Material Safety Data Sheet
Carbon-doped titanium dioxide MSDS

Section 1: Chemical Product and Company Identification

Product Name: Visible Light Titania™ (VLT)
Catalog Codes: Nanoptek VLT
CAS#: Not yet available; see 13463-67-7 for titanium dioxide
RTECS: Not yet available; see XR2275000 for titanium dioxide
TSCA: Not available.
CI#: Not available.
Synonyms: visible light photocatalyst, visible light titanium dioxide, carbon-doped titania
Chemical Name: Carbon-doped titanium dioxide
Chemical Formula: TiO_2:C
Contact Information of Supplier/ Manufacturer:

Nanoptek Corporation
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Section 2: Composition and Information on Ingredients

Formula: TiO_2:C
Composition: 95% Titanium dioxide (TiO_2) powder doped with carbon (C) typically to about 4-5% on atomic percentage basis, and ≤ 0.5% trace metals basis
Name CAS # % by Weight Titanium dioxide 13463-67-7 95
Toxicological Data on Ingredients: Carbon-doped titanium dioxide LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.
Potential Chronic Health Effects: Unknown for this product.
For titanium dioxide, they are:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to lungs, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

General Advice: Consult a physician. Show this safety data sheet to the physician in attendance.
Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes as a precaution. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and plenty of water. Get medical attention if irritation develops.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion: Not available. Do not ingest. If ingested, rinse mouth with water. Consult a physician. Never give anything by mouth to an unconscious person.
Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.
Auto-Ignition Temperature: Not applicable.
Flash Points: Not applicable.
Flammable Limits: Not applicable.
Products of Combustion: Not available.
Fire Hazards in Presence of Various Substances: of metals
Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.
Fire Fighting Media and Instructions: Not applicable.
Special Remarks on Fire Hazards: Not combustible. A violent or incandescent reaction with metals (aluminum, calcium, magnesium, potassium, sodium, zinc, and lithium) may occur at high temperatures.
Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Personal Precautions: Use personal protective equipment. Avoid dust formation. Avoid breathing dust.
Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.
Large Spill: Not applicable, 200 mg to 1000 mg sample.

Section 7: Handling and Storage

Precautions: Do not breathe dust. Wear suitable protective clothing. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as acids.
Storage: Keep container tightly closed. Keep container in dry dark area or in light-tight and moisture resistant bag that it shipped in.

Section 8: Exposure Controls/Personal Protection

Engineering Controls: Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.
Personal Protection in Case of a Large Spill: Not applicable as sample size is 200 mg to 1000 mg.
Exposure Limits: Not known for this product, but for titanium dioxide powder they are: TWA: 15 (mg/m3) from OSHA (PEL) [United States] Inhalation Total. TWA: 10 (mg/m3) from ACGIH (TLV) [United States] Inhalation Total. TWA: 4 [United Kingdom (UK)] Inhalation Respirable. TWA: 10 [United Kingdom (UK)] Inhalation Total.Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Powdered solid.)
Odor: Odorless.
Taste: Tasteless.
Molecular Weight: Approximately 79.9g/mole
Color: Light to dark gray.
pH (1% soln/water): Not applicable.
Boiling Point: Approximately 2750°C (4982°F)
Melting Point: Approximately 1855°C (3371°F)
Critical Temperature: Not available.
Specific Gravity: Approximately 4.26 (Water = 1)
Vapor Pressure: Not applicable.
Vapor Density: Not available.
Volatility: Not available.
Odor Threshold: Not available.
Water/Oil Dist. Coeff.: Not available.
Ionicity (in Water): Not available.
Dispersion Properties: Not available.
Solubility: Insoluble in cold water, hydrochloric acid, nitric acid, diluted sulfuric acid, organic solvents. Soluble in hot concentrated sulfuric acid, hydrofluoric acid, alkali.

