



SAFETY DATA SHEET FUMARIC ACID REVISION 4, DATE 15 APR 19

1. IDENTIFICATION

Product Name	Fumaric acid
Other Names	No Data Available
Uses	Food additive; acidulant.
Chemical Family	No Data Available
Chemical Formula	C ₄ H ₄ O ₄
Chemical Name	2-Butenedioic acid, (E)-
Product Description	No Data Available

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		Hazardous according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS)	
Hazard Categories		Serious Eye Damage/Irritation - Category 2A	
Pictograms			
Signal Word		Warning	
Hazard Statements		H319	Causes serious eye irritation.
Precautionary Statements	Prevention	P280	Wear eye protection/face protection.
		P264	Wash hands thoroughly after handling.
	Response	P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
		P337 + P313	If eye irritation persists: Get medical advice.

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)
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Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

HSNO Classifications	Health Hazards	6.4A	Substances that are irritating to the eye
	Environmental Hazards	9.1C	Substances that are harmful in the aquatic environment

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Chemical Entity	Formula	CAS Number	Proportion
Fumaric acid	C4H4O4	110-17-8	<=100 %

4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure

Swallowed	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. Never give anything by mouth to an unconscious person.
Eye	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. Get

	medical advice/attention.
Skin	IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it 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.
Advice to Doctor	Treat symptomatically.
Medical Conditions Aggravated by Exposure	No information available.

5. FIRE FIGHTING MEASURES

General Measures	If safe to do so, move undamaged containers from fire area. Cool containers with water spray until well after fire is out.
Flammability Conditions	Combustible solid; May burn but does not ignite readily.
Extinguishing Media	Use dry chemical, Carbon dioxide (CO ₂), foam or water spray for extinction.
Fire and Explosion Hazard	Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.
Hazardous Products of Combustion	Fire may produce irritating, toxic and/or corrosive fumes, including Carbon oxides.
Special Fire Fighting Instructions	Contain runoff from fire control or dilution water - Runoff may pollute waterways.
Personal Protective Equipment	Wear positive pressure 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	ca. 399 °C
Hazchem Code	No Data Available

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure	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	Collect material (sweep or vacuum up) and seal in properly labelled containers for disposal (see SECTION 13). Avoid dispersal of dust in the air (i.e. clearing dusty surfaces with compressed air).
Containment	Stop leak if safe to do so – Prevent entry into waterways, drains or confined areas. Prevent dust cloud.
Decontamination	No information available.
Environmental Precautionary Measures	Prevent entry into drains and waterways.
Evacuation Criteria	Spill or leak area should be isolated immediately. Keep unauthorised personnel away.
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. Minimise dust generation and accumulation. Avoid breathing dust and contact with eyes, skin and clothing. Do not ingest. Use personal protective equipment as required (see SECTION 8). Dry powders can build static electricity charges when subjected to the friction of
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transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres.

Storage	Store in a cool, dry and well-ventilated place, out of direct sunlight. Keep container tightly closed when not in use - check regularly for spills. Avoid exposure to air and moisture. Keep away from heat and sources of ignition - No smoking. Keep away from incompatible materials (see SECTION 10).
Container	Keep only in dedicated and assigned containers. Nitrogen blanketing required for large scale operations. Empty containers must not be used for other products. - Unsuitable materials: Zinc

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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/m ³ (measured as inhalable dust). - New Zealand WES (Particulates not otherwise classified): TWA = 10 mg/m ³ ; TWA = 3 mg/m ³ (respirable dust).
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: In case of inadequate ventilation, wear respiratory protection. Recommended: Dust mask/particulate filter respirator (refer to AS/NZS 1715 & 1716). - Eye/face protection: Wear appropriate eye protection to avoid eye contact. Recommended: Chemical goggles. - Hand protection: Handle with gloves. Recommended: Impervious gloves. - Skin/body protection: Wear appropriate personal protective clothing to avoid skin contact. Recommended: Overalls, safety shoes.
Special Hazards Precautions	No information available.
Work Hygienic Practices	Do not eat, drink or smoke when using this product. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storage or re-use. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Solid
Appearance	Granules or crystalline powder
Odour	Odourless
Colour	White
pH	2.24 (0.5% w/v sol'n) (25 °C)
Vapour Pressure	0.000154 mmHg (@ 25 °C)
Relative Vapour Density	No Data Available
Boiling Point	200 °C
Melting Point	287 °C
Freezing Point	No Data Available
Solubility	Soluble in water (7 g/L) 25°C
Specific Gravity	1.635 - 1.64
Flash Point	No Data Available
Auto Ignition Temp	ca. 399 °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	116.07
Net Propellant Weight	No Data Available
Octanol Water Coefficient	log Pow = ca. 4.02 (20 °C)
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	Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.
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	Combustible solid; May burn but does not ignite readily.
Reactions That Release Gases or Vapours	Fire/decomposition may produce irritating, toxic and/or corrosive fumes, including Carbon oxides.
Release of Invisible Flammable Vapours and Gases	No information available.

10. STABILITY AND REACTIVITY

General Information	No information available.
Chemical Stability	Material is stable under normal conditions.
Conditions to Avoid	Avoid generating dust. Keep away from heat and sources of ignition. Avoid temperatures above 190°C.
Materials to Avoid	Incompatible/reactive with oxidising agents, amines, strong bases, alkali metals, carbonates.
Hazardous Decomposition Products	Fire/decomposition may produce irritating, toxic and/or corrosive fumes, including Carbon oxides.
Hazardous Polymerisation	Hazardous polymerisation will not occur.

