

### 1. IDENTIFICATION

<b>Product Name</b>	<b>Menadione nicotinamide bisulfite (MNB)</b>
<b>Other Names</b>	Vitamin K3 (Menadione)
<b>Uses</b>	Feed ingredient/additive; Animal nutrition.
<b>Chemical Family</b>	No Data Available
<b>Chemical Formula</b>	No Data Available
<b>Chemical Name</b>	Menadione nicotinamide bisulfite (MNB)
<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

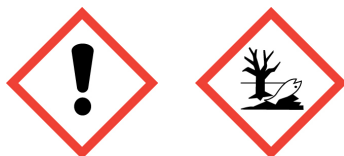
### 2. HAZARD IDENTIFICATION

**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>	Serious Eye Damage/Irritation - Category 2A Skin Corrosion/Irritation - Category 2 Acute Hazard To The Aquatic Environment - Category 1 Long-term Hazard To The Aquatic Environment - Category 1

**Pictograms**



**Signal Word** Warning

<b>Hazard Statements</b>	<b>H315</b>	Causes skin irritation.
	<b>H319</b>	Causes serious eye irritation.
	<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.
		<b>P280</b>	Wear protective gloves/eye protection/face protection.
		<b>P302 + P352</b>	IF ON SKIN: Wash with plenty of soap and water.
	Response	<b>P337 + P313</b>	If eye irritation persists: Get medical advice/attention.
		<b>P391</b>	Collect spillage.
		<b>P332 + P313</b>	If skin irritation occurs: Get medical advice/attention.
		<b>P362</b>	Take off contaminated clothing and wash before reuse.
Disposal	<b>P305 + P351 + P338</b>	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.	
	<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** NOT 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

<b>HSNO Classifications</b>	Health Hazards	<b>6.3A</b>	Substances that are irritating to the skin
		<b>6.4A</b>	Substances that are irritating to the eye
	Environmental Hazards	<b>9.1A</b>	Substances that are very ecotoxic in the aquatic environment

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

*Ingredients*

Chemical Entity	Formula	CAS Number	Proportion
Menadione nicotinamide bisulfite	No Data Available	73581-79-0	<=100 %

## 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. Call a Poison Centre or doctor/physician if you feel unwell.
<b>Eye</b>	Eye contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.
<b>Skin</b>	Skin contact: Wash with plenty of soap and water. Take off contaminated clothing and wash clothing 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 experiencing respiratory symptoms, call a Poison Centre or doctor/physician.
<b>Advice to Doctor</b>	Treat symptomatically.
<b>Medical Conditions Aggravated by Exposure</b>	Inhalation of product may aggravate existing chronic respiratory problems such as asthma, emphysema or bronchitis.

## 5. FIRE FIGHTING MEASURES

<b>General Measures</b>	If safe to do so, move undamaged containers from fire area. Cool containers with flooding quantities of water until well after fire is out.
<b>Flammability Conditions</b>	Product will burn under fire conditions.
<b>Extinguishing Media</b>	Suitable: Dry chemical, CO <sub>2</sub> , water spray or foam. Unsuitable: Strong water jet.
<b>Fire and Explosion Hazard</b>	May form combustible dust concentrations in air.
<b>Hazardous Products of Combustion</b>	Fire may produce irritating, toxic, and/or corrosive fumes, including: Oxides of carbon, oxides of sulfur, oxides of nitrogen.
<b>Special Fire Fighting Instructions</b>	No information available.
<b>Personal Protective Equipment</b>	Firefighters should wear approved self-contained breathing apparatus (SCBA) and full protective clothing.
<b>Flash Point</b>	No Data Available
<b>Lower Explosion Limit</b>	No Data Available
<b>Upper Explosion Limit</b>	No Data Available
<b>Auto Ignition Temperature</b>	No Data Available
<b>Hazchem Code</b>	No Data Available

## 6. ACCIDENTAL RELEASE MEASURES

<b>General Response Procedure</b>	Ventilate enclosed spaces before entering. ELIMINATE all ignition sources (no smoking, flares, sparks or flame). Do not touch or walk through spilled material.
<b>Clean Up Procedures</b>	Use clean non-sparking tools to collect material and place it into loosely-covered containers for later disposal.
<b>Containment</b>	Stop leak if safe to do so – Prevent entry into waterways, drains or confined areas. Prevent dust cloud.
<b>Decontamination</b>	Clean up residual material by washing area with water. Do not flush to drain - Collect for disposal.
<b>Environmental Precautionary Measures</b>	Do not allow spills to enter drains or waterways.
<b>Evacuation Criteria</b>	Spill or leak area should be isolated immediately. Keep unauthorised personnel away. Keep upwind and to higher ground.
<b>Personal Precautionary Measures</b>	Wear appropriate personal protective equipment (see Section 8).

