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SAFETY DATA SHEET

Section 1- IDENTIFICATION

COMPOSITION TiO2		PRODUCT NAME Titanium Oxide
SUPPLIER: Plasmaterials, Inc. 2268 Research Drive Livermore, CA 94550 Ph: 925-447-4030	RECOMMENDED USE: Laboratory Chemicals Scientific Research	EMERGENCY TELEPHONE NUMBERS US: 001-800-424-9300 Europe: 001-703-527-3887

Section 2- HAZARD(S) IDENTIFICATION

Physical Hazards: Not Classified	Health Hazards: Carcinogenicity - Category 2 (H351)
Environmental Hazards: Not Classified	OSHA Defined Hazards: Combustible Dust
LABEL ELEMENTS: Signal Word: Warning	
	
HAZARD STATEMENTS	
-Warning-May form combustible dust concentrations in air (During processing)	
-H351: Suspected of causing cancer	
PRECAUTIONARY STATEMENTS	
-P201: Obtain special instructions before use	
-P202: Do not handle until all safety precautions have been read and understood	
-P281: Use personal protective equipment as required	
-P308+P313: If exposed or concerned: Get medical advice/attention	
-P403+P233: Store in a well-ventilated place. Keep container tightly closed.	
-P405: Store locked up	
-P501: Dispose of contents/container to an approved waste disposal plant	
Hazards not otherwise classified (HNOC):	
-None identified.	

Section 3- COMPOSITION/INFORMATION ON INGREDIANTS

COMPONENT	CAS-No	Molecular Weight
Titanium Oxide	13463-67-7	79.87 g/mol

Section 4- FIRST AID MEASURES

<p>GENERAL ADVICE: If exposed or concerned, get medical advice/attention. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.</p> <p>Inhalation: Remove victim from exposure to fresh air. Give oxygen if breathing is difficult. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim inhaled the substance.</p>
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Consult a physician if symptoms develop or persist.

Skin Contact: Remove and isolate contaminated clothing and shoes. Wash off with soap and plenty of water. Wash contaminated clothing before reuse. If skin irritation develops or persists, get medical advice/attention. For minor skin contact, avoid spreading material on unaffected skin.

Eye Contact: Flush eyes with plenty of water, lifting upper and lower lids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation develops or persists, get medical advice/attention.

Ingestion: Rinse mouth with water thoroughly. If ingestion of a large amount does occur, call a poison control center immediately. Do not induce vomiting without the advice from poison control center. If vomiting occurs, keep head low so that stomach content does not get into the lungs. Never give anything by mouth to an unconscious person. If symptoms occur, get medical advice/attention.

Most Important Symptoms/Effects: The most important known symptoms and effects are described in Section 2 and/or in Section 11. Irritation of eyes and mucous membranes. Dusts may irritate the respiratory tract, skin and eyes. Prolonged exposure may cause chronic effects.

Indication of any Immediate Medical Attention and Special Treatment Needed: Provide general supportive measures and treat symptomatically. Keep victim under observation as symptoms may be delayed.

Section 5- FIREFIGHTING MEASURES

Suitable Extinguishing Media:

Avoid high pressure media which could cause the formation of a potentially explosible dust-air mixture. Water Fog. Foam. Dry Chemical Powder. Carbon Dioxide (CO₂). Apply extinguishing media carefully to avoid creating airborne dust.

Unsuitable Extinguishing Media:

Do not use water jet as an extinguisher as this will spread the fire.

Specific Hazards Arising from the Chemical:

Explosion Hazard: Avoid generating dust. Fine dust dispersed in the air in sufficient concentrations and in the presence of an ignition source is a potential dust explosion hazard.

General Fire Hazards:

May form combustible dust concentrations in air

Protective Equipment & Precautions for Firefighters:

As in any fire, Firefighters must wear full face, self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective clothing to prevent contact with skin and eyes.

Fire Fighting Equipment/Instructions:

In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk. Water runoff can cause environmental damage

Specific Methods:

Use standard firefighting procedures and consider the hazards of other involved materials.

Section 6- ACCIDENTAL RELEASE MEASURES

Personal Precautions:

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Use only non-sparking tools. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Wear appropriate protective equipment and clothing during clean-up. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personnel protection see Section 8.

