Material Safety Data Sheet
Titanium Dioxide
OXIDE005

Edition: 18/03/2024
In compliance with Regulation (EC) No. 1907/2006 (REACH) & 1272/2008 (CLP)

1) Identification of substance/preparation and of the company undertaking

Material Titanium Dioxide
Synonyms Titanium Dioxide, Titanium White, Pigment White 6, C.I.No 77891.
EC No 236-675-5
CAS No 13463-67-7
REACH No 01-2119489379-17-XXXX
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1.1) Relevant identified uses of the substance or mixture and uses advised against

1.1.1) Relevant identified uses

As colouring and opacifying agent in the following industries:

- Coatings and Paints
- Printing
- Plastics
- Synthetic Fibres
- Paper
- Rubber
- Ceramics
- Cement
- Cosmetics

1.12) Uses advised against

None

2) Composition

Hazardous ingredients	Titanium dioxide, TiO_2
Typical composition (%)	>82
CAS Number	13463-67-7
EINECS/EC Label Number	236-675-5

3) Hazard Identification

3.1) Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Titanium dioxide according to Regulation (EC) No. 1273/2008 is not classified as dangerous.

Classification according to Directive 67/548/EEC

Titanium dioxide according to Directive (EC) No. 67/548/EEC is not classified as dangerous.

Human health effects

Skin effect:	Skin is not penetrated, but prolonged contact can cause irritation.
Eyes effect:	Feeling of a strange body in the eyes.
Swallowing:	No hazard during normal industrial use.
Inhalation:	Chemically neutral dust. Excessive exposure may cause temporary drying effect and/or irritation of mucous membranes

3.2) Label Elements

Labelling according to Regulation (EC) No. 1272/2008 (CLP)

No labelling required according to Regulation (EC) No. 1272/2008

3.3) Other Hazards

Titanium dioxide is neither a PBT or a vPvB substance.

4) First Aid Measures

4.1) Description of First Aid Measures

Ingestion:	No adverse health effects anticipated by this route.
Inhalation:	Move to a fresh air atmosphere. In case of persistent symptoms, consult a doctor.
Skin:	Remove contaminated clothing, and wash affected areas thoroughly with soap and water. If skin irritation or rash occurs: Get medical advice/attention. Show label if possible.
Eyes:	Irrigate eyeball thoroughly with water for at least 10 minutes. If discomfort persists seek medical attention.

4.2) Most important symptoms and effects, both acute and delayed

Acute and delayed symptoms and effects do not occur in normal conditions of use

4.3) Indication of any immediate medical attention and special treatment needed

No special requirements. Medical assistance may be required if large amounts of dust are inhaled.

5) Fire Fighting

5.1) Extinguishing media

Suitable extinguishing media	Any type to be selected according to materials stored in the immediate neighbourhood.
Unsuitable extinguishing media	None.

5.2) Special hazards arising from the substance or mixture

Non-flammable. Extinguish surrounding fires with appropriate methods.

5.3) Advice for firefighters

Protection during firefighting:	Use of approved supplied air or self-contained breathing apparatus operated in positive pressure mode are satisfactory. Totally impervious protective suits, gloves, and boots must be worn

6) Accidental Release Measures

6.1) Personal precautions, protective equipment and emergency procedures

General measures:	Keep public away from danger area. See section 8.2. Avoid dust production. Avoid all contact with this substance.

6.1.1) For non-emergency personnel

No additional information available

6.1.2) For emergency responders

No additional information available

6.2) Environmental precautions

Prevent entry to sewers and soil. Notify authorities if product enters sewers or public waters.

6.3) Methods and material for containment and cleaning up

Methods for cleaning up: Collect mechanically and transfer into appropriate container for disposal. Avoid dust production.

6.4) Reference to other sections

See section 8 and 13 for more information.

7) Handling/Storage

7.1) Precautions for safe handling

Precautions for safe handling:	Do not breathe dust. Avoid all contact with this substance. Wash hands plentifully and other exposed areas with water after handling. Remove contaminated clothing and shoes. Wash clothing before reusing.
Packagings:	Even those that have been emptied will retain product residue. Always obey safety warnings and handle empty packagings as if they were full. Avoid all contact with this substance.

