

### 1. IDENTIFICATION

<b>Product Name</b>	<b>Zinc oxide (Bulk-DG)</b>
<b>Other Names</b>	C.I. 77947; C.I. Pigment White 4; Chinese white; Zinc monoxide; Zinc white
<b>Uses</b>	Additive.
<b>Chemical Family</b>	No Data Available
<b>Chemical Formula</b>	ZnO
<b>Chemical Name</b>	Zinc oxide
<b>Product Description</b>	No Data Available

#### Contact Details of the Supplier of this Safety Data Sheet

Organisation	Location	Telephone
Redox Pty Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000
Redox Pty 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

<b>Hazard Classification</b>	Hazardous according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS)		
<b>Hazard Categories</b>	Acute Hazard To The Aquatic Environment - Category 1 Long-term Hazard To The Aquatic Environment - Category 1		
<b>Pictograms</b>			
<b>Signal Word</b>	Warning		
<b>Hazard Statements</b>	<b>H410</b>	Very toxic to aquatic life with long lasting effects.	
<b>Precautionary Statements</b>	Prevention	<b>P273</b>	Avoid release to the environment.
	Response	<b>P391</b>	Collect spillage.
	Disposal	<b>P501</b>	Dispose of contents/container in accordance with local / regional / national / international regulations.

### National Transport Commission (Australia)

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

**Dangerous Goods Classification** Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

### Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

**HSNO Classifications**

Environmental Hazards	<b>9.1A</b>	Substances that are very ecotoxic in the aquatic environment
	<b>9.3C</b>	Substances that are harmful to terrestrial vertebrates

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### Ingredients

Chemical Entity	Formula	CAS Number	Proportion
Zinc oxide	ZnO	1314-13-2	>=85 %

## 4. FIRST AID MEASURES

### Description of necessary measures according to routes of exposure

<b>Swallowed</b>	IF SWALLOWED: Rinse mouth then drink plenty of water. Do not induce vomiting unless directed to do so by medical personnel. Get medical advice/attention if you feel unwell. If vomiting occurs, lean patient forward or place on left side (head-down position if possible) to maintain open airway and prevent aspiration. Never give anything by mouth to an unconscious person.
<b>Eye</b>	IF IN EYES: Immediately flush eyes with running water for several minutes, holding eyelids open and occasionally lifting the upper and lower lids. Remove contact lenses if present and easy to do. Continue rinsing for at least 15 minutes. If eye irritation persists, get medical advice/attention.
<b>Skin</b>	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.
<b>Inhaled</b>	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing until recovered. If

respiratory symptoms persist, get medical advice/attention. Apply resuscitation if victim is not breathing. Administer oxygen if breathing is difficult.

**Advice to Doctor**

The symptoms of metal fume fever do not become manifest until a few hours have passed. Treat symptomatically. No action shall be taken involving any personal risk or without suitable training. Ensure that attending medical personnel are aware of the identity and nature of the product(s) involved, and take precautions to protect themselves.

**Medical Conditions Aggravated by Exposure**

No information available.

## 5. FIRE FIGHTING MEASURES

**General Measures**

Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. 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; Material does not burn.

**Extinguishing Media**

If material is involved in a fire, use dry chemical, Carbon dioxide (CO<sub>2</sub>), foam or water spray for extinction.

**Fire and Explosion Hazard**

No information available.

**Hazardous Products of Combustion**

Fire or heat may produce irritating, toxic and/or corrosive fumes, including Carbon dioxide, Carbon monoxide, metal oxides.

**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) in combination with normal firefighting clothing (full fire kit).

**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**

ZZ

## 6. ACCIDENTAL RELEASE MEASURES

**General Response Procedure**

No action shall be taken involving any personal risk or without suitable training. Ensure adequate ventilation. Do not touch or walk through spilled material. Avoid creating dusty conditions and prevent wind dispersal. Avoid breathing dust and contact with eyes, skin and clothing.

**Clean Up Procedures**

Move containers from spill area. Collect material (sweep or vacuum up) and place it into a suitable, properly labelled container for disposal (see SECTION 13); if appropriate, moisten first or cover with damp absorbent to avoid generating dust.