## 7. HANDLING AND STORAGE

<b>Handling</b>	Quick drench showers and eyewash fountains should be provided within the immediate work are for emergency use. Handle in accordance with good industrial hygiene and safety practice. Ensure good ventilation of the work station. Avoid breathing dust. Avoid contact with skin and eyes. Wear protective gloves/eye protection/face protection. DUST EXPLOSION HAZARD - Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Take precautionary measures against static discharge.
<b>Storage</b>	Store in a cool, dry and well-ventilated place. Keep container tightly closed. Keep away from heat and ignition sources (sparks, flames, hot surfaces). Protect from sunlight. Keep away from strong acids, strong bases and strong oxidising agents. Handle containers with care to avoid damage and spillages.
<b>Container</b>	Keep in the original container.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

<b>General</b>	Contains no substances with occupational exposure limit values. Dusts from solid substances without specific occupational exposure standards: - Safe Work Australia (Rogue dust): TWA = 10 mg/m <sup>3</sup> (inspirable dust). - OSHA PEL (Particulates not otherwise regulated): TWA = 15 mg/m <sup>3</sup> (total dust); 5 mg/m <sup>3</sup> (respirable).
<b>Exposure Limits</b>	No Data Available
<b>Biological Limits</b>	No information available.
<b>Engineering Measures</b>	Provide adequate ventilation. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. If these are not sufficient to maintain concentrations of particulates and any vapour below occupational exposure limits suitable respiratory protection must be worn.
<b>Personal Protection Equipment</b>	Respiratory protection: When respirators are required, select NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with regulatory standards and/or industrial recommendations. Recommended: Dust/mist filtering respirator. Eye protection: Safety glasses with side-shields (minimum protection). Hand protection: Gloves (PVC or rubber). Skin/body protection: Suitable long-sleeved clothing.
<b>Special Hazards Precautions</b>	No information available.
<b>Work Hygienic Practices</b>	Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored. Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics, or using the toilet. Wash exposed skin promptly to remove accidental splashes of contact with this material.

## 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>	1.0 - 3.5 (10% aqueous sol.)
<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>	178 - 180 °C
<b>Freezing Point</b>	No Data Available
<b>Solubility</b>	Not soluble
<b>Specific Gravity</b>	No Data Available
<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>	No Data Available
<b>Specific Heat</b>	No Data Available
<b>Molecular Weight</b>	No Data Available
<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 Data Available
<b>Potential for Dust Explosion</b>	This product (when mixed with air in critical proportions and in the presence of an ignition source) may present an explosion hazard.
<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>	Product will burn under fire conditions.
<b>Reactions That Release Gases or Vapours</b>	Fire may produce irritating, toxic, and/or corrosive fumes, including: Oxides of carbon, oxides of sulfur, oxides of nitrogen.
<b>Release of Invisible Flammable Vapours and Gases</b>	No information available.

## 10. STABILITY AND REACTIVITY

<b>Chemical Stability</b>	This product is stable under the suggested handling and storage conditions.
<b>Conditions to Avoid</b>	Avoid heat and ignition sources (no smoking, flares, sparks or flame).
<b>Materials to Avoid</b>	Avoid strong oxidising agents, strong acids and strong bases.
<b>Hazardous Decomposition Products</b>	Oxides of carbon, oxides of sulfur, oxides of nitrogen.
<b>Hazardous Polymerisation</b>	Will not occur.

