

Safety Data Sheet (MSDS)

- D-Limonene

(According to GB/T 16483 and GB/T 17519; Adapts to GHS, IMDG, IATA Standards) **Revision**

Date: 15 FEB 2026 **Product Name:** D-Limonene | **CAS No.:** 5989-27-5 | **Product Number:** DL-20260215 | **Brand:** SIGALD

SECTION 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product Identifiers

- Synonyms: (R)-4-Isopropenyl-1-methylcyclohexene; d-Phellandrene; Citrene
- Chemical Formula: C₁₀ H₁₆ | Molecular Weight: 136.24 g/mol

1.2 Details of the supplier of the safety data sheet

- Company: NEWAY SINOPHC TECH. LIMITED
- Address: RM. 204, BUILDING 3, NO. 188, AONA RD., CHINA (SHANGHAI) PILOT FREE TRADE ZONE.
- Telephone: +86-021-50350029 | Fax: +86-021-50350029

1.3 Emergency telephone

- Emergency Phone #: +86-021-50350029 (CHEMTREC)

1.4 Relevant Identified Uses and Uses Advised Against

- **Identified Uses:** Flavor and fragrance raw material; solvent for cleaning & degreasing; cosmetic ingredient; pharmaceutical intermediate; food additive (flavor enhancer).
- **Uses Advised Against:** Not for use in high-temperature thermal processing without stabilizer; no use in infant food without regulatory approval.

SECTION 2: Hazards Identification

2.1 GHS Classification

- Flammable Liquids (Category 3)
- Skin Irritation (Category 2)
- Eye Irritation (Category 2A)
- Specific Target Organ Toxicity - Single Exposure (Category 3, Respiratory tract irritation)
- Hazardous to the Aquatic Environment - Acute (Category 2)
- Hazardous to the Aquatic Environment - Chronic (Category 2)

2.2 GHS Label Elements

- **Hazard Pictogram:** Flame (), Exclamation Mark (), Aquatic Hazard ()

- **Signal Word:** WARNING

• Hazard Statements:

- H226: Flammable liquid and vapor
- H315: Causes skin irritation
- H319: Causes serious eye irritation
- H335: May cause respiratory tract irritation
- H411: Toxic to aquatic life with long lasting effects

• Precautionary Statements:

- 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.
- P261: Avoid breathing dust/fume/gas/mist/vapors/spray
- P264: Wash skin thoroughly after handling
- P273: Avoid release to the environment
- P280: Wear protective gloves/eye protection/face protection
- P302+P352: If on skin: Wash with plenty of soap and water

- 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/attention
- P332+P313: If skin irritation occurs: Get medical advice/attention
- P370+P378: In case of fire: Use dry chemical, CO₂, or foam for extinction
- P501: Dispose of contents/container to an approved waste disposal plant

2.3 Physical and Chemical Hazards

- Flammable liquid and vapor; vapor may form explosive mixtures with air.
- Vapors may spread along the ground and ignite at a distance from the fire source.
- No explosion risk under normal storage and use with proper ventilation.

2.4 Health Hazards

- Acute: Skin/eye irritation; respiratory tract irritation if inhaled in high concentration; dizziness or nausea from excessive inhalation.
- Chronic: Repeated skin contact may cause mild allergic contact dermatitis in sensitive individuals; no known chronic systemic toxicity.

2.5 Environmental Hazards

- Toxic to aquatic organisms with long-lasting effects; may cause harm to fish, algae and invertebrates.
- Moderately biodegradable; avoid release to water, soil and sewage systems.

2.6 Other Hazards

- No additional hazards identified.

SECTION 3: Composition/Information on Ingredients

- **Substance / Mixture:** Pure substance
- **Active Ingredient:** D-Limonene (CAS 5989-27-5), Concentration: ≥98.5% (w/w)
- **Hazardous Ingredients:** Only D-Limonene (no other hazardous additives)

SECTION 4: First Aid Measures

4.1 Description of First-Aid Measures

- **If Inhaled:** Move victim to fresh air. Keep respiratory tract unobstructed. If breathing is difficult, give oxygen. Get medical advice if dizziness, nausea or coughing persists.
- **In Case of Skin Contact:** Remove contaminated clothing immediately. Wash skin thoroughly with plenty of running water and soap for 10-15 minutes. Get medical attention if redness, itching or rash occurs.
- **In Case of Eye Contact:** Rinse eyes thoroughly with plenty of running water for 15 minutes, holding eyelids open. Remove contact lenses if present. Get medical attention immediately if irritation, redness or blurred vision persists.
- **If Swallowed:** Do not induce vomiting. Rinse mouth with water. Drink a glass of water or milk (if conscious). Get medical attention immediately if abdominal pain or nausea occurs.

4.2 Most Important Symptoms and Effects

- Acute: Redness, burning, itching of skin/eyes; cough, sore throat, shortness of breath (inhalation); nausea, abdominal discomfort (ingestion); dizziness (excessive inhalation).
- Delayed: No known delayed toxic effects.

4.3 Indication of Immediate Medical Attention

- Required for severe eye irritation, persistent skin rash, severe respiratory discomfort, excessive inhalation or ingestion of large quantities.

SECTION 5: Firefighting Measures

5.1 Extinguishing Media

- **Suitable:** Dry chemical powder, carbon dioxide (CO₂), foam (alcohol-resistant), water spray (cool container only).

- **Unsuitable:** High-pressure water jet (may spread the fire and vapor).

5.2 Special Hazards Arising from the Substance

- Combustion generates carbon monoxide (CO) and small amounts of volatile organic compounds.
- Vapors are heavier than air and may accumulate in low-lying areas, leading to flash fire.

