

Safety Data Sheet D-Limonene Revision 4, Date 19 Jun 2018

1. IDENTIFICATION

Product Name	D-Limonene
Other Names	Hydrocarbons, terpene processing by product [CAS#68956-56-9]; Orange, sweet, extract/Sweet orange, peel, tincture [CAS#8028-48-6]; Terpenes and terpenoids, mixed grapefruit oil and shaddock oil [CAS#68917-58-8]; Terpenes and terpenoids, mixed sour and sweet orange oil [CAS#68917-57-7]; Terpenes and terpenoids, orange oil [CAS#68647-72-3]; Terpenes and terpenoids, turpentine oil, limonene fraction [CAS#65996-99-8]
Uses	It can be used to formulate cleaners and as flavour and fragrance ingredient.
Chemical Family	No Data Available
Chemical Formula	C10H16
Chemical Name	Cyclohexene, 1-methyl-4-(1-methylethenyl)-, (R)-
Product Description	A colourless liquid with a neutral citrus odour.

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
Chemcall	New Zealand	0800-243622 +64-4-9179888
National Poisons Centre	New Zealand	0800-764766

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	Flammable Liquids - Category 3 Skin Corrosion/Irritation - Category 2 Sensitisation (Skin) - Category 1
Redox Pty Ltd	Australia New Zealand Malaysia

Redox NZ Auckland Office PO Box 76886 Manukau City Auckland 2241 New Zealand 11 Mayo Road Wiri Auckland New Zealand
 Phone
 +64 9 250 6222

 Fax
 +64 9 250 6226

 E-mail
 auckland@redox.com

 Web
 www.redox.com

 ABN
 92 000 762 345

AustraliaNew ZealandAdelaideAucklandBrisbaneChristchurchMelbourneHawke's BayPerthSydney

d Malaysia Kuala Lumpur y USA Los Angeles





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Aspiration Hazard - Category 1

Acute Hazard To The Aquatic Environment - Category 1

Long-term Hazard To The Aquatic Environment - Category 1

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Signal Word		Danger	
Hazard Statements		H226	Flammable liquid and vapour.
		H304	May be fatal if swallowed and enters airways.
		H315	Causes skin irritation.
		H317	May cause an allergic skin reaction.
		H410	Very toxic to aquatic life with long lasting effects.
Precautionary Statements	Prevention	P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
		P233	Keep container tightly closed.
		P240	Ground/bond container and receiving equipment.
		P241	Use explosion-proof electrical/ventilating/lighting/equipment.
		P242	Use only non-sparking tools.
		P243	Take precautionary measures against static discharge.
		P261	Avoid breathing mist/vapours/spray.
		P264	Wash hands thoroughly after handling.
		P272	Contaminated work clothing should not be allowed out of the workplace.
		P273	Avoid release to the environment.
		P280	Wear protective gloves/protective clothing/eye protection/face protection.
	Response	P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
		P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
		P303 + P361 + P353	IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.
		P331	Do NOT induce vomiting.
		P333 + P313	If skin irritation or rash occurs: Get medical advice/attention.
		P362	Take off contaminated clothing and wash before reuse.
		P370 + P378	In case of fire: Use sand or water for extinction.
		P391	Collect spillage.
	Storage	P403 + P235	Store in a well-ventilated place. Keep cool.
		P405	Store locked up.
	Disposal	P501	Dispose of contents/container in accordance with local / regional / national / international regulations.

Pictograms

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

HSNO Classifications	Physical Hazards	3.1C	Flammable liquid - medium hazard
	Health Hazards	6.1E	Substances that are acutely toxic -May be harmful, Aspiration hazard
		6.3A	Substances that are irritating to the skin
		6.4A	Substances that are irritating to the eye
		6.5B	Substances that are contact sensitisers
	Environmental Hazards	9.1A	Substances that are very ecotoxic in the aquatic environment



