Material Safety Data Sheet
D-Limonene

1. IDENTIFICATION

Product Name	**D-Limonene**
Other Names	(R)-p-Menth-1,8-diene [Dipentene; Limonene; d - Limonene]; Orange oil, terpenes; Terpene Hydrocarbons NOS; Terpenes and terpenoids, orange oil
Uses	Natural Flavour/Solvent. Flavouring; fragrance; solvent; wetting agent; resin manufacture.
Chemical Family	No Data Available
Chemical Formula	No Data Available
Chemical Name	D-Limonene
Product Description	A colourless liquid with a neutral citrus odour.

Contact Information

Organisation	Location	Telephone	Ask For
Redox Pty Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000	MSDS Officer
	11 Mayo Road Wiri Auckland 2104 New Zealand	+64-9-2506222	
Poisons Information Centre	Westmead NSW	1800-251525 131126	
Chemcall	Australia New Zealand	1800-127406 0800-243622 +64-3-3530199	
National Poisons Centre	New Zealand	0800-764766	

2. HAZARD IDENTIFICATION

ADG Code	Dangerous Goods according to the criteria of the Australian Dangerous Goods Code (ADG Code).	
ASCC Hazard Classification	Hazardous according to the criteria of ASCC [NOHSC:1008(2004)]	
Categories	**Xn**	Harmful
	N	Dangerous For The Environment
Risk Phrases	**R10**	Flammable.
	R38	Irritating to skin.
	R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
	R43	May cause sensitisation by skin contact.
Safety Phrases	**S24**	Avoid contact with skin.
	S28	After contact with skin, wash immediately with plenty of soap and water.
	S60	This material and its container must be disposed of as hazardous waste.
	S61	Avoid release to the environment. Refer to special instructions/Material Safety Data Sheets.
	S36/37	Wear suitable protective clothing and gloves.
HSNO Hazard Classification	3.1C; 6.1E; 6.3A; 6.4A; 6.5B; 9.1A; 9.2B	
Poisons Schedule (Aust)	No Data Available	

This Material Safety Data Sheet may not provide exhaustive guidance for all HSNO Controls assigned to this substance. The EPA (New Zealand) web site should be consulted for a full list of triggered controls and cited regulations.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Chemical Entity	Formula	CAS Number	Proportion
D-Limonene (Terpene Hydrocarbons)	No Data Available	68647-72-3	93.00 - 96.00 %
Impurities	No Data Available		Balance %

4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure

Swallowed DO NOT INDUCE VOMITING (to avoid aspiration). Rinse mouth with water. If swallowed, give a glass of water to drink. If vomiting occurs give further water. Seek medical assistance.

Eye If in eyes, wash out immediately with water, flushing continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting upper and lower lids. In all cases of eye contamination it is a sensible precaution to seek medical advice.

Skin If skin or hair contact occurs, immediately remove any contaminated clothing and wash skin and hair thoroughly with running water. If swelling, redness, blistering or irritation occurs seek medical assistance.

Inhaled Remove victim from exposure to fresh air - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm and at rest until fully recovered. Seek medical advice if effects persist.

Advice to Doctor Treat symptomatically. No specific treatment recommended. Show a copy of this MSDS to medical personnel dealing with cases of over exposure.

Medical Conditions Aggravated by Exposure No information available on medical conditions aggravated by exposure to this product.

5. FIRE FIGHTING MEASURES

General Measures
Clear fire area of all non-emergency personnel.
Stay upwind.
Keep out of low areas.
Eliminate ignition sources.
Move fire exposed containers from fire area if it can be done without risk.
Flame-proof equipment is necessary in all areas where this chemical is being used.
Nearby equipment must be earthed.

Flammability Conditions
Product is a flammable liquid.
May form flammable vapour mixtures with air.

Extinguishing Media
Foam, dry agent (carbon dioxide, dry chemical powder).
Keep containers cool with water spray.

Fire and Explosion Hazard
Vapour may travel a considerable distance to source of ignition and flash back.
Heating can cause expansion or decomposition of the material, which can lead to the containers exploding.
combustible material wet or soaked in limonene may autoxidise, generating heat and igniting spontaneously.

Hazardous Products of Combustion On burning will emit toxic fumes.

Special Fire Fighting Instructions Do NOT allow fire fighting water to reach waterways, drains or sewers. Store fire fighting water for treatment.

Personal Protective Equipment Fire fighters should wear a positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots and gloves) or chemical splash suit.

