

1. IDENTIFICATION

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|----------------------------|--|
| Product Name | Sulfur Powder |
| Other Names | Sulphur |
| Uses | Industrial and laboratory application. |
| Chemical Family | No Data Available |
| Chemical Formula | S |
| Chemical Name | Sulfur |
| Product Description | 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

| | | | |
|---------------------------------|--|--------------------------------|---|
| Hazard Classification | Hazardous according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) | | |
| Hazard Categories | Skin Corrosion/Irritation - Category 2 Serious Eye Damage/Irritation - Category 2A Flammable Solids - Category 2 | | |
| Pictograms |  | | |
| Signal Word | Warning | | |
| Hazard Statements | H315 | Causes skin irritation. | |
| | H319 | Causes serious eye irritation. | |
| | H228 | Flammable solid. | |
| Precautionary Statements | Prevention | P210 | Keep away from heat/sparks/open flames/hot surfaces. No smoking. |
| | | P280 | Wear protective gloves/eye protection/face protection. |
| | | P240 | Ground/bond container and receiving equipment. |
| | | P241 | Use explosion-proof electrical/ventilating/lighting and all other equipment. |
| | Response | P370 + P378 | In case of fire: Use carbon dioxide (CO ₂), dry chemical, regular foam extinguishing agent or water spray for extinction. |
| | | P302 + P352 | IF ON SKIN: Wash with plenty of soap and water. |
| | | P337 + P313 | If eye irritation persists: Get medical advice/attention. |
| | | P332 + P313 | If skin irritation occurs: Get medical advice/attention. |
| | | P362 | Take off contaminated clothing and wash before reuse. |
| | | P305 + P351 + P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |

National Transport Commission (Australia)

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

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|---------------------------------------|---|
| Dangerous Goods Classification | 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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Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

| | | | |
|-----------------------------|------------------|---------------|--|
| HSNO Classifications | Physical Hazards | 4.1.1B | Readily combustible solids and solids that may cause fire through friction: low hazard |
| | Health Hazards | 6.4A | Substances that are irritating to the eye |

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

| Chemical Entity | Formula | CAS Number | Proportion |
|-------------------|-------------|-------------|------------|
| Sulphur | S | 7704-34-9 | >90 % |
| Inert ingredients | Unspecified | Unspecified | <10 % |

4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure

| | |
|--|--|
| Swallowed | IF SWALLOWED: Rinse mouth. Get medical advice/attention if you feel unwell. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. |
| Eye | IF IN EYES: Rinse cautiously with 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. Do NOT rub eyes. |
| 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 | Treat symptomatically. |
| Medical Conditions Aggravated by Exposure | Sensitive persons can experience skin sensitisation from repeated exposure to Sulfur dust; Allergic responses can occur. |

5. FIRE FIGHTING MEASURES

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| General Measures | If safe to do so, move undamaged containers from fire area. Cool containers with water spray until well after fire is out. Care should be taken that the Sulfur dust is not scattered into the air. |
| Flammability Conditions | FLAMMABLE SOLID: May be ignited by friction, heat, sparks or flame. |
| Extinguishing Media | Use dry chemical, Carbon dioxide, foam or water spray for extinction. High pressure water jets disperse the dust into the air and should NOT be used. Incipient fires in Sulfur storage piles can be smothered by gently shoveling more Sulfur, sand or fine earth on them to exclude all air. |
| Fire and Explosion Hazard | Vapours, dust, borings or turnings may form explosive mixtures with air. May burn fiercely. May re-ignite after fire is extinguished. May melt and flow when heated or involved in a fire. |
| Hazardous Products of Combustion | Fire may produce irritating, toxic, and/or corrosive gases, including Sulfur oxides. |
| Special Fire Fighting Instructions | Contain runoff from fire control or dilution water - Contaminated runoff may pollute waterways. |
| Personal Protective Equipment | Full fire kit and self-contained breathing apparatus (SCBA). |
| Flash Point | >180 °C (as dust) |
| Lower Explosion Limit | 35 g/cm ³ (dust) |
| Upper Explosion Limit | 1,400 g/cm ³ (dust) |
| Auto Ignition Temperature | 232 - as dust °C |
| Hazchem Code | 1Z |

