SAFETY DATA SHEET
TITANIUM DIOXIDE (ANATASE)
REVISION 4, DATE 20 AUG 20

1. IDENTIFICATION

Product Name	**Titanium dioxide (Anatase)**
Other Names	Anatase [CAS#1317-70-0]; HOMBITAN AFDC101
Uses	Colouring agents, pigments; Cosmetics; Pharmaceutical; Food/feed-stuff additives.
Chemical Family	No Data Available
Chemical Formula	TiO2
Chemical Name	Titanium dioxide
Product Description	Inorganic. The specific chemical identity and/or exact percentage (concentration) of composition may be withheld as a trade secret.

Contact Details of the Supplier of this Safety Data Sheet

Organisation	Location	Telephone
Redox Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000
Redox Ltd	11 Mayo Road Wiri Auckland 2104 New Zealand	+64-9-2506222
Redox Inc.	3960 Paramount Boulevard Suite 107 Lakewood CA 90712 USA	+1-424-675-3200
Redox Chemicals Sdn Bhd	Level 2, No. 8, Jalan Sapir 33/7 Seksyen 33, Shah Alam Premier Industrial Park 40400 Shah Alam Sengalor, Malaysia	+60-3-5614-2111

Emergency Contact Details

For emergencies only; DO NOT contact these companies for general product advice.

Organisation	Location	Telephone
Poisons Information Centre	Westmead NSW	1800-251525 131126
Chemcall	Australia	1800-127406 +64-4-9179888
Chemcall	Malaysia	+64-4-9179888
Chemcall	New Zealand	0800-243622 +64-4-9179888
National Poisons Centre	New Zealand	0800-764766
CHEMTREC	USA & Canada	1-800-424-9300 CN723420 +1-703-527-3887

2. HAZARD IDENTIFICATION

Poisons Schedule (Aust)	Not Scheduled

Globally Harmonised System

Hazard Classification	NOT hazardous according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS)
Signal Word	None

National Transport Commission (Australia)

Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification	NOT Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Chemical Entity	Formula	CAS Number	Proportion
Titanium dioxide	TiO2	13463-67-7	95 - 100 %

4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure

Swallowed	IF SWALLOWED: Rinse mouth, then give small amounts of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical advice/attention if you feel unwell.
Eye	IF IN EYES: Immediately flush eyes with running water for several minutes, holding eyelids open and occasionally lifting the upper and lower lids. Protect the unharmed eye. Remove contact lenses if present and easy to do. Continue rinsing for at least 15 minutes. If eye irritation persists, get medical advice/attention.
Skin	IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash before reuse. If skin irritation occurs, get medical advice/attention.
Inhaled	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If respiratory symptoms persist, get medical advice/attention. Apply resuscitation if victim is not breathing - Administer oxygen if breathing is difficult.
Advice to Doctor	Do not leave victim unattended. Treat systematically. No action shall be taken involving any personal risk or without suitable training.
Medical Conditions Aggravated by Exposure	No information available.

5. FIRE FIGHTING MEASURES

General Measures	No action shall be taken involving any personal risk or without suitable training. If safe to do so, move undamaged containers from fire area. Cool containers with water spray until well after fire is out.
Flammability Conditions	Non-combustible; The product itself does not burn.
Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Product is compatible with standard fire-fighting agents. Do not use high-volume water jet.

Fire and Explosion Hazard	Not expected to form explosive dust-air mixtures.
Hazardous Products of Combustion	Fire or heat may produce irritating and/or toxic fumes.
Special Fire Fighting Instructions	Contain runoff from fire control or dilution water - Runoff may pollute waterways.
Personal Protective Equipment	Wear self-contained breathing apparatus (SCBA) and chemical splash suit. SCBA and structural firefighter's uniform may provide limited protection.
Flash Point	No Data Available
Lower Explosion Limit	No Data Available
Upper Explosion Limit	No Data Available
Auto Ignition Temperature	No Data Available
Hazchem Code	No Data Available

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure	No action shall be taken involving any personal risk or without suitable training. Ensure adequate ventilation. ELIMINATE all ignition sources. Do not touch or walk through spilled material. Avoid generating dust. Avoid breathing dust and contact with eyes, skin and clothing.
Clean Up Procedures	Clean up promptly by sweeping or vacuum. Keep in suitable, closed containers for disposal (see SECTION 13). Avoid creating dusty conditions and prevent wind dispersal. *Never return spilled material to original containers for re-use.
Containment	Stop leak if safe to do so – Prevent entry into waterways, drains or confined areas. Prevent dust cloud.
Decontamination	Ventilate the area.
Environmental Precautionary Measures	The product should not be allowed to enter drains, water courses or the soil. If the product contaminates waterways or drains, inform respective authorities.
Evacuation Criteria	Spill or leak area should be isolated immediately. Keep unauthorised personnel away from and upwind of spill/leak.
Personal Precautionary Measures	Only qualified personnel equipped with suitable protective equipment may intervene (see SECTION 8).