**Containment**

Stop leak if safe to do so – Prevent entry into waterways, drains or confined areas. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

**Decontamination**

No information available.

**Environmental Precautionary Measures**

Spillages and decontamination runoff should be prevented from entering drains and watercourses. If environmental contamination has occurred, advise local emergency services.

**Evacuation Criteria**

Spill or leak area should be isolated immediately. Keep unauthorised personnel away. Keep upwind and to higher ground.

**Personal Precautionary Measures**

Use personal protective equipment as required (see SECTION 8).

## 7. HANDLING AND STORAGE

**Handling**

Safety showers and eyewash facilities should be provided within the immediate work area for emergency use. Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Avoid dust formation. Avoid breathing dust and contact with eyes, skin and clothing. Do not ingest. Use personal protective equipment as required (see SECTION 8). Avoid release to the environment - Collect spillage (see SECTION 6).

<b>Storage</b>	Store in a cool, dry and well-ventilated place, out of direct sunlight. Keep container tightly closed when not in use; Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Keep away from foodstuffs and incompatible materials (see SECTION 10). Use appropriate containment to avoid environmental contamination.
<b>Container</b>	Keep in the original container or an approved alternative made from a compatible material. Do not store in unlabelled containers. Empty containers retain product residue and can be hazardous.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

<b>General</b>	<p>COMPONENT: Zinc oxide (CAS No. 1314-13-2):</p> <ul style="list-style-type: none"> <li>- Safe Work Australia Exposure Standard for Zinc oxide (dust): TWA = 10 mg/m<sup>3</sup>.*</li> <li>*This value is for inhalable dust containing no asbestos and &lt;1% crystalline silica.</li> <li>- Safe Work Australia Exposure Standard for Zinc oxide (fume): TWA = 5 mg/m<sup>3</sup>; STEL = 10 mg/m<sup>3</sup>.</li> <li>- New Zealand WES for Zinc oxide, dust: TWA = 10 mg/m<sup>3</sup> (respirable dust).</li> <li>- New Zealand WES for Zinc oxide, fume: TWA = 3 mg/m<sup>3</sup> (respirable dust); STEL = 10 mg/m<sup>3</sup>.</li> </ul> <p>COMPONENT: Magnesium oxide (CAS No. 1309-48-4):</p> <ul style="list-style-type: none"> <li>- Safe Work Australia Exposure Standard for Magnesium oxide (fume): TWA = 10 mg/m<sup>3</sup>.</li> <li>- New Zealand WES for Magnesium oxide, fume: TWA = 10 mg/m<sup>3</sup>.</li> </ul>
<b>Exposure Limits</b>	No Data Available
<b>Biological Limits</b>	No information available.
<b>Engineering Measures</b>	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.
<b>Personal Protection Equipment</b>	<ul style="list-style-type: none"> <li>- Respiratory protection: Wear respiratory protection in case of inadequate ventilation or if an inhalation risk exists. Recommended: Dust mask/respirator complying with an approved standard (refer to AS/NZS 1715 &amp; 1716).</li> <li>- Eye/face protection: Wear appropriate eye protection to avoid eye contact. Recommended: Safety glasses with side-shields; If operating conditions cause high dust concentrations to be produced, use dust goggles.</li> <li>- Hand protection: Handle with gloves. Recommended (&lt;1 hr): Chemical-resistant, impervious gloves, e.g. Polyvinyl chloride (PVC), Nitrile rubber (NBR), Polychloroprene (CR).</li> <li>- Skin/body protection: Wear appropriate personal protective clothing to avoid skin contact. Recommended: Wear protective clothing, e.g. Overalls, safety shoes.</li> </ul>
<b>Special Hazards Precautions</b>	No information available.
<b>Work Hygienic Practices</b>	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Physical State</b>	Solid
<b>Appearance</b>	Powder
<b>Odour</b>	Odourless
<b>Colour</b>	White to yellowish
<b>pH</b>	No Data Available
<b>Vapour Pressure</b>	No Data Available
<b>Relative Vapour Density</b>	No Data Available
<b>Boiling Point</b>	No Data Available
<b>Melting Point</b>	>800 - 1975 °C
<b>Freezing Point</b>	No Data Available
<b>Solubility</b>	Insoluble in cold water
<b>Specific Gravity</b>	5.61
<b>Flash Point</b>	No Data Available
<b>Auto Ignition Temp</b>	No Data Available
<b>Evaporation Rate</b>	No Data Available
<b>Bulk Density</b>	No Data Available