## 11. TOXICOLOGICAL INFORMATION

<b>General Information</b>	<p>Most important symptoms &amp; effects:</p> <ul style="list-style-type: none"> <li>- Eye contact: Causes serious eye irritation. Can cause irritation and redness on prolonged contact.</li> <li>- Skin contact: Causes skin irritation. May cause dryness and irritation on prolonged contact.</li> <li>- Ingestion: Low acute oral toxicity.</li> <li>- Inhalation: Dusts may cause respiratory tract irritation. Inhalation of product may aggravate existing chronic respiratory problems such as asthma, emphysema or bronchitis.</li> </ul>
<b>Acute</b>	
<b>Ingestion</b>	<p>Acute toxicity - Oral:</p> <ul style="list-style-type: none"> <li>- Rat LD50: &gt;5,000 mg/kg</li> </ul>
<b>Carcinogen Category</b>	None

## 12. ECOLOGICAL INFORMATION

<b>Ecotoxicity</b>	Aquatic toxicity: - Toxicity to Fish (Rainbow trout), (96 h) LC50: 0.43 mg/l; (96 h) LC0: 0.32 mg/l (Highly toxic). - Toxicity to Crustaceans (Daphnia magna), (48 h) EC50: 0.77 mg/l; (72 h) EC0: 0.40 mg/l (Highly toxic). - Toxicity to Algae (Selenastrum copricomutum), (72 h) Er50: 6.6 mg/l; (72 h) Eb50: 2.6 mg/l; NOEC: 0.90 mg/l.
<b>Persistence/Degradability</b>	17% biodegradation after 28 days (OECD 301A).
<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>	Dispose of contents/container in accordance with local, state and federal regulations.
<b>Special Precautions for Land Fill</b>	No information available.

## 14. TRANSPORT INFORMATION

### Land Transport (Australia)

ADG Code

<b>Proper Shipping Name</b>	VITAMIN K3 (MNB)
<b>Class</b>	No Data Available
<b>Subsidiary Risk(s)</b>	No Data Available
<b>EPG</b>	47 Low To Moderate Hazard Substances
<b>UN Number</b>	No Data Available
<b>Hazchem</b>	No Data Available
<b>Pack Group</b>	No Data Available
<b>Special Provision</b>	AU01

### Land Transport (Malaysia)

ADR Code

<b>Proper Shipping Name</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Menadione nicotinamide bisulfite)
<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. (Menadione nicotinamide bisulfite)
<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. (Menadione nicotinamide bisulfite)
<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. (Menadione nicotinamide bisulfite)
<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

<b>Proper Shipping Name</b>	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Menadione nicotinamide bisulfite)
<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>	NOT 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>	HSR002521
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### National/Regional Inventories

<b>Australia (AICS)</b>	Not Listed
<b>Canada (DSL)</b>	Not Listed
<b>Canada (NDSL)</b>	Not Listed
<b>China (IECSC)</b>	Listed
<b>Europe (EINECS)</b>	277-543-7
<b>Europe (REACH)</b>	Pre-registered
<b>Japan (ENCS/METI)</b>	Not Listed
<b>Korea (KECI)</b>	Not Listed
<b>Malaysia (EHS Register)</b>	Listed
<b>New Zealand (NZIoC)</b>	Listed
<b>Philippines (PICCS)</b>	Not Listed
<b>Switzerland (Giftliste 1)</b>	Not Determined
<b>Switzerland (Inventory of Notified Substances)</b>	Not Determined
<b>Taiwan (NCSR)</b>	Listed
<b>USA (TSCA)</b>	Not Listed

## 16. OTHER INFORMATION

<b>Related Product Codes</b>	VITKCN1000, VITKCN1001, VITKCN1002, VITKCN1003, VITKCN1004, VITKCN1005, VITKCN1006, VITKCN1007, VITKCN1100, VITKCN1101, VITKCN1200, VITKCN2000, VITKCN3000, VITKCN4000
<b>Revision</b>	1
<b>Revision Date</b>	25 Mar 2015
<b>Key/Legend</b>	<p>&lt; Less Than &gt; 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</p>



**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  
**inH<sub>2</sub>O** Inch of Water  
**K** Kelvin  
**kg** Kilogram  
**kg/m<sup>3</sup>** Kilograms per Cubic Metre  
**lb** Pound  
**LC<sub>50</sub>** LC stands for lethal concentration. LC<sub>50</sub> 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.  
**LD<sub>50</sub>** LD stands for Lethal Dose. LD<sub>50</sub> 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<sup>3</sup>** Cubic Metre  
**mbar** Millibar  
**mg** Milligram  
**mg/24H** Milligrams per 24 Hours  
**mg/kg** Milligrams per Kilogram  
**mg/m<sup>3</sup>** Milligrams per Cubic Metre  
**Misc** or **Miscible** Liquids form one homogeneous liquid phase regardless of the amount of either component present.  
**mm** Millimetre  
**mmH<sub>2</sub>O** 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  
**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