7. HANDLING AND STORAGE

Handling	Ensure that eyewash stations and safety showers are close to the workstation location. Use only with adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Manual handling guidelines should be adhered to when handling sacks. Avoid generating dust. Avoid breathing dust/mist/vapours and contact with eyes, skin and clothing. Do not ingest. Use personal protective equipment as required (see SECTION 8). Emptying of flexible intermediate bulk containers (FIBC's) can generate static electricity. Empty FIBC's by gravity only (do not empty pneumatically). Remove all wrapping prior to emptying FIBC's. When transferring from one container to another, apply earthing measures and use conductive hose material.
Storage	Store in a cool, dry and well-ventilated place, protected from sunlight. Keep container tightly closed when not in use. Containers which are opened must be carefully resealed and kept upright to prevent leakage. In all cases, the protective cover or wrapping should remain in place during storage and only be removed immediately prior to use. Care should be taken to avoid moisture, particularly with a partly used pallet of material. Keep away from heat and sources of ignition - No smoking. Keep away from incompatible materials (see SECTION 10). Use appropriate containment to avoid environmental contamination. Store in accordance with the particular national regulations. *When using standard pallets, those containing paper or plastics bags can be stacked to a maximum of 2 high.
Container	Keep only in the original container.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

SUBSTANCE: Titanium dioxide (CAS No. 13463-67-7):

General	- Safe Work Australia Exposure Standard: TWA = 10 mg/m3 (This value is for inhalable dust containing no asbestos and < 1% crystalline silica). - New Zealand Workplace Exposure Standard [Next review 2022]: TWA = 10 mg/m3.
Exposure Limits	No Data Available
Biological Limits	SUBSTANCE: Titanium dioxide (CAS No. 13463-67-7): - PNEC, Marine water: 0.0184 mg/l - PNEC, Freshwater: 0.184 mg/l - PNEC, Marine sediment: 100 mg/kg - PNEC, Fresh water sediment: 1,000 mg/kg - PNEC, Freshwater/intermittent: 0.193 mg/l - PNEC, Sewage treatment plant: 100 mg/l - PNEC, Soil: 100 mg/kg
Engineering Measures	Ensure adequate ventilation, especially in confined areas. A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area.
Personal Protection Equipment	- Respiratory protection: Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Recommended: P2 Filter. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection (refer to AS/NZS 1715 & 1716). - Eye/face protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. Recommended: Safety glasses. - Hand protection: Handle with gloves. Recommended: Impervious gloves. - Skin/body protection: Wear suitable protective equipment. Recommended: Overalls, safety shoes. Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Special Hazards Precaustions	In the manufacture of titanium dioxide, product is packaged at temperatures of approximately 100 to 120 °C (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.
Work Hygienic Practices	Smoking, eating and drinking should be prohibited in the application area. Wash face, hands and any exposed skin thoroughly after handling. Remove contaminated clothing and protective equipment before entering eating areas. Barrier creams may help to protect the exposed areas of skin, they should however not be applied once exposure has occurred. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Solid
Appearance	Powder
Odour	Odourless
Colour	White
pH	4 - 9
Vapour Pressure	No Data Available
Relative Vapour Density	No Data Available
Boiling Point	No Data Available
Melting Point	>1,800 °C
Freezing Point	No Data Available
Solubility	<0.01 g/l water - Practically insoluble in other solvents 20°C
Specific Gravity	No Data Available
Flash Point	No Data Available
Auto Ignition Temp	No Data Available
Evaporation Rate	No Data Available

Bulk Density	No Data Available
Corrosion Rate	No Data Available
Decomposition Temperature	No Data Available
Density	ca. 3.9 g/cm3 (Skeletal density)
Specific Heat	No Data Available
Molecular Weight	79.88 g/mol [Calculation method]
Net Propellant Weight	No Data Available
Octanol Water Coefficient	No Data Available
Particle Size	No Data Available
Partition Coefficient	No Data Available
Saturated Vapour Concentration	No Data Available
Vapour Temperature	No Data Available
Viscosity	No Data Available
Volatile Percent	No Data Available
VOC Volume	No Data Available
Additional Characteristics	No information available.
Potential for Dust Explosion	Not expected to form explosive dust-air mixtures.
Fast or Intensely Burning Characteristics	No information available.
Flame Propagation or Burning Rate of Solid Materials	No information available.
Non-Flammables That Could Contribute Unusual Hazards to a Fire	No information available.
Properties That May Initiate or Contribute to Fire Intensity	Non-combustible; The product itself does not burn.
Reactions That Release Gases or Vapours	Fire or heat may produce irritating and/or toxic fumes.
Release of Invisible Flammable Vapours and Gases	No information available.