<b>Corrosion Rate</b>	No Data Available
<b>Decomposition Temperature</b>	No Data Available
<b>Density</b>	5.6 g/cm <sup>3</sup>
<b>Specific Heat</b>	No Data Available
<b>Molecular Weight</b>	81.4 g/mol
<b>Net Propellant Weight</b>	No Data Available
<b>Octanol Water Coefficient</b>	No Data Available
<b>Particle Size</b>	No Data Available
<b>Partition Coefficient</b>	No Data Available
<b>Saturated Vapour Concentration</b>	No Data Available
<b>Vapour Temperature</b>	No Data Available
<b>Viscosity</b>	No Data Available
<b>Volatile Percent</b>	No Data Available
<b>VOC Volume</b>	No Data Available
<b>Additional Characteristics</b>	No information available.
<b>Potential for Dust Explosion</b>	No information available.
<b>Fast or Intensely Burning Characteristics</b>	No information available.
<b>Flame Propagation or Burning Rate of Solid Materials</b>	No information available.
<b>Non-Flammables That Could Contribute Unusual Hazards to a Fire</b>	No information available.
<b>Properties That May Initiate or Contribute to Fire Intensity</b>	Non-combustible; Material does not burn.
<b>Reactions That Release Gases or Vapours</b>	Fire or heat may produce irritating, toxic and/or corrosive fumes, including Carbon dioxide, Carbon monoxide, metal oxides.
<b>Release of Invisible Flammable Vapours and Gases</b>	No information available.

## 10. STABILITY AND REACTIVITY

<b>General Information</b>	Reacts violently with aluminium powder, magnesium powder and chlorinated rubber (on heating); This generates fire and explosion hazard.
<b>Chemical Stability</b>	Stable under normal storage and handling conditions.
<b>Conditions to Avoid</b>	Avoid dust formation. Avoid release to the environment.
<b>Materials to Avoid</b>	Incompatible/reactive with acids, alkalis, magnesium, aluminium, chlorinated rubber (on heating).
<b>Hazardous Decomposition Products</b>	Fire or heat may produce irritating, toxic and/or corrosive fumes, including Carbon dioxide, Carbon monoxide, metal oxides.
<b>Hazardous Polymerisation</b>	Will not occur.

## 11. TOXICOLOGICAL INFORMATION

<b>General Information</b>	Information on possible routes of exposure: - Ingestion: No adverse effects expected; Large amounts may cause abdominal pain, diarrhoea, nausea, vomiting. - Eye contact: Non-irritating; May cause (mechanical) eye irritation, redness. - Skin contact: Non-irritating; No adverse effects expected. - Inhalation: Dust may cause respiratory irritation, coughing, sore throat. Fumes may cause metallic taste, headache, fever, chest tightness, shortness of breath, weakness, muscle pain. Chronic effects: Repeated or prolonged inhalation of (Zinc oxide) dust may lead to chronic respiratory irritation.
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## Acute

<b>Ingestion</b>	Acute toxicity (Oral): COMPONENT: Zinc oxide (CAS No. 1314-13-2): - LD50, Rat: >5,000 mg/kg COMPONENT: Magnesium oxide (CAS No. 1309-48-4): - LD50, Rat: >5,000 mg/kg
<b>Inhalation</b>	Acute toxicity (Inhalation - Dust/mist): COMPONENT: Zinc oxide (CAS No. 1314-13-2): - LC50, Rat: >5,700 mg/m <sup>3</sup> (4 h).
<b>Carcinogen Category</b>	None