5.3 Advice for Firefighters

- Wear self-contained breathing apparatus (SCBA) and full fire-fighting protective gear.
- Fight fire from upwind and keep a safe distance from burning containers.
- Cool exposed containers with water spray until the fire is completely out to prevent re-ignition.
- Prevent fire runoff from entering sewers, water bodies or soil.

SECTION 6: Accidental Release Measures

6.1 Personal Precautions

- Wear nitrile rubber gloves, chemical splash goggles, protective mask and flame-retardant clothing.
- Eliminate all ignition sources (no smoking, no sparks, no open flames) in the spill area.
- Ensure good natural or mechanical ventilation; evacuate non-essential personnel.

6.2 Environmental Precautions

- Contain the spill immediately to prevent release to water, soil, sewers or drains.
- Do not flush the spill into water bodies; use absorbent materials to contain and collect the product.

6.3 Methods and Materials for Containment and Cleaning Up

- **Small Spill:** Absorb with inert, non-combustible materials (sand, diatomite, vermiculite). Collect the absorbed material in a sealed, explosion-proof container for proper disposal. Wipe the area with absorbent paper and dispose of it.
- **Large Spill:** Contain with dikes or sand bags (non-combustible). Transfer the liquid to a sealed, explosion-proof HDPE container using an explosion-proof pump for recycling or disposal. Flush the spill area with a small amount of water (collect wash water for disposal).

SECTION 7: Handling and Storage

7.1 Precautions for Safe Handling

- Operate in a well-ventilated fume hood or open, well-ventilated area.
- Avoid contact with skin, eyes and respiratory tract; avoid generating vapors or mists.
- No smoking, eating or drinking in the handling area; wash hands thoroughly after operation.
- Use explosion-proof electrical equipment, tools and transfer pumps in the handling area.
- Ground and bond containers during transfer to prevent static electricity buildup.

7.2 Conditions for Safe Storage

- **Storage Conditions:** Store in a cool, dry, well-ventilated explosion-proof warehouse (temperature $\leq 25^{\circ}\text{C}$). Keep away from heat, sparks, open flames, hot surfaces and direct sunlight.
- **Container:** Sealed HDPE or glass containers (explosion-proof for large storage); keep tightly closed when not in use.
- **Incompatibilities:** Strong oxidizing agents (e.g., hydrogen peroxide, potassium permanganate), strong acids, strong bases, halogens, oxidizing acids.
- **Storage Class (TRGS 510):** 3 (Flammable Liquids)
- **Shelf Life:** 24 months (unopened, under specified storage conditions; stored with antioxidant stabilizer).

SECTION 8: Exposure Controls/Personal Protection

8.1 Control Parameters

- **Occupational Exposure Limit:** TWA: 50 ppm (275 mg/m³) (OSHA); STEL: 75 ppm (410 mg/m³) (OSHA)

- **TLV-TWA:** 50 ppm (ACGIH)

8.2 Exposure Controls

- **Engineering Controls:** Local exhaust ventilation (LEV) to keep vapor concentration below OEL; general ventilation to maintain air circulation; explosion-proof ventilation systems.
- **Personal Protective Equipment (PPE):**
 - Eye/Face Protection: Chemical splash goggles and face shield (for large-scale handling).
 - Skin Protection: Nitrile rubber gloves (thickness ≥0.3mm), flame-retardant chemical-resistant lab coat, protective boots.
 - Respiratory Protection: Half-face respirator with organic vapor cartridge (if ventilation is insufficient or vapor concentration exceeds OEL); self-contained breathing apparatus (SCBA) for fire or large spill situations.
 - Hand Protection: Replace gloves if damaged, contaminated or permeated.

SECTION 9: Physical and Chemical Properties

Property	Value	Unit
Physical State	Clear liquid	-
Color	Colorless	-
Odor	Characteristic citrus (orange) fragrance	-
Melting Point	-72.5	°C
Boiling Point	176.3	°C
Flash Point	45	°C (Closed Cup)
Autoignition Temperature	480	°C
Relative Density (20/20°C)	0.842	-
Refractive Index (20°C)	1.4742	-
Viscosity (25°C)	0.76	mPa·s
Water Solubility	Insoluble (<0.01 g/L at 25°C)	g/L
Solubility	Miscible with ethanol, ether, acetone, vegetable oil, most organic solvents	-
Vapor Pressure (25°C)	4.5	hPa
Vapor Density (Air=1)	4.7	(-)
Flammability	Flammable liquid (Category 3)	-
Optical Rotation (20°C)	+99.8	°
Octanol/Water Partition Coefficient (Log K _{oc})	4.5	(-)

SECTION 10: Stability and Reactivity

10.1 Chemical Stability

- Stable under normal temperature and storage conditions (≤25°C, sealed, dark); may oxidize slowly in air and light to form peroxides (add antioxidant to prevent).
- Stable to hydrolysis under neutral conditions.

10.2 Possibility of Hazardous Reactions

- No hazardous reactions under normal use and storage conditions; may react violently with strong oxidizing agents.

10.3 Conditions to Avoid

- High temperature (>60°C), open flame, direct sunlight, air/oxygen (long-term contact), strong oxidizing agents, strong acids/bases, static electricity.

10.4 Incompatible Materials

- Strong oxidizing agents (KMnO₄, H₂O₂, concentrated nitric acid), concentrated sulfuric acid, concentrated hydrochloric acid, sodium hydroxide (concentrated), chlorine gas, bromine.

10.5 Hazardous Decomposition Products

- Carbon monoxide (CO), carbon dioxide (CO₂), volatile terpenoid fragments (at high temperature/combustion); peroxides (on long-term exposure to air/light).

SECTION 11: Toxicological Information

- **Acute Oral Toxicity (Rat, LD₅₀):** 4,400 mg/kg (moderate toxicity)
- **Acute