Environmental Precautions:

Avoid discharge into drains, water courses or onto the ground. Avoid release to the environment. Do not contaminate water. Contact local authorities in case of spillage to drain/aquatic environment.

Methods for Containment & Clean Up:

Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Take precautionary measures against static discharge. Use only non-sparking tools. Avoid dispersal of dust in the air (i.e.,

clearing dust surfaces with compressed air). Collect spillage. Collect dust using a vacuum cleaner equipped with a HEPA filter. The product is immiscible with water and will spread on the water surface. Prevent entry into waterways, sewer, basements, or confined areas. Stop the flow of material if this is without risk.

- Large Spills: Wet down with water and dike for later disposal. Shovel the material into waste container. Following product recovery, flush area with water.
- Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal.
- Never return spills to original containers for re-use.

For waste disposal see Section 13.

Section 7- HANDLING AND STORAGE

Handling:

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Minimize dust generation and accumulation. Avoid significant deposits of material, especially on horizontal surfaces, which may become airborne and form combustible dust clouds and may contribute to secondary explosions. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres. Keep away from heat/sparks/open flames/hot surfaces. No Smoking. Explosion-proof general and local exhaust ventilation. Avoid prolonged exposure. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Wash thoroughly after handling. Avoid release to the environment. Do not empty into drains.

Storage:

Store locked up. Store in a cool, dry place out of direct sunlight. Store in original tightly closed container in a dry, cool and well-ventilated place. Store away from incompatible materials.

Section 8- EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines:

Occupational Exposure Limits/Components with Workplace Control Parameters: The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

Component	CAS-No.	Basis	Value	Control Parameters	Form
Titanium Oxide	13463-67-7	USA.NIOSH Pocket Guide to Chemical Hazards Material	TWA	2.4 mg/m3	Fine Particles
			TWA	0.3 mg/m3	Ultra-Fine Particles (including engineered nanoscale)
		USA. Occupational Exposure Limits (OSHA) Table Z-1 Limits for Air Contaminants (29 CFR 11910.1000)	TWA	10 mg/m3	
			Remarks	Potential Occupational Carcinogen See Appendix A	
			PEL	15 mg/m3	Total Dust
		USA. ACGIH Threshold Limit Values (TLV)	TWA	10 mg/cm3	
			Remarks	Lower Respiratory Tract Irritation Not Classifiable as a Human Carcinogen	

Biological Limit Values: No biological exposure limits noted for the substance. Do not let product enter drains.

Appropriate Engineering Controls:

Explosion-proof general and local exhaust ventilation. Good general ventilation should be used. Ventilation

rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen-deficient environment. Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment). If engineering measures are not sufficient to maintain concentrations of dust particulates below Occupational Exposure Limit (OEL), suitable respiratory protection must be worn. Use only appropriately classified electrical equipment and powered industrial trucks. Provide eyewash station.

Personal Protective Equipment:

Eye/Face Protection: Wear safety glasses with side shields or goggles. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Skin and Body Protection: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Wear appropriate chemical resistant protective clothing. Use of an impervious apron is recommended. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory Protection: In case of insufficient ventilation, wear suitable respiratory equipment. Where protection from nuisance levels of dusts is desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH/MSHA (US) or CEN (EU).

Thermal Hazards: Wear appropriate thermal protective clothing when necessary.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety practice. When using do not smoke, eat or drink. Keep away from food and drink. Wash thoroughly after handling and before eating, drinking and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

Section 9- PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Solid

Form: Powder

Odor: No information available

Odor Threshold: No information available

pH: No information available

Melting Point/Range: 1843°C (3349.4°F)

Boiling Point/Range: 2500-3000°C (4532-5432°F)

Flash Point: No information available

Evaporation Rate: No information available

Flammability (solid,gas): No information available

Flammability or Explosive Limits:

Upper: No data available

Lower: No data available

Vapor Pressure: No information available

Vapor Density: No information available

Relative Density: No information available

Solubility: Insoluble

Partition coefficient; n-octanol/water: No information available

Auto Ignition Temperature: No information available

Decomposition Temperature: No information available

Viscosity: No information available

Explosive Properties: No information available

Oxidizing Properties: No information available

Density: 4.23 g/cm³ estimated

Specific Gravity: 4.23

Section 10- STABILITY AND REACTIVITY

Reactive Hazard: Stable and non-reactive under normal conditions of use, storage and transport