Flash Point 45 - 49 °C Closed Cup

Lower Explosion Limit 0.7 %

Upper Explosion Limit 6.1 %

Auto Ignition Temperature 255 °C

3Y

Hazchem Code

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure	Shut off all possible sources of ignition and do not smoke. Avoid accidents, clean up immediately. Increase ventilation. Avoid walking through spilled product as it is slippery when spilled. Use clean, non-sparking tools and equipment.
Clean Up Procedures	Small spills can be wiped up; rags or other combustible material wet or soaked in limonene may autoxidise, generating heat and igniting spontaneously. Use absorbent (soil, sand or other inert material) for larger spills. When saturated collect material, transfer to suitable, labelled, dry chemical-waste containers and dispose of promptly as hazardous waste.
Containment	Stop leak if safe to do so. Isolate the area.
Environmental Precautionary Measures	Do NOT let product reach drains or waterways. If product does enter a waterway, advise the Environmental Protection Authority or your local Waste Management.
Evacuation Criteria	Evacuate all unnecessary personnel.
Personal Precautionary Measures	Personnel involved in the clean up should wear full protective clothing as listed in section 8.

7. HANDLING AND STORAGE

Handling	Ensure an eye bath and safety shower are available and ready for use. Observe good personal hygiene practices and recommended procedures. Wash thoroughly after handling. Take precautionary measures against static discharges by bonding and grounding equipment. Avoid contact with eyes, skin and clothing. Do not inhale product vapours. Avoid prolonged or repeated exposure.
Storage	Store in a cool, dry, well ventilated place out of direct sunlight. Keep containers tightly sealed when not in use. Inspect regularly for deficiencies such as damage or leaks or build up of pressure. Protect against physical damage. Ground and bond storage containers. Store away from incompatible materials as listed in section 10. Store away from sources of heat or ignition. This product has a UN Classification of 2319 and a Dangerous Goods Class 3 (flammable) according to The Australian Code for the Transport of Dangerous Goods By Road and Rail
Container	Store in original packaging as approved by manufacturer.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

General	No exposure standard has been established for this product by the Australian Safety and Compensation Council (ASCC).
Exposure Limits	No Data Available
Biological Limits	No information available on biological limit values for this product.
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. Vapour heavier than air – prevent concentration in hollows and sumps. Do NOT enter confined spaces where vapour may have collected.
Personal Protection Equipment	RESPIRATOR: Use with local exhaust ventilation or while wearing organic vapour respirator. (AS1715/1716). EYES: Chemical goggles to prevent splashing in the eyes (AS1336/1337). HANDS: Elbow length impervious gloves (AS2161). CLOTHING: Chemical-resistant coveralls, splash apron and safety footwear (AS3765/2210).
Work Hygienic Practices	Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storage or re-use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Liquid
Odour	Characteristic citrus ammonia
Colour	Colourless
pH	No Data Available
Vapour Pressure	Approx. 2mm Hg (@ 25 °C)
Relative Vapour Density	approx. 4.7 Air = 1
Boiling/Melting Point	175 - 185 °C
Solubility	Not soluble
Freezing Point	Approx. - 75 °C
Specific Gravity	0.835 - 0.855
Flash Point	45 - 49 °C Closed Cup
Auto Ignition Temp	255 °C
Evaporation Rate	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	4.23 log Pow
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	Reactivity: Autoxidation facilitated by light and air.
Potential for Dust Explosion	Product is a liquid.
Fast or Intensely Burning Characteristics	No Data Available
Flame Propagation or Burning Rate of Solid Materials	No Data Available
Non-Flammables That Could Contribute Unusual Hazards to a Fire	No Data Available
Properties That May Initiate or Contribute to Fire Intensity	Vapour may travel a considerable distance to source of ignition and flash back. Heating can cause expansion or decomposition of the material, which can lead to the containers exploding. combustible material wet or soaked in limonene may autoxidise, generating heat and igniting spontaneously.
Reactions That Release Gases or Vapours	No Data Available
Release of Invisible Flammable Vapours and Gases	No Data Available

10. STABILITY AND REACTIVITY

General Information	Flammable Liquid.

Chemical Stability	Autoxidation facilitated by light and air. Combustible material that has been soaked with d- Limonene may spontaneously combust. Peroxides formed by oxidation may present an explosion hazard if they become highly concentrated through distillation.
Conditions to Avoid	No Data Available
Materials to Avoid	Reacts with strong oxidising agents. Incompatible with oxidising agents, acidic clays and mineral acids.
Hazardous Decomposition Products	No Data Available
Hazardous Polymerisation	No Data Available