6. ACCIDENTAL RELEASE MEASURES

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|---|---|
| General Response Procedure | No action shall be taken involving any personal risk or without suitable training. Ensure adequate ventilation. ELIMINATE all ignition sources (no smoking, flares, sparks or flame). Do not touch or walk through spilled material. Avoid dust formation. Avoid breathing dust and contact with eyes, skin and clothing. |
| Clean Up Procedures | Move containers from spill area. Recover material without delay. Use clean, non-sparking tools to collect material and place it into suitable, labelled containers for later disposal (see SECTION 13). Cover with damp absorbent (inert material, sand or soil) to suppress dust/fire potential. |
| Containment | Prevent entry into waterways, drains or confined areas. Prevent dust cloud - Sulfur dusts may form explosive mixtures with air; Explosion may be avoided by preventing atmospheres becoming dust-laden by adequate ventilation or by hose-down instead of sweeping. |
| Decontamination | No information available. |
| Environmental Precautionary Measures | Spillages and decontamination runoff should be prevented from entering drains and watercourses. If contamination of drains or waterways has occurred, advise local emergency services. Spill or leak area should be isolated immediately. Evacuate the accident area. Keep unauthorised personnel away. |

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| Evacuation Criteria | Keep upwind and to higher ground. |
| Personal Precautionary Measures | Use personal protective equipment as required (see SECTION 8). |

7. HANDLING AND STORAGE

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| 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 practices. Keep away from heat/sparks/open flames/hot surfaces - No smoking. Ground/bond container and receiving equipment. Take precautionary measures against static discharges. Use explosion-proof electrical/ventilating/lighting equipment. Avoid breathing dust and contact with eyes, skin and clothing. Wear protective gloves/eye protection/face protection (see SECTION 8). Take precautions to avoid sparking when tank covers are released; Open slowly and allow tanks to vent accumulated (highly flammable) Hydrogen sulfide gas if present. Molten Sulfur should be maintained at temperatures between 115 °C minimum, to prevent accumulation of solid Sulfur, and 145 °C maximum, to prevent Sulfur fires inside tanks. Dedicated heated and vented tanks required. |
| Storage | Store in accordance with local regulations. Store in a cool, dry and well-ventilated place. Keep container tightly closed when not in use - Check regularly for leaks; Avoid physical damage to containers. Keep away from heat/sparks/open flames/hot surfaces. Keep away from food, drink and animal feedstuffs. Keep away from incompatible materials (oxidising agents, reducing agents, bases, halides, flammable materials, metal oxides, metal salts, strong acids). |
| Container | Keep in the original container; Do not store in unlabelled containers. |

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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|--------------------------------------|--|
| General | No specific exposure standards are available for this product. For dusts from solid substances without specific occupational exposure standards: - Safe Work Australia Exposure Standard (Nuisance dusts): 8 hr TWA = 10 mg/m3 (measured as inhalable dust). - New Zealand WES (Particulates not otherwise classified): TWA = 10 mg/m3 (total); TWA = 3 mg/m3 (respirable). |
| Exposure Limits | No Data Available |
| Biological Limits | No information available. |
| Engineering Measures | 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: If determined by a risk assessment an inhalation risk exists, wear a dust mask/respirator meeting the requirements of AS/NZS 1715 and AS/NZS 1716. Eye/face protection: Wear eye protection/face protection. Recommended: Safety glasses with side-shields; Chemical goggles. Hand protection: Wear protective gloves. Protective (impervious) gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Recommended: For prolonged or repeated contact, wear gloves with a protection class of 5 or higher (breakthrough time: >240 min); For brief contact only, wear gloves with a protection class of 3 or higher (break through time: >60 min). Select gloves tested to a relevant standard (AS/NZS 2161.1 or national equivalent). Skin/body protection: Wear appropriate personal protective clothing to avoid skin contact. Choose body protection according to the amount and concentration of the hazardous substance(s) at the specific workplace. Recommended: Overalls, safety shoes; PVC apron. |
| Special Hazards Precautions | Prevent concentration in hollows and sumps. Do NOT enter confined spaces until atmosphere has been checked. |
| Work Hygienic Practices | Do not eat, drink or smoke when using this product. Wash hands before breaks and at the end of the workday. Take off contaminated clothing and wash before storage or reuse. |

9. PHYSICAL AND CHEMICAL PROPERTIES

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|-----------------------|------------------------|
| Physical State | Solid |
| Appearance | Divided solid (powder) |
| Odour | Odourless |
| Colour | Yellow |