## 12. ECOLOGICAL INFORMATION

<b>Ecotoxicity</b>	Aquatic toxicity: COMPONENT: Zinc oxide (CAS No. 1314-13-2): - EC50, Daphnia (Ceriodaphnia dubia): 0.413 mg Zn/L (48 h) [US EPA 821-R-02-012; pH: <7]. - IC50, Algae (Pseudokirchneriella subcapitata): 0.136 mg Zn/L (72 h) [OECD 201, Growth Inhibition Test; pH: >7 - 8.5].
<b>Persistence/Degradability</b>	No information available; The methods for determining the biological degradability are not applicable to inorganic substances.
<b>Mobility</b>	No information available.
<b>Environmental Fate</b>	Very toxic to aquatic life with long lasting effects - Avoid release to the environment.
<b>Bioaccumulation Potential</b>	No information available.
<b>Environmental Impact</b>	No Data Available

## 13. DISPOSAL CONSIDERATIONS

<b>General Information</b>	The generation of waste should be avoided or minimised wherever possible. Dispose of surplus and non-recyclable product via a licensed waste disposal contractor and in accordance with local/regional/national regulations. This material and its container must be disposed of in a safe way. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction.
<b>Special Precautions for Land Fill</b>	Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues.

## 14. TRANSPORT INFORMATION

### Land Transport (Australia)

ADG Code

<b>Proper Shipping Name</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)
<b>Class</b>	9 Miscellaneous Dangerous Goods and Articles
<b>Subsidiary Risk(s)</b>	No Data Available
<b>EPG</b>	47 Low To Moderate Hazard Substances
<b>UN Number</b>	3077
<b>Hazchem</b>	2Z
<b>Pack Group</b>	III
<b>Special Provision</b>	No Data Available

**Land Transport (Malaysia)**

ADR Code

<b>Proper Shipping Name</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)
<b>Class</b>	9 Miscellaneous Dangerous Goods and Articles
<b>Subsidiary Risk(s)</b>	No Data Available
<b>EPG</b>	47 Low To Moderate Hazard Substances
<b>UN Number</b>	3077
<b>Hazchem</b>	2Z
<b>Pack Group</b>	III
<b>Special Provision</b>	No Data Available

**Land Transport (New Zealand)**

NZS5433

<b>Proper Shipping Name</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)
<b>Class</b>	9 Miscellaneous Dangerous Goods and Articles
<b>Subsidiary Risk(s)</b>	No Data Available
<b>EPG</b>	47 Low To Moderate Hazard Substances
<b>UN Number</b>	3077
<b>Hazchem</b>	2Z
<b>Pack Group</b>	III
<b>Special Provision</b>	No Data Available

**Land Transport (United States of America)**

US DOT

<b>Proper Shipping Name</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)
<b>Class</b>	9 Miscellaneous Dangerous Goods and Articles
<b>Subsidiary Risk(s)</b>	No Data Available
<b>ERG</b>	171 Substances (Low to Moderate Hazard)
<b>UN Number</b>	3077
<b>Hazchem</b>	2Z
<b>Pack Group</b>	III
<b>Special Provision</b>	No Data Available

**Sea Transport**

IMDG Code

<b>Proper Shipping Name</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)
<b>Class</b>	9 Miscellaneous Dangerous Goods and Articles
<b>Subsidiary Risk(s)</b>	No Data Available
<b>UN Number</b>	3077
<b>Hazchem</b>	2Z
<b>Pack Group</b>	III
<b>Special Provision</b>	No Data Available
<b>EMS</b>	F-A, S-F
<b>Marine Pollutant</b>	Yes

**Air Transport**

IATA DGR

<b>Proper Shipping Name</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc oxide)
<b>Class</b>	9 Miscellaneous Dangerous Goods and Articles

<b>Subsidiary Risk(s)</b>	No Data Available
<b>UN Number</b>	3077
<b>Hazchem</b>	2Z
<b>Pack Group</b>	III
<b>Special Provision</b>	No Data Available

### National Transport Commission (Australia)

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

<b>Dangerous Goods Classification</b>	Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)
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## 15. REGULATORY INFORMATION