11. TOXICOLOGICAL INFORMATION

General Information	Oral LD50 (rat) 4,400 -5,300 mg/Kg Dermal LD 50 (rabbit) > 5,000 mg/Kg
EyeIrritant	May be an eye irritant.
Ingestion	Swallowing can result in nausea, vomiting, diarrhoea and abdominal pain.
Inhalation	Material may be an irritant to the mucous membranes of the respiratory tract (airways). Breathing in vapour can result in headaches, dizziness and possible nausea.
SkinIrritant	Irritating to skin. May cause sensitisation by skin contact. Repeated or prolonged skin contact may lead to allergic contact dermatitis.
Carcinogen Category	0

12. ECOLOGICAL INFORMATION

Ecotoxicity	No Data Available
Persistence/Degradability	The material is partially biodegradable. Log Octanol/Water Partition Coefficient 4.23 48hr LC50 (Daphnia magna) 0.577 96hr LC50 (fathead minnow) 0.688 - 0.702
Mobility	No Data Available
Environmental Fate	Do NOT let product reach waterways, drains and sewers. Very toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.
Bioaccumulation Potential	Risk of bioaccumulation in an aquatic species is high.
Environmental Impact	No Data Available

13. DISPOSAL CONSIDERATIONS

General Information	Dispose of in accordance with all local, state and federal regulations. All empty packaging should be disposed of in accordance with Local, State, and Federal Regulations or recycled/reconditioned at an approved facility.
Special Precautions for Land Fill	Contact a specialist disposal company or the local waste regulator for advice. Advise flammable nature. Incinerate at an approved site following all local regulations. Empty containers must be decontaminated and destroyed.

14. TRANSPORT INFORMATION

ADG Code	Dangerous Goods according to the criteria of the Australian Dangerous Goods Code (ADG Code).

Air

IATA

Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
UN Number	2319
Hazchem	3Y
Pack Group	III
Special Provision	No Data Available

Land

Australia: ADG Code

Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
EPG	15 Liquids - Flammable
UN Number	2319
Hazchem	3Y
Pack Group	III
Special Provision	No Data Available

Malaysia:

Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
EPG	15 Liquids - Flammable
UN Number	2319
Hazchem	3Y
Pack Group	III
Special Provision	No Data Available

New Zealand: NZS5433

Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
EPG	15 Liquids - Flammable
UN Number	2319
Hazchem	3Y
Pack Group	III
Special Provision	No Data Available

United States of America: US DOT

Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
ERG	128 Flammable Liquids (Non-Polar / Water-Immiscible)
UN Number	2319

Hazchem	3Y
Pack Group	III
Special Provision	No Data Available

Sea

IMDG Code

Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
UN Number	2319
Hazchem	3Y
Pack Group	III
Special Provision	No Data Available
EMS	FE,SD
Marine Pollutant	Yes

15. REGULATORY INFORMATION

General Information No Data Available

EPA (New Zealand)

Hazardous Substances and New Organisms Act (HSNO)

Approval Code: HSR003235

Poisons Schedule (Aust) No Data Available

AICS Name Terpenes and terpenoids, orange oil

16. OTHER INFORMATION

Related Product Codes LIMONE1000, LIMONE1001, LIMONE1002, LIMONE1003, LIMONE1004, LIMONE1500, LIMONE2000, LIMONE2001, LIMONE2002, LIMONE2003, LIMONE2004, LIMONE2005, LIMONE2006, LIMONE2007, LIMONE3000, LIMONE3001, LIMONE3002, LIMONE3003, LIMONE3500, LIMONE3501, LIMONE3600, LIMONE4000, LIMONE4500, LIMONE4501, LIMONE4502, LIMONE4900, LIMONE5000, LIMONE5001, LIMONE5400, LIMONE5500, LIMONE5501, LIMONE5600, LIMONE5700, LIMONE6000, LIMONE6001, LIMONE6002, LIMONE6500, LIMONE7000, LIMONE7001, LIMONE7700, LIMONE8000, LIMONE8100, LIMONE8200, LIMONE9000, LIMONE9500, LIMONE1800, LIMONE1801, LIMONE1802, LIMONE1803, LIMONE1804, LIMONE1805, LIMONE1806, LIMONE1807, LIMONE1808, LIMONE1809, LIMONE1810, LIMONE1811, LIMONE1812, LIMONE1813, LIMONE1814, LIMONE1815, LIMONE1816, LIMONE1817, LIMONE1818, LIMONE1819, LIMONE1820, LIMONE1821, LIMONE1822, LIMONE1823, LIMONE1824, LIMONE1825, LIMONE1826, LIMONE5601, LIMONE1830, LIMONE5300, LIMONE6050, LIMONE5800, LIMONE5594, LIMONE3012, LIMONE3011, LIMONE3010, LIMONE3020

Revision 2

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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/l 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 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 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
torr Millimetre of Mercury
TWA Time Weighted Average
ug/24H Micrograms per 24 Hours
UN United Nations
wt Weight