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|---|---|
| pH | No Data Available |
| Vapour Pressure | No Data Available |
| Relative Vapour Density | 0.133 Air = 1 |
| Boiling Point | 444.6 °C |
| Melting Point | 112.8 - 119 °C |
| Freezing Point | No Data Available |
| Solubility | Insoluble in water; Slightly soluble in alcohol, ethene - Soluble in Carbon disulfide, benzene, toluene |
| Specific Gravity | 1.92 - 2.07 (Water = 1) |
| Flash Point | >180 °C (as dust) |
| Auto Ignition Temp | 232 - as dust °C |
| Evaporation Rate | No Data Available |
| Bulk Density | No Data Available |
| Corrosion Rate | No Data Available |
| Decomposition Temperature | No Data Available |
| Density | No Data Available |
| Specific Heat | No Data Available |
| Molecular Weight | 32.06 g/mol |
| 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 | 15 - 20 °C |
| Viscosity | No Data Available |
| Volatile Percent | No Data Available |
| VOC Volume | No Data Available |
| Additional Characteristics | Sulfur is a flammable substance in both solid and liquid states. |
| Potential for Dust Explosion | May form flammable dust clouds in air; The dust is characterised by a very low ignition point of 190 °C compared to other combustible dusts; dust clouds are readily ignited by weak frictional sparks if the Oxygen content is above 8%. |
| Fast or Intensely Burning Characteristics | May burn fiercely. May re-ignite after fire is extinguished. May melt and flow when heated or involved in a fire. |
| 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 | FLAMMABLE SOLID: May be ignited by friction, heat, sparks or flame. |
| Reactions That Release Gases or Vapours | Fire may produce irritating, toxic, and/or corrosive gases, including Sulfur oxides (Sulfur dioxide). |
| Release of Invisible Flammable Vapours and Gases | Reacts violently with strong oxidants causing fire and explosion hazard, especially if powdered. Molten sulfur reacts with hydrocarbons to form toxic and flammable gases. |

10. STABILITY AND REACTIVITY

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|---|---|
| General Information | Reacts violently with oxidising agents. |
| Chemical Stability | Stable under recommended storage and handling conditions. |
| Conditions to Avoid | Avoid dust generation. Keep away from heat and all sources of ignition. |
| Materials to Avoid | Incompatible/reactive with oxidising agents, reducing agents, bases, halides, flammable materials, metal oxides, metal salts, strong acids. Corrosive to steel. |
| Hazardous Decomposition Products | Fire may produce irritating, toxic, and/or corrosive gases, including Sulfur oxides (Sulfur dioxide). Molten sulfur reacts with hydrocarbons to form toxic and flammable gases. |

Hazardous Polymerisation

No information available.

11. TOXICOLOGICAL INFORMATION**General Information**

Based on our experience and the information available, adverse health effects are not expected if handled as recommended with suitable precautions for designated uses. Symptoms/effects that may occur if the product is mishandled and overexposure occurs:

- Ingestion: Swallowing can result in nausea, vomiting, diarrhoea, and gastrointestinal irritation.
 - Inhalation: breathing dust/powder of this substance may cause inflammation of the nose and the respiratory tract. Long term exposure to high dust concentrations may cause changes in lung function (pneumoconiosis) caused by particles less than 0.5 micron penetrating and remaining in the lungs (lung shadows show on x-ray).
 - Eye contact: Causes serious eye irritation.
 - Skin contact: Causes skin irritation. Not a skin sensitiser.
- CMR effects: The product does not have a carcinogenic effects; The product is not mutagenic or toxic for reproduction.

Acute**Ingestion**

Acute toxicity (Oral):
- LD50, Rat: >2,000 mg/kg

Other

Acute toxicity (Dermal):
- LD50, Rat: >2,000 mg/kg

Carcinogen Category

None

12. ECOLOGICAL INFORMATION**Ecotoxicity**

No information available.

Persistence/Degradability

The solid matter content can be separated mechanically in a sewage plant.

Mobility

No information available.

Environmental Fate

Avoid release to the environment; Prevent entry into drains and waterways.

Bioaccumulation Potential

No information available.

Environmental Impact

No Data Available

13. DISPOSAL CONSIDERATIONS**General Information**

The generation of waste should be avoided or minimised wherever possible. When recycling of the product is not possible, dispose to landfill or incinerate in accordance with local/regional/national regulations.

Special Precautions for Land Fill

Contaminated packaging: Can be reused after emptying and cleaning.