Hygiene measures:	When using do not eat, drink or smoke. Wash hands and other exposed areas with mild soap and water before eat, drink or smoke and when leaving work. Remove contaminated clothing and shoes.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions:	Store in dry, cool, well-ventilated area. Keep away from food, drink and animal feeding stuffs.
Incompatible products:	None known

7.3. Specific end use(s)

No additional information available

8) Exposure Controls and Personal Protection

8.1) Exposure Limits

WEL long term exposure limit (8-hour TWA reference period)
10mg/m^3 (total inhalable)
4mg/m^3 (respirable)

DNEL's for workers

Long term – local effects . Inhalation. 10mg/m^3

DNEL's for the general population

Long term – systemic effects . Oral. 700mg/m^3 bw/day

PNEC's

End Use	Value
Aqua (freshwater)	0.127mg/L
Aqua (Intermittent release)	0.61mg/L
Aqua (marine water)	1 mg/L
Sediment (freshwater)	1,000 mg/L
Sediment (marine water)	100 mg/L
Soil	0.000733mg/kg
STP	100mg/L

8.2) Occupational Exposure controls

Appropriate engineering controls:	Use as far as possible in a closed system. Provide a regular control of the atmosphere. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Local exhaust and general ventilation must be adequate to meet exposure standards. Please refer to the annex (exposure scenarios).
Hand protection:	Use gloves resistant to chemical products

	corresponding to EN 374:3. Take advice to gloves' supplier.
Eye protection:	Wear safety glasses with side shields according EN 166.
Skin and body protection:	Wear closed protective clothing.
Respiratory protection:	Use respiratory protection mask according to EN 140 or EN 405 with filter type P3 according to EN 143:2000 or FFP3 according to EN 149:2001.
Environmental exposure controls:	Prevent entry to sewers and soil.

9) Physical/Chemical Properties

Physical state	Solid crystalline powder
Colour	white
Odour	odourless
Odour threshold	Not applicable
pH	6 - 8
Relative evaporation rate (butylacetate=1)	No data available
Melting point	1,843 °C
Freezing point	No data available
Boiling point (at 1,1013 hPa)	Ca. 3,0000 C
Flash point	Not flammable
Decomposition temperature	No data available
Flammability (solid, gas)	Not flammable
Vapour pressure	Not applicable
Density at 20^0C	4.26 kg/L
Solubility in water	1 µg/L at pH 6, 7 and 8
Bulk Density	800 – 1,300 kg/m^3
Viscosity, kinematic	Not applicable
Viscosity, dynamic	No data available
Explosive properties	No data available
Oxidising properties	Non-oxidising
Explosive limits	Not applicable

9.1) Other information

Molecular formula: TiO2

10) Stability/Reactivity

10.1) Reactivity

Stable under normal conditions of handling and storage.

10.2) Chemical stability
Stable under normal conditions of handling and storage.

10.3) Possibility of hazardous reactions
Stable under normal conditions of handling and storage.

10.4) Conditions to avoid
Protect from moisture

10.5) Incompatible materials
None

10.6) Hazardous decomposition products
No information available

11) Toxicological Info

11.1) Information on toxicological effects

Acute Toxicity

Oral: LD50 rat >5,000mg/kg bw (OECD 425)
Dermal: LD50 rabbit >5,000mg/kg bw
Inhalative: LC50 rat >6.8mg/l (4h)

Corrosivity/Irritation

Respiratory Tract: Not irritating
Skin: Not irritating (OECD 404)
Eyes: Not irritating (OECD 405)

Sensitization

Not sensitizing (OECD 406, OECD 429)

Repeated dose

NOAEL: ORAL. 3,500mg/kg bw/day (chronic rat)

Toxicity

NOAEC: INHALATION. (Target organ – respiratory lung) 10mg/m3 (chronic rat)

Toxicity for reproduction

Based on the weight of evidence from the available long-term toxicity/carcinogenicity studies in rodents and the relevant information on the toxicokinetic behaviour in rats it is concluded that Titanium dioxide does not present a reproductive toxicity hazard.

12) Ecological Information

12.1) Toxicity

Titanium dioxide does not fulfil the toxic criteria.