<b>General Information</b>	No Data Available
<b>Poisons Schedule (Aust)</b>	Not Scheduled

### Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

<b>Approval Code</b>	HSR002054
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### National/Regional Inventories

<b>Australia (AICS)</b>	Listed
<b>Canada (DSL)</b>	Not Determined
<b>Canada (NDSL)</b>	Not Determined
<b>China (IECSC)</b>	Not Determined
<b>Europe (EINECS)</b>	215-222-5
<b>Europe (REACH)</b>	Not Determined
<b>Japan (ENCS/METI)</b>	Not Determined
<b>Korea (KECI)</b>	Not Determined
<b>Malaysia (EHS Register)</b>	Not Determined
<b>New Zealand (NZIoC)</b>	Listed
<b>Philippines (PICCS)</b>	Not Determined
<b>Switzerland (Giftliste 1)</b>	Not Determined
<b>Switzerland (Inventory of Notified Substances)</b>	Not Determined
<b>Taiwan (NCSR)</b>	Not Determined
<b>USA (TSCA)</b>	Not Determined



## 16. OTHER INFORMATION

<b>Related Product Codes</b>	ZIOXID9268
<b>Revision</b>	1
<b>Revision Date</b>	26 Jul 2017
<b>Key/Legend</b>	< Less Than > Greater Than <b>AICS</b> Australian Inventory of Chemical Substances <b>atm</b> Atmosphere <b>CAS</b> Chemical Abstracts Service (Registry Number) <b>cm<sup>2</sup></b> Square Centimetres <b>CO<sub>2</sub></b> Carbon Dioxide <b>COD</b> Chemical Oxygen Demand <b>deg C (°C)</b> Degrees Celcius <b>EPA (New Zealand)</b> Environmental Protection Authority of New Zealand <b>deg F (°F)</b> Degrees Farenheit <b>g</b> Grams <b>g/cm<sup>3</sup></b> Grams per Cubic Centimetre <b>g/l</b> Grams per Litre <b>HSNO</b> Hazardous Substance and New Organism <b>IDLH</b> Immediately Dangerous to Life and Health <b>immiscible</b> Liquids are insoluable in each other. <b>inHg</b> Inch of Mercury <b>inH<sub>2</sub>O</b> Inch of Water <b>K</b> Kelvin <b>kg</b> Kilogram <b>kg/m<sup>3</sup></b> Kilograms per Cubic Metre <b>lb</b> Pound <b>LC50</b> 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. <b>LD50</b> 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. <b>ltr</b> or <b>L</b> Litre <b>m<sup>3</sup></b> Cubic Metre <b>mbar</b> Millibar <b>mg</b> Milligram <b>mg/24H</b> Milligrams per 24 Hours <b>mg/kg</b> Milligrams per Kilogram <b>mg/m<sup>3</sup></b> Milligrams per Cubic Metre <b>Misc</b> or <b>Miscible</b> Liquids form one homogeneous liquid phase regardless of the amount of either component present. <b>mm</b> Millimetre <b>mmH<sub>2</sub>O</b> Millimetres of Water <b>mPa.s</b> Millipascals per Second <b>N/A</b> Not Applicable <b>NIOSH</b> National Institute for Occupational Safety and Health <b>NOHSC</b> National Occupational Heath and Safety Commission <b>OECD</b> Organisation for Economic Co-operation and Development <b>Oz</b> Ounce <b>PEL</b> Permissible Exposure Limit <b>Pa</b> Pascal <b>ppb</b> Parts per Billion <b>ppm</b> Parts per Million <b>ppm/2h</b> Parts per Million per 2 Hours <b>ppm/6h</b> Parts per Million per 6 Hours <b>psi</b> Pounds per Square Inch <b>R</b> Rankine <b>RCP</b> Reciprocal Calculation Procedure <b>STEL</b> Short Term Exposure Limit <b>TLV</b> Threshold Limit Value <b>tne</b> Tonne <b>TWA</b> Time Weighted Average <b>ug/24H</b> Micrograms per 24 Hours <b>UN</b> United Nations <b>wt</b> Weight