10. STABILITY AND REACTIVITY

General Information	No dangerous reaction known under conditions of normal use.
Chemical Stability	Stable under recommended storage conditions.
Conditions to Avoid	Avoid generating dust.
Materials to Avoid	Incompatible/reactive with oxidising agents, strong acids.
Hazardous Decomposition Products	No decomposition if stored and applied as directed.
Hazardous Polymerisation	No information available.

11. TOXICOLOGICAL INFORMATION

General Information	- Acute toxicity: Not classified. May cause gastrointestinal discomfort if consumed in large amounts. - Skin corrosion/irritation: Not classified. No skin irritation (Rabbit) [OECD TG 404]. Normally reversible injuries. The product is not irritant but, as with all fine powders, can absorb moisture and natural oils from the surface of the skin during prolonged exposure. Individuals with sensitive skin may experience skin drying on prolonged or repeated

exposure.
- Eye damage/irritation: Not classified. No eye irritation (Rabbit) [OECD TG 405]. Normally reversible injuries. Dust contact with the eyes can lead to mechanical irritation.
- Respiratory/skin sensitisation: Not classified. Does not cause respiratory sensitisation; Does not cause skin sensitisation (Guinea pig) [OECD TG 406].
- Germ cell mutagenicity: Not classified. Tests on bacterial or mammalian cell cultures did not show mutagenic effects; Animal testing did not show any mutagenic effects [Titanium dioxide].
- Carcinogenicity: Not classified. Titanium dioxide has been classified by the International Agency for Research on Cancer (IARC) as Possibly carcinogenic to humans (Group 2B). The weight of scientific evidence indicates that there is no causative link between Titanium dioxide exposure and cancer risk in humans and that workplace exposures in compliance with applicable exposure standards will not result in lung cancer or chronic respiratory diseases in humans.
- Reproductive toxicity: Not classified. No evidence of adverse effects on sexual function and fertility, or on development, based on animal experiments [Titanium dioxide].
- STOT (single exposure): Not classified. Inhalation of dust may cause shortness of breath, tightness of the chest, sore throat and cough.
- STOT (repeated exposure): Not classified. No adverse effect has been observed in chronic toxicity tests [Titanium dioxide].
- Aspiration toxicity: Not classified.

Acute

Ingestion	Acute toxicity (Oral): - LD50, Rat (female): >5,000 mg/kg [Titanium dioxide; OECD TG 425].
Inhalation	Acute toxicity (Inhalation): - LC50, Rat (male/female): 3.43 - 5.09 mg/l (4h) dust/mist [Titanium dioxide; OECD TG 403].
Other	Acute toxicity (Dermal): - LD50, Rabbit: >10,000 mg/kg [Titanium dioxide].
Carcinogen Category	IARC 2B

12. ECOLOGICAL INFORMATION

Ecotoxicity	Aquatic toxicity: - LC50, Fish (Cyprinodon variegatus): 10,000 mg/l (96 h) [Marine water; semi-static test; OECD TG 203].
Persistence/Degradability	The methods for determining biodegradability are not applicable to inorganic substances.
Mobility	No information available.
Environmental Fate	The product should not be allowed to enter drains, water courses or the soil.
Bioaccumulation Potential	Does not bioaccumulate. - Bioconcentration factor (BCF): 19- 352 (Oncorhynchus mykiss, 14 d) [Freshwater; semi-static test].
Environmental Impact	No Data Available

13. DISPOSAL CONSIDERATIONS

General Information	This material and its container must be disposed of in a safe way. If recycling is not practicable, dispose of wastes in an approved waste disposal facility and in compliance with local and national regulations.
Special Precautions for Land Fill	Contaminated packaging: Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. TRANSPORT INFORMATION

Land Transport (Australia)
ADG Code

Proper Shipping Name	Titanium dioxide
Class	No Data Available
Subsidiary Risk(s)	No Data Available
	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
Comments	NON-DANGEROUS GOODS: Not regulated for LAND transport.

Land Transport (Malaysia)
ADR Code

Proper Shipping Name	Titanium dioxide
Class	No Data Available
Subsidiary Risk(s)	No Data Available
	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
Comments	NON-DANGEROUS GOODS: Not regulated for LAND transport.

Land Transport (New Zealand)
NZS5433

Proper Shipping Name	Titanium dioxide
Class	No Data Available
Subsidiary Risk(s)	No Data Available
	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
Comments	NON-DANGEROUS GOODS: Not regulated for LAND transport.