9.2B

Substances that are ecotoxic in the soil environment

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Chemical Entity	Formula	CAS Number	Proportion
D-Limonene	C10H16	5989-27-5	<=100 %
Hydrocarbons, terpene processing by product	Alternative CAS No.	68956-56-9	No Data Available
Orange, sweet, extract	Alternative CAS No.	8028-48-6	No Data Available
Terpenes and terpenoids, mixed grapefruit oil and shaddock oil	Alternative CAS No.	68917-58-8	No Data Available
Terpenes and terpenoids, mixed sour and sweet orange oil	Alternative CAS No.	68917-57-7	No Data Available
Terpenes and terpenoids, orange oil	Alternative CAS No.	68647-72-3	No Data Available
Terpenes and terpenoids, turpentine oil, limonene fraction	Alternative CAS No.	65996-99-8	No Data Available

4. FIRST AID MEASURES

Description of necessary measur	res according to routes of exposure
Swallowed	IF SWALLOWED: Rinse mouth, then drink plenty of water. Do NOT induce vomiting. Immediately call a Poison Centre or doctor/physician. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. 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. If eye irritation persists, get medical advice/attention.
Skin	IF ON SKIN (or hair): Remove contaminated clothing and shoes immediately. Wash skin and hair with plenty of soap and running water for at least 15 minutes. In case of gross contamination, drench contaminated clothing and skin with plenty of water before removing clothes. If skin irritation or rash occurs, get medical advice/attention. Wash contaminated clothing and shoes before reuse.
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 - Do not use direct mouth-to-mouth method if victim ingested or inhaled the substance; use alternative respiratory method or proper respiratory device - Administer oxygen if breathing is difficult.
Advice to Doctor	Keep victim calm and warm - Obtain immediate medical care. Ensure that attending medical personnel are aware of 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	If safe to do so, move undamaged containers from fire area. Cool container with water spray until well after fire is out. Avoid getting water inside containers.
Flammability Conditions	FLAMMABLE LIQUID & VAPOUR: May be ignited by heat, sparks or flames.
Extinguishing Media	Use dry chemical, Carbon dioxide (CO2), foam or water spray for extinction - Do not use water jets.
Fire and Explosion Hazard	Risk of violent reaction or explosion: Vapours may form explosive mixtures with air. Vapours may travel to source of ignition and flash back. Most vapours are heavier than air and will spread along ground and will collect in low or confined areas. Many liquids are lighter than water. Containers may explode when heated. Vapours from runoff may create an explosion hazard.
Hazardous Products of Combustion	Fire may produce irritating, toxic and/or corrosive gases, including Carbon oxides and other non-identified organic compounds.
Special Fire Fighting Instructions	Contain runoff from fire control or dilution water - Runoff may pollute waterways; Vapours from runoff may create an explosion hazard.
Personal Protective Equipment	Wear self-contained breathing apparatus (SCBA) and chemical protective clothing. SCBA and structural firefighting

	uniform provide limited protection.
Flash Point	45 - 48 °C
Lower Explosion Limit	0.7 %
Upper Explosion Limit	6.1 %
Auto Ignition Temperature	237 °C
Hazchem Code	3Y

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure	Ensure adequate ventilation - Ventilate enclosed spaces before entering. ELIMINATE all ignition sources - All equipment used in handling the product must be earthed. Do not touch or walk through spilled material. Avoid breathing vapours and contact with eyes, skin and clothing.
Clean Up Procedures	Absorb with earth, sand or other non-combustible material. Use clean, non-sparking tools to collect absorbed material and place it into suitable containers for later disposal (see SECTION 13).
Containment	Stop leak if safe to do so – Prevent entry into waterways, drains or confined areas. Vapour-suppressing foam may be used to control vapours - Water spray may be used to knock down or divert vapour clouds.
Decontamination	Clean area with soap (detergent) and water.
Environmental Precautionary Measures	Spillages and decontamination runoff should be prevented from entering drains and watercourses.
Evacuation Criteria	Spill or leak area should be isolated immediately. Keep unauthorised personnel away. Keep upwind and to higher ground. Large spill: Immediately contact Police or Fire Brigade; Consider initial downwind evacuation of areas within at least 100 m.
Personal Precautionary Measures	SCBA and gas-tight suits should be worn when dealing with damaged or leaking containers and where there is no risk of ignition. SCBA and structural firefighting uniform provide limited protection where there is a risk of ignition.