Aquatic compartment (including sediment)

Short-term toxicity to fish	LC50 for freshwater fish	1,000mg/L
	LC50 for marine water fish	10,000mg/L
Long-term toxicity to fish	No reliable chronic toxicity data are available for fish and the requirement for new test results is waived	
Short-term toxicity to aquatic invertebrates	EC50/LC50 for freshwater invertebrates	1,000mg/L
	EC50/LC50 for marine water invertebrates	10,000mg/L
Long-term toxicity to aquatic invertebrates	No reliable chronic toxicity data are available for aquatic invertebrates and the requirement for new test results is waived	
Algae and aquatic plants	EC50/LC50 for freshwater algae	61mg/L (Pseudokirchgneriella subcapitata)
	EC50/LC50 for marine water algae	10,000mg/L (Skeletonema costatum)
	EC10/LC10 or NOEC for freshwater algae	12.7mg/L
	EC10/LC10 or NOEC for Marine water algae	5,600mg/L
Toxicity to aquatic micro-organisms	EC50/LC50 for aquatic micro-organisms	1,000mg/L
	EC50/LC50 or NOEC for aquatic micro-organisms	1,000mg/L
Sediment organisms	EC50/LC50 for freshwater sediment	100,000mg/kg sediment dw (Hyalella azteca)
	EC50/LC50 for marine water sediment	14,989 mg/kg sediment dw (amphipod volutator Corophium)
	EC10/LC10 or NOEC for freshwater sediment	100,000 mgkg sediment dw

Terrestrial compartment

Toxicity to terrestrial arthropods	Long term EC10/LC10 pr NOEC for soil arthropods	1,000mg/kg soil dw
Toxicity to terrestrial plants	Long term EC10/LC10 pr NOEC for terrestrial plants	100,000mg/kg soil dw
Toxicity to soil micro-organisms	Long term EC10/LC10 pr NOEC micro-organisms	10,000mg/kg soil dw

12.2. Persistence and degradability
Titanium dioxide does not fulfil the PBT or vPvB criteria.

12.3. Bioaccumulative potential
Titanium dioxide does not fulfil the PBT or vPvB criteria.

12.4. Mobility in soil
Titanium dioxide pigments have very limited mobility, since they are insoluble in water and other solvents.

12.5. Results of PBT and vPvB assessment
Not classified as PBT or vPvB.

12.6. Other adverse effects
None anticipated

13) Disposal Consideration

13.1. Waste treatment methods
Recover or recycle if possible. Dispose of contents in accordance with local, national or international legislation

13.2. Additional Information
No information available

14) Transport Information

In accordance with ADR / RID / ADNR / IMDG / ICAO / IATA

14.1. UN number
Not applicable

14.2. UN proper shipping name
Not classified as dangerous according to Transport Regulations

14.3. Transport hazard class(es)
Not applicable

14.4. Packing group
Not applicable

14.5. Environmental hazards
Other information: No supplementary information available.

14.6. Special precautions for user
14.6.1. Overland transport
Not applicable

14.6.2. Transport by sea
No additional information available

14.6.3. Air transport
No additional information available

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable

15) Regulatory Information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU Legislation:
Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18th December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulations (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments.
Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16th December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 with amendments.

15.2. Chemical Safety Assessment
A chemical safety assessment has been carried out.

16) Other Information

16.1. Indications of change
a) Original Document
b) Formatting Changes

International Agency for Research on cancer (IARC) has classified titanium dioxide in to Group 2B “Possibly carcinogenic to humans”. This classification is based on the IARC rules which state: there is “Sufficient evidence of carcinogenicity:….if…..two or more

independent studies in one species of animals carried out at different laboratories or under different protocols" show evidence of tumors. The IARC expert group judged three studies on rats as qualifying.

However there is no evidence that titanium dioxide itself has toxic properties that would lead to cancer, nor that it presents a carcinogenic risk to humans at exposures experienced in the workplace.

Training
Employees should be trained in the scope of proper substance handling. Read the safety data sheet before use.

The following Acronyms may be found in this document
LD50:

DNEL:	Derived No Effect Level
LTEL:	Long Term Exposure Limit
NIOSH:	National Institute of Occupational Safety and Health
OEL:	Occupational Exposure Limits
OSHA:	Occupational Safety and Health Administration
PBT:	Persistent, Bioaccumulative and Toxic
PNEC:	Predicted No Effect Concentration
STEL:	Short Term Exposure Limit
STOT:	Specific Target Organ Toxicity
TLV - TWA:	Threshold Limit Value – Time Weighted Average
vPvB:	Very persistent and very Bioaccumulative
WEL:	Workplace Exposure Limit (UK HSE EH40)

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