Safety Data Sheet D-limonene Revision 5, 22/08/2024

1. IDENTIFICATION

Product Name	**D-Limonene**
Other Names	Citrus sinensis; Orange Terpenes; 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
Aurora Cleaning Supplies	F1 / 5 Bungaleen Court Dandenong Court VIC 3175	03 9768 2669

Emergency Contact Details

For emergencies only; DO NOT contact these companies for general product advice.

Organisation	Location	Telephone
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

Flammable Liquids - Category 3

Skin Corrosion/Irritation - Category 2

Sensitisation (Skin) - Category 1

Aspiration Hazard - Category 1

Acute Hazard To The Aquatic Environment - Category 1

Long-term Hazard To The Aquatic Environment - Category 1

Pictograms

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	**P233**	Keep container tightly closed.
	P240	Ground and bond container and receiving equipment.
	P241	Use explosion-proof electrical/ventilating/lighting/equipment.
	P242	Use non-sparking tools.
	P243	Take action to prevent static discharges.
	P261	Avoid breathing mist/vapours/spray.
	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.
	P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Response	**P301 + P310**	IF SWALLOWED: Immediately call a POISON CENTER or doctor.
	P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
	P331	Do NOT induce vomiting.
	P333 + P313	If skin irritation or rash occurs: Get medical attention.
	P370 + P378	In case of fire: Use sand or water for extinction.
	P391	Collect spillage.
	P363	Wash contaminated clothing before reuse.
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.

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)

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
		6.5B	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 measures 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 for advice. 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: Do not rub affected area! 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): Immediately flush skin and hair with running water for at least 15 minutes, while removing contaminated clothing and shoes. Wash skin with soap and water. If skin irritation or rash occurs, get medical advice/attention. Wash contaminated clothing and shoes before reuse.
*In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.

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. Give artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult.

Advice to Doctor Keep victim calm and warm. 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: Will be easily 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. *CAUTION: This product has a very low flash point: Use of water spray when fighting fire may be inefficient.
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. Vapor explosion hazard indoors, outdoors or in sewers! Many liquids are lighter than water. Containers may explode when heated.
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 cause pollution. Vapours from runoff may create an explosion hazard!
Personal Protective Equipment	Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only 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 (no smoking, flares, sparks or flames in immediate area). 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 you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Dike far ahead of large spill for later disposal. *Vapour-suppressing foam may be used to control vapours. Water spray may reduce vapour, but may not prevent ignition in closed spaces.
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 for at least 300 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/protective clothing/eye protection/face protection (see SECTION 8). FLAMMABLE LIQUID & VAPOUR: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources - 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, hot surfaces, sparks, open flames and other ignition sources - 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
pH	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	approx. -74 °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 and Gases	Vapours may form explosive mixtures with air.

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, hot surfaces, sparks, open flames and other ignition sources.
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 (Australia)
ADG Code

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	III
Special Provision	No Data Available

Land Transport (Malaysia)
ADR Code

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	III
Special Provision	No Data Available

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	III
Special Provision	No Data Available

Land Transport (United States of America)
US DOT

Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S.
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 Transport
IMDG Code

Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S.
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
UN Number	2319
Hazchem	3Y
Pack Group	III
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	3Y
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	HSR002495 HSR002725 (Revoked)

National/Regional Inventories

Australia (AIIC)	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, LIMONE1812, LIMONE1813, LIMONE1814, LIMONE1815, LIMONE1816, LIMONE1817, LIMONE1818, LIMONE1819, LIMONE1820, LIMONE1821, LIMONE1822, LIMONE1823, LIMONE1824, LIMONE1825, LIMONE1826, LIMONE1830, LIMONE1895, LIMONE2000, LIMONE2001, LIMONE2002, LIMONE2003, LIMONE2004, LIMONE2005, LIMONE2006, LIMONE2007, LIMONE3000, LIMONE3001, LIMONE3002, LIMONE3003, LIMONE3010, LIMONE3011, LIMONE3012, LIMONE3020, LIMONE3091, LIMONE3092, LIMONE3094, LIMONE3095, LIMONE3100, LIMONE3500, LIMONE3501, LIMONE3600, LIMONE4000, LIMONE4500, LIMONE4501, LIMONE4502, LIMONE4900, LIMONE5000, LIMONE5001, LIMONE5300, LIMONE5400, LIMONE5500, LIMONE5501, LIMONE5594, LIMONE5600, LIMONE5601, LIMONE5650, LIMONE5700, LIMONE5800, LIMONE6000, LIMONE6001, LIMONE6002, LIMONE6050, LIMONE6500, LIMONE7000, LIMONE7001, LIMONE7094, LIMONE7700, LIMONE8000, LIMONE8100, LIMONE8200, LIMONE9000, LIMONE9500
Revision	5
Revision Date	22/08/2024
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/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
TWA Time Weighted Average
ug/24H Micrograms per 24 Hours
UN United Nations
wt Weight