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 breathing mist/vapours and contact with eyes, skin and clothing. Do not ingest. Wear protective gloves/eye protection/face protection (see SECTION 8). FLAMMABLE LIQUID & VAPOUR: Keep away from heat and sources of ignition - No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge.
Storage	Store in a cool, dry and well-ventilated place, out of direct sunlight. Keep container tightly closed. Keep away from heat and sources of ignition - No smoking. Keep away from foodstuffs and incompatible materials (see SECTION 10). Store locked up.
Container	Keep in the original container.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

General	No specific exposure standards are available for this product.
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: Organic vapour respirator (refer to AS/NZS 1715 & 1716). Eye/face protection: Wear appropriate eye protection to avoid eye contact. Recommended: Use safety glasses and face shield, if required. Hand protection: Wear protective gloves. Recommended: Use chemically-resistant gloves. Skin/body protection: Wear appropriate personal protective clothing to prevent skin contact. Recommended:

Overalls, safety shoes.

Special Hazards Precaustions

Vapour heavier than air – prevent concentration in hollows or sumps. Do NOT enter confined spaces where vapour may have collected.

Work Hygienic Practices

Do not eat, drink or smoke when using this product. Wash the hands thoroughly after handling and before eating, drinking or smoking. Contaminated clothing must be changed and washed before reuse. Contaminated work clothing should not be allowed out of the workplace.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Liquid
Odour	Characteristic, citrus
Colour	Colourless to pale yellow
рН	No Data Available
Vapour Pressure	approx. 2 mmHg (@ 25 °C)
Relative Vapour Density	approx. 4.7 Air = 1
Boiling Point	approx. 175 °C
Melting Point	-90 °C
Freezing Point	approx74 °C
Solubility	Immiscible with water - Soluble in ethanol
Specific Gravity	0.835 - 0.845
Flash Point	45 - 48 °C
Auto Ignition Temp	237 °C
Evaporation Rate	approx. 5.8 (Diethyl ether = 1)
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	No Data Available
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 applicable.
Fast or Intensely Burning Characteristics	Risk of violent reaction or explosion.
Flame Propagation or Burning Rate of Solid Materials	No information available.
Non-Flammables That Could Contribute Unusual Hazards to a Fire	Combustible material that has been soaked with D-Limonene may spontaneously combust.
Properties That May Initiate or Contribute to Fire Intensity	FLAMMABLE LIQUID & VAPOUR: May be ignited by heat, sparks or flames.
Reactions That Release Gases or Vapours	Fire/decomposition may produce irritating, toxic and/or corrosive gases, including Carbon oxides and other non- identified organic compounds.



Release of Invisible Flammable Vapours may form explosive mixtures with air. Vapours and Gases

10. STABILITY AND REACTIVITY

General Information	Peroxides formed by oxidation may present an explosion hazard if they become highly concentrated through distillation.
Chemical Stability	Stable under normal conditions of storage and use.
Conditions to Avoid	Keep away from heat and sources of ignition.
Materials to Avoid	Incompatible/reactive with strong oxidising agents, acidic clays and mineral acids.
Hazardous Decomposition Products	Fire/decomposition may produce irritating, toxic and/or corrosive gases, including Carbon oxides and other non- identified organic compounds.
Hazardous Polymerisation	Hazardous polymerisation will not occur.

11. TOXICOLOGICAL INFORMATION

General Information	 Acute toxicity: May be harmful if swallowed; May cause gastrointestinal irritation, abdominal pain, nausea, vomiting, diarrhoea, drowsiness, dizziness. Skin corrosion/irritation: Causes skin irritation. May cause reddening, swelling, blistering. Product has a degreasing effect; Repeated exposure may cause skin dryness. Eye damage/irritation: May cause eye irritation, reddening. Respiratory/skin sensitisation: May cause an allergic skin reaction. Germ cell mutagenicity: No information available. Carcinogenicity: No information available. Reproductive toxicity: No damage to embryo or foetus when exposure values are observed. STOT (single exposure): May cause irritation to the respiratory tract; May cause respiratory disruptions, sore throat, coughing, shortness of breath, drowsiness, dizziness, nausea. STOT (repeated exposure): No information available. Aspiration toxicity: May be fatal if swallowed and enters airways.
Acute	
Ingestion	Acute toxicity (Oral): - LD50, Rat: 4,400 - 52,00 mg/kg [Supplier's SDS].
Carcinogen Category	None

