not applicable
Freezing Point : 0 C (32 F)
Evaporation Rate : Not available
Solubility in Water : Solids are insoluble
pH : 7.0-10.5
Odor : Slight amine
Form : Opaque dispersion, liquid
Color : White
Specific Gravity : 1.8-2.4

STABILITY AND REACTIVITY

Chemical Stability

Stable.

Incompatibility with Other Materials

None reasonably foreseeable.

(STABILITY AND REACTIVITY - Continued)

Decomposition

Decomposition will not occur.

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

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

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

This product contains Titanium Dioxide which is a slight (HMIS scale) or moderate (DuPont 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 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 1,000 mg/m3 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

(TOXICOLOGICAL INFORMATION - Continued)

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.

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 10 mg/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

Shipping Containers

Tank Cars.
Tank Trucks.

Bags

NOT REGULATED AS A HAZARDOUS MATERIAL BY DOT OR IMO.

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Reported/Included.

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 DuPont CAUTION Bulletin No. H-50102.

(Continued)

For more specific information on composition and properties,
see DuPont 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.

Responsibility for MSDS : MSDS Coordinator
> : DuPont Titanium Technologies
Address : Wilmington, DE 19898
Telephone : (800) 441-9485

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