Stability: Stable under normal conditions

Conditions to Avoid: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. Avoid temperatures exceeding the decomposition temperature. Minimize dust generation and accumulation. Contact with incompatible materials

Incompatible Materials: Acids, Chlorine

Hazardous Decomposition Products: No information available

Hazardous Polymerization: No information available

Hazardous Reactions: No information available

Section 11- TOXICOLOGICAL INFORMATION

Information on likely Routes of Exposure:

Inhalation: Dust may irritate respiratory system. Prolonged inhalation may be harmful

Skin Contact: Dust or powder may irritate the skin. Due to lack of data classification is not possible.

Eye Contact: Direct contact with eyes causes irritation

Ingestion: Due to lack of data classification is not possible

Symptoms related to the physical, chemical and toxicological characteristics: Dusts may irritate the respiratory tract, skin, and eyes.

Information on Toxicological Effects:

Acute Toxicity: May cause respiratory irritation

Skin Corrosion/Irritation: No information available

Serious eye damage/irritation: Causes eye irritation

Respiratory or Skin Sensitization: No information available

Carcinogenicity: Suspected of causing cancer

IARC Monographs Overall Evaluation of Carcinogenicity: Not listed

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053): Not listed

US National Toxicology Program (NTP) Report on Carcinogens: Not listed

Germ Cell Mutagenicity: No information available

Reproductive Effects: No information available

Development Effects: No information available

Specific Target Organ Toxicity – single exposure: Respiratory tract irritation

Specific Target Organ Toxicity – repeated exposure: Causes damage to organs through prolonged or repeated exposure

Aspiration Hazard: No information available

Chronic Effects: Prolonged inhalation may be harmful. Causes damage to organs through prolonged or repeated exposure. Prolonged exposure may cause chronic effects.

-To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

Section 12- ECOLOGICAL INFORMATION

Toxicity: Accumulation in aquatic organisms is expected. May cause long lasting harmful effects to aquatic life. Contains a substance which causes risk of hazardous effects to the environment.

Toxicity to Fish (Acute):

-Crustacea – EC50 – Water flea (*Daphnia magna*) – >1000 mg/l – 48.0 h

-Fish – LC50 – Mummichog (*Fundulus heteroclitus*) – >1000 mg/l – 96.0 h

Persistence and Degradability: No information available

Bioaccumulation/Accumulation: No information available

Mobility in Soil: No information available

Results of PBT & vPvB assessment: PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

Other Adverse Effects: No information available.

Section 13- DISPOSAL CONSIDERATIONS

Waste Disposal Methods: Collect and reclaim or dispose in sealed containers to a licensed disposal company. Dispose of contaminated packaging as unused product. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways, or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Section 14- TRANSPORT INFORMATION

DOT: Not regulated as dangerous goods

IATA: Not regulated as dangerous goods

IMDG/IMO: Not regulated as dangerous goods

Section 15- REGULATORY INFORMATION

US Federal Regulations:

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

All components are on the US EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt.D): Not regulated

U.S. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053): Not Listed

CERCLA Hazardous Substance List (40 CFR 302.4): Not Listed

SARA 302 Extremely Hazardous Substance: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302

SARA 304 Emergency Release Notification: Not regulated

SARA 311/312 Hazardous Chemical: Yes (Chronic Health Hazard) (Combustible Dust)

SARA 313 (TRI Reporting): This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List: Not regulated

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130): Not regulated

Safe Drinking Water Act (SDWA): Not regulated

WARNING: This product contains a chemical known to the State of California to cause cancer.

US California Proposition 65: This product does not contain any chemicals known to the State of California to cause cancer, birth defects or any other reproductive harm.

Section 16- OTHER INFORMATION

The above information is accurate to the best of our knowledge. However, since data, safety standards and government regulations are subject to change, the conditions of handling and use, or misuse are beyond our control, Plasmaterials, Inc. makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Users should satisfy themselves that they have all current data relevant to their particular use.

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