Section 10: Stability and Reactivity Data

Stability: The product itself is stable but should be kept in the dark to prevent unintended oxidation of proximal or contacted surfaces.
Instability Temperature: Not available.
Conditions of Instability: Incompatible materials
Incompatibility with various substances: Reactive with acids. Slightly reactive to reactive with metals.
Corrosivity: Non-corrosive.
Special Remarks on Reactivity: Nanoptek VLT is a carbon-doped titanium dioxide photocatalyst powder that is activated by both UV and visible light, and in the presence of ambient humidity will dissociated organic compounds that are proximal to it or in contact with it.
For reference, reaction of titanium dioxide and lithium occurs around 200 C with a flash of light; the temperature can reach 900 degrees C. A violent or incandescent reaction with metals (aluminum, calcium, magnesium, potassium, sodium, zinc, and lithium) may occur at high temperatures.
Special Remarks on Corrosivity: Nanoptek VLT is a photocatalyst that when activated by light, whether UV or visible, is strongly oxidizing in the presence of ambient humidity to materials in contact with it. Chemical compounds, especially organic carbon compounds, may be dissociated as a result into other compounds that may or may not be hazardous.
Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.
Toxicity to Animals: LD50: Not available. LC50: Not available.
Chronic Effects on Humans: Unknown for this product. For titanium dioxide powder they are as follows: CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. May cause damage to the following organs: lungs, upper respiratory tract.
Other Toxic Effects on Humans: Unknown for this product. For titanium dioxide powder they include: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.
Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Unknown for this product. For titanium dioxide powder, Possible carcinogen (tumorgen) based on animal data. No human data found at this time and IARC so far has found inadequate evidence for carcinogenicity in humans.
Special Remarks on other Toxic Effects on Humans: Not known for this product, but for titanium dioxide powder Acute Potential Health Effects include:
Skin: Skin exposure to titanium dioxide is virtually harmless. It is reported to be a mild irritant and may cause mechanical irritation (irritation from frictional action). It is believed not to be absorbed through intact skin.
Eyes: Dust may cause mechanical irritation (irritation from frictional action), Ingestion: May cause gastrointestinal (digestive) tract irritation with nausea, vomiting and diarrhea. It is not absorbed following ingestion. No hazard is expected in normal industrial use.
Inhalation: Nuisance dust. May be harmful if inhaled. Causes respiratory tract irritation. May affect respiration and blood.
Chronic Potential Health Effects: Heavy occupational dust exposures may cause chronic rhinitis, chronic bronchitis, impaired pulmonary function, resemblance of silicosis without any fibrosis, functional change in trachea or bronchi, chronic pulmonary edema.

Section 12: Ecological Information

Ecotoxicity: Not available.
BOD5 and COD: Not available.
Products of Biodegradation: Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.
Toxicity of the Products of Biodegradation: Unknown for this product. For reference, titanium dioxide powder itself and its products of degradation are not toxic.
Special Remarks on the Products of Biodegradation: Nanoptek VLT is a photocatalyst that when activated by light, whether UV or visible, is strongly oxidizing in the presence of ambient humidity to materials in contact with it. Chemical compounds, especially organic carbon compounds, may be dissociated as a result into other compounds that may or may not be hazardous.

Section 13: Disposal Considerations

Waste Disposal: Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification (U.S.): Not believed to be a DOT controlled material (United States) based on classification of titanium dioxide.
IMDG: Would likely be classified as **"**Not dangerous goods" based on titanium dioxide classification
IATA: Would likely be classified as **"**Not dangerous goods" based on titanium dioxide classification
Special Provisions for Transport: None except to use the usual handling care for shipping a powder in a glass vial. Use or re-use the light and moisture sample bag which acts as secondary containment of the powder should vial break. Use or re-use the original foam-lined sturdy oversize corrugated cardboard shipping box as it is the first line of protection.

Section 15: Other Regulatory Information

Federal and State Regulations: Not yet determined for this product, but for titanium dioxide powder the following apply: Illinois toxic substances disclosure to employee act: Titanium dioxide Rhode Island RTK hazardous substances: Titanium dioxide Pennsylvania

RTK: Titanium dioxide Minnesota: Titanium dioxide Massachusetts RTK: Titanium dioxide New Jersey: Titanium dioxide TSCA 8(b) inventory: Titanium dioxide
Other Regulations: Not yet determined for this product, but for titanium dioxide powder they include: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.
Other Classifications: Not available or unknown
WHMIS (Canada): Not available for this product. Titanium dioxide powder is not controlled under WHMIS (Canada).
DSCL (EEC): Not available or unknown
Not available S24/25- Avoid contact with skin and eyes.
HMIS (U.S.A.): Not available
Health Hazard: Unknown for this product. Titanium dioxide powder is rated 1
Fire Hazard: 0
Reactivity: 0
Personal Protection: E
National Fire Protection Association (U.S.A.):
Health: Unknown for this product. Titanium dioxide powder is rated 1
Flammability: 0
Reactivity: 0
Specific hazard: Photocatalyst in visible light and UV
Protective Equipment: Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Safety glasses.

Section 16: Other Information

References: Not available.
Other Special Considerations: Nanoptek VLT is a strong oxidizing agent to proximal or contacted surfaces when illuminated with UV and/or visible light in the presence of ambient humidity. It will bleach and/or dissociate chemical compounds, especially organic carbon compounds, into other compounds that may be more or less hazardous.
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