Land Transport (South Korea)
DGMA

Proper Shipping Name	Titanium dioxide
Class	No Data Available
Subsidiary Risk(s)	No Data Available
	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
Comments	NON-DANGEROUS GOODS: Not regulated for LAND transport.

Land Transport (United States of America)
US DOT

Proper Shipping Name	Titanium dioxide
Class	No Data Available
Subsidiary Risk(s)	No Data Available
	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
Comments	NON-DANGEROUS GOODS: Not regulated for LAND transport.

Sea Transport
IMDG Code

Proper Shipping Name	Titanium dioxide
Class	No Data Available
Subsidiary Risk(s)	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
EMS	No Data Available
Marine Pollutant	No
Comments	NON-DANGEROUS GOODS: Not regulated for SEA transport.

Air Transport
IATA DGR

Proper Shipping Name	Titanium dioxide
Class	No Data Available
Subsidiary Risk(s)	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
Comments	NON-DANGEROUS GOODS: Not regulated for AIR transport.

National Transport Commission (Australia)
Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification	NOT Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

15. REGULATORY INFORMATION

General Information	No Data Available

Poisons Schedule (Aust)	Not Scheduled

Environmental Protection Authority (New Zealand)
Hazardous Substances and New Organisms Amendment Act 2015

Approval Code	Not Hazardous

National/Regional Inventories

Australia (AIIC)	Listed
Canada (DSL)	Listed
Canada (NDSL)	Not Listed
China (IECSC)	Listed
Europe (EINECS)	236-675-5
Europe (REACh)	01-2119489379-17-0006
Japan (ENCS/METI)	Listed
Korea (KECI)	KE-33900
Malaysia (EHS Register)	Not Listed
New Zealand (NZIoC)	Listed
Philippines (PICCS)	Listed
Switzerland (Giftliste 1)	Not Determined
Switzerland (Inventory of Notified Substances)	Not Determined
Taiwan (NCSR)	Listed
USA (TSCA)	Listed

16. OTHER INFORMATION

Related Product Codes	TIDIOA4100, TIDIOX0101, TIDIOX1050, TIDIOX1055, TIDIOX1075, TIDIOX2010, TIDIOX3500, TIDIOX3900, TIDIOX4100, TIDIOX4300, TIDIOX4400, TIDIOX4500, TIDIOX4501, TIDIOX4502, TIDIOX4700, TIDIOX8200, TIDIOX8201, TIDIOX8210, TIDIOX8212, TIDIOX8213, TIDIOX8214, TIDIOX8215
Revision	4
Revision Date	20 Aug 2020
Key/Legend	< Less Than > Greater Than **AICS** Australian Inventory of Chemical Substances **atm** Atmosphere **CAS** Chemical Abstracts Service (Registry Number) **cm^2** Square Centimetres **CO2** Carbon Dioxide **COD** Chemical Oxygen Demand **deg C (°C)** Degrees Celcius

EPA (New Zealand) Environmental Protection Authority of New Zealand
deg F (°F) Degrees Farenheit
g Grams
g/cm^3 Grams per Cubic Centimetre
g/l Grams per Litre
HSNO Hazardous Substance and New Organism
IDLH Immediately Dangerous to Life and Health
immiscible Liquids are insoluable in each other.
inHg Inch of Mercury
inH2O Inch of Water
K Kelvin
kg Kilogram
kg/m^3 Kilograms per Cubic Metre
lb Pound
LC50 LC stands for lethal concentration. LC50 is the concentration of a material in air which causes the death of 50% (one half) of a group of test animals. The material is inhaled over a set period of time, usually 1 or 4 hours.
LD50 LD stands for Lethal Dose. LD50 is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals.
ltr or **L** Litre
m^3 Cubic Metre
mbar Millibar
mg Milligram
mg/24H Milligrams per 24 Hours
mg/kg Milligrams per Kilogram
mg/m^3 Milligrams per Cubic Metre
Misc or **Miscible** Liquids form one homogeneous liquid phase regardless of the amount of either component present.
mm Millimetre
mmH2O Millimetres of Water
mPa.s Millipascals per Second
N/A Not Applicable
NIOSH National Institute for Occupational Safety and Health
NOHSC National Occupational Heath and Safety Commission
OECD Organisation for Economic Co-operation and Development
Oz Ounce
PEL Permissible Exposure Limit
Pa Pascal
ppb Parts per Billion
ppm Parts per Million
ppm/2h Parts per Million per 2 Hours
ppm/6h Parts per Million per 6 Hours
psi Pounds per Square Inch
R Rankine
RCP Reciprocal Calculation Procedure
STEL Short Term Exposure Limit
TLV Threshold Limit Value
tne Tonne
TWA Time Weighted Average
ug/24H Micrograms per 24 Hours
UN United Nations
wt Weight