11. TOXICOLOGICAL INFORMATION

General Information	<ul style="list-style-type: none"> - Acute toxicity: No adverse effects expected; large amounts may cause nausea and vomiting. - Skin corrosion/irritation: Contact with skin may result in irritation. - Eye damage/irritation: Causes serious eye irritation. - Respiratory/skin sensitisation: Not a skin sensitizer (Guinea pig). - Germ cell mutagenicity: Not classified.
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- Carcinogenicity: Not classified.
- Reproductive toxicity: Not classified.
- STOT (single exposure): Breathing in dust may result in respiratory irritation.
- STOT (repeated exposure): Not classified.
- Aspiration toxicity: Not classified.

Acute

Ingestion	Acute toxicity (Oral): - LD50, Rat (female): 9,300 mg/kg
Other	Acute toxicity (Dermal): - LD50, Rat: 20,000 mg/kg bw.
Inhalation	Acute toxicity (Inhalation): - LC50, Rat: >1,306 mg/L air (4 h) [Analytical].
Carcinogen Category	None

12. ECOLOGICAL INFORMATION

Ecotoxicity	Aquatic toxicity: - LC50, Fish: >100 mg/L (96 h) [OECD 203]. - EC50, Daphnia: 212 mg/L (48 h) [OECD 202]. - EC50, Algae: >100 mg/L (72 h) [OECD 201].
Persistence/Degradability	Readily biodegradable.
Mobility	The product is soluble in water.
Environmental Fate	No known significant effects or critical hazards.
Bioaccumulation Potential	No information available.
Environmental Impact	No Data Available

13. DISPOSAL CONSIDERATIONS

General Information	Dispose of contents/container in accordance with local/regional/national/international regulations.
Special Precautions for Land Fill	Since emptied containers may retain product residue, follow label warnings even after container is emptied.

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

ADG Code

Proper Shipping Name	Fumaric acid
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 LAND transport.

Land Transport (Malaysia)

ADR Code

Proper Shipping Name	Fumaric acid
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	Fumaric acid
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	Fumaric acid
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	Fumaric acid
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	Fumaric acid
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)
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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	HSR002503 HSR003272 (Revoked)
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National/Regional Inventories

Australia (AIC)	Listed
Canada (DSL)	Listed
Canada (NDSL)	Listed
China (IECSC)	Listed
Europe (EINECS)	203-743-0
Europe (REACH)	Listed
Japan (ENCS/METI)	2-1091
Korea (KECI)	KE-13658
Malaysia (EHS Register)	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	FUACID1000, FUACID1001, FUACID1002, FUACID1003, FUACID1004, FUACID1005, FUACID1006, FUACID1007, FUACID1008, FUACID1009, FUACID1010, FUACID1011, FUACID1012, FUACID1013, FUACID1014, FUACID1015, FUACID1016, FUACID1017, FUACID1018, FUACID1019, FUACID1020, FUACID1021, FUACID1022, FUACID1023, FUACID1024, FUACID1025, FUACID1026, FUACID1027, FUACID1028, FUACID1029, FUACID1030, FUACID1031, FUACID1032, FUACID1033, FUACID1034, FUACID1035, FUACID1036, FUACID1037, FUACID1038, FUACID1039, FUACID1040, FUACID1041, FUACID1042, FUACID1043, FUACID1044, FUACID1045, FUACID1046, FUACID1048, FUACID1050, FUACID1500, FUACID1501, FUACID1600, FUACID1700, FUACID1701, FUACID1705, FUACID1710, FUACID1715, FUACID1720, FUACID1730, FUACID2000, FUACID2100, FUACID2500, FUACID3000, FUACID3001, FUACID3010, FUACID3011, FUACID3012, FUACID3100, FUACID3200, FUACID3300, FUACID3320, FUACID4000, FUACID4100, FUACID4200, FUACID4500, FUACID4501, FUACID4700, FUACID5100, FUACID5101, FUACID5102, FUACID5103, FUACID5104, FUACID5105, FUACID5106, FUACID5107, FUACID5200, FUACID5201, FUACID6000, FUACID6500, FUACID7000, FUACID7200, FUACID7400, FUACID8000, FUACID8100, FUACID9000, FUACID9001, FUACID9200, FUACID9201, FUACID9500, FUACID9501, FUACID9510
Revision	4
Revision Date	15 Apr 2019
Key/Legend	<p>< Less Than</p> <p>> Greater Than</p> <p>AICS Australian Inventory of Chemical Substances</p> <p>atm Atmosphere</p> <p>CAS Chemical Abstracts Service (Registry Number)</p> <p>cm² Square Centimetres</p> <p>CO₂ Carbon Dioxide</p> <p>COD Chemical Oxygen Demand</p> <p>deg C (°C) Degrees Celcius</p> <p>EPA (New Zealand) Environmental Protection Authority of New Zealand</p> <p>deg F (°F) Degrees Fahrenheit</p> <p>g Grams</p> <p>g/cm³ Grams per Cubic Centimetre</p> <p>g/l Grams per Litre</p> <p>HSNO Hazardous Substance and New Organism</p> <p>IDLH Immediately Dangerous to Life and Health</p> <p>immiscible Liquids are insoluable in each other.</p> <p>inHg Inch of Mercury</p> <p>inH₂O Inch of Water</p> <p>K Kelvin</p> <p>kg Kilogram</p> <p>kg/m³ Kilograms per Cubic Metre</p> <p>lb Pound</p> <p>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.</p> <p>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.</p> <p>ltr or L Litre</p> <p>m³ Cubic Metre</p> <p>mbar Millibar</p>

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

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