14. TRANSPORT INFORMATION**Land Transport (Australia)**

ADG Code

Proper Shipping Name

SULPHUR

Class

4.1 Flammable Solids

Subsidiary Risk(s)

No Data Available

EPG

20 Solids - Flammable

| | |
|--------------------------|-------------------|
| UN Number | 1350 |
| Hazchem | 1Z |
| Pack Group | III |
| Special Provision | No Data Available |

Land Transport (Malaysia)

ADR Code

| | |
|-----------------------------|-----------------------|
| Proper Shipping Name | SULPHUR |
| Class | 4.1 Flammable Solids |
| Subsidiary Risk(s) | No Data Available |
| EPG | 20 Solids - Flammable |
| UN Number | 1350 |
| Hazchem | 1Z |
| Pack Group | III |
| Special Provision | No Data Available |

Land Transport (New Zealand)

NZS5433

| | |
|-----------------------------|-----------------------|
| Proper Shipping Name | SULPHUR |
| Class | 4.1 Flammable Solids |
| Subsidiary Risk(s) | No Data Available |
| EPG | 20 Solids - Flammable |
| UN Number | 1350 |
| Hazchem | 1Z |
| Pack Group | III |
| Special Provision | No Data Available |

Land Transport (United States of America)

US DOT

| | |
|-----------------------------|----------------------|
| Proper Shipping Name | SULPHUR |
| Class | 4.1 Flammable Solids |
| Subsidiary Risk(s) | No Data Available |
| ERG | 133 Flammable Solids |
| UN Number | 1350 |
| Hazchem | 1Z |
| Pack Group | III |
| Special Provision | No Data Available |

Sea Transport

IMDG Code

| | |
|-----------------------------|----------------------|
| Proper Shipping Name | SULPHUR |
| Class | 4.1 Flammable Solids |
| Subsidiary Risk(s) | No Data Available |
| UN Number | 1350 |
| Hazchem | 1Z |
| Pack Group | III |
| Special Provision | No Data Available |
| EMS | F-A, S-G |
| Marine Pollutant | No |

Air Transport

IATA DGR

| | |
|-----------------------------|----------------------|
| Proper Shipping Name | SULPHUR |
| Class | 4.1 Flammable Solids |
| Subsidiary Risk(s) | No Data Available |
| UN Number | 1350 |
| Hazchem | 1Z |
| Pack Group | III |
| Special Provision | No Data Available |

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) |
|---------------------------------------|---|

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 HSR001284

National/Regional Inventories

| | |
|----------------------------------|----------------|
| Australia (AICS) | Listed |
| Canada (DSL) | Not Determined |
| Canada (NDSL) | Not Determined |
| China (IECSC) | Not Determined |
| Europe (EINECS) | Not Determined |
| Europe (REACH) | Not Determined |
| Japan (ENCS/METI) | Not Determined |
| Korea (KECI) | Not Determined |
| Malaysia (EHS Register) | Not Determined |
| New Zealand (NZIoC) | Listed |
| Philippines (PICCS) | Not Determined |
| Switzerland (Giftliste 1) | Not Determined |

| | |
|---|----------------|
| Switzerland (Inventory of Notified Substances) | Not Determined |
| Taiwan (NCSR) | Not Determined |
| USA (TSCA) | Not Determined |

16. OTHER INFORMATION

| | |
|------------------------------|---|
| Related Product Codes | SULPHD1100, SULPHD2100, SULPHD2200, SULPHU0300, SULPHU0301, SULPHU0302, SULPHU0303, SULPHU0700, SULPHU1005, SULPHU1015, SULPHU1101, SULPHU1400, SULPHU1401, SULPHU2700, SULPHU2701, SULPHU4810, SULPHU5000, SULPHU5001, SULPHU6500, SULPHU6501, SULPHU6502, SULPHU6503, SULPHU6510, SULPHU6511, SULPHU6512, SULPHU6600, SULPHU6601, SULPHU6602, SULPHU7000, SULPHU7500, SULPHU7600, SULPHU8100, SULPHU8300, SULPHU8500, SULPHU8600, SULPHU9200, SULPHU9300, SULPHU9400, SULPHU9500, SULPHU9600, SULPHU9900, SULPHW7100 |
| Revision | 3 |
| Revision Date | 23 Nov 2017 |
| Key/Legend | <p>< Less Than > Greater Than</p> <p>AICS Australian Inventory of Chemical Substances atm Atmosphere CAS Chemical Abstracts Service (Registry Number) cm² 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 Fahrenheit g Grams g/cm³ 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 insoluble in each other. inHg Inch of Mercury inH₂O Inch of Water K Kelvin kg Kilogram kg/m³ 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 m³ Cubic Metre mbar Millibar mg Milligram mg/24H Milligrams per 24 Hours mg/kg Milligrams per Kilogram mg/m³ 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 Health 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</p> |

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