12. ECOLOGICAL INFORMATION

Ecotoxicity	Aquatic toxicity: - LC50, Fish (Pimephales promelas): 0.619 - 0.796 mg/L (96 h). - EC50, Crustacea (Daphnia magna): 0.577 mg/L (48 h).
Persistence/Degradability	The material is partially biodegradable.
Mobility	No information available.
Environmental Fate	Very toxic to aquatic life with long lasting effects - Avoid release to the environment.
Bioaccumulation Potential	Risk of bioaccumulation in an aquatic species is high.
Environmental Impact	No Data Available

13. DISPOSAL CONSIDERATIONS

General Information

Dispose of by incineration or landfill and in accordance with local/regional/national regulations.

Special Precautions for Land Fill Empty containers should be washed thoroughly with detergent and water before being sent for reconditioning or disposal. The washing should be treated as trade effluent.



14. TRANSPORT INFORMATION

Land Transport (New Zealand) NZS5433

Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S.
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
EPG	15 Liquids - Flammable
UN Number	2319
Hazchem	3Y
Pack Group	Ш
Special Provision	No Data Available
Sea Transport	
Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S.
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
UN Number	2319
Hazchem	ЗY
Pack Group	Ш
Special Provision	No Data Available
EMS	F-E, S-D
Marine Pollutant	Yes
Air Transport IATA DGR	
Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S.
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
UN Number	2319
Hazchem	ЗY
Pack Group	III
Special Provision	No Data Available

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

HSR003235

National/Regional Inventories

Australia (AICS)	Listed
Canada (DSL)	Not Determined
Canada (NDSL)	Not Determined
China (IECSC)	Not Determined
Europe (EINECS)	232-433-8
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	LIMONE0092, LIMONE0381, LIMONE0390, LIMONE1000, LIMONE1001, LIMONE1002, LIMONE1003, LIMONE1004, LIMONE1390, LIMONE1395, LIMONE1500, LIMONE1800, LIMONE1801, LIMONE1802, LIMONE1803, LIMONE1804, LIMONE1805, LIMONE1806, LIMONE1807, LIMONE1808, LIMONE1809, LIMONE1810, LIMONE1811, LIMONE1805, LIMONE1813, LIMONE1814, LIMONE1815, LIMONE1816, LIMONE1817, LIMONE1811, LIMONE1812, LIMONE1813, LIMONE1814, LIMONE1815, LIMONE1819, LIMONE1820, LIMONE1821, LIMONE1815, LIMONE1823, LIMONE1824, LIMONE1825, LIMONE1826, LIMONE1830, LIMONE18200, LIMONE2000, LIMONE2002, LIMONE2003, LIMONE2005, LIMONE2006, LIMONE2007, LIMONE3000, LIMONE3001, LIMONE3002, LIMONE3003, LIMONE3010, LIMONE3011, LIMONE3012, LIMONE3000, LIMONE5000, LIMONE5000, LIMONE5000, LIMONE5000, LIMONE5001, LIMONE5500, LIMONE5500, LIMONE5501, LIMONE5594, LIMONE5600, LIMONE5601, LIMONE5650, LIMONE5700, LIMONE5800, LIMONE5000, LIMONE5000, LIMONE5000, LIMONE5600, LIMONE5600, LIMONE5000, LIMONE5000, LIMONE5600, LIMONE5600, LIMONE5600, LIMONE5000, LIMONE5500, LIMONE5501, LIMONE5594, LIMONE5600, LIMONE5600, LIMONE5600, LIMONE5000, LIMONE5500, LIMON
Revision	4
Revision Date	19 Jun 2018
Reason for Issue	Updated SDS
Key/Legend	< Less Than Greater Than 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 Farenheit g Grams g/cm³ Grams per Cubic Centimetre g/I 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 Mercurv inH2O Inch of Water K Kelvin kg Kilogram kg/m³ Kilograms per Cubic Metre **b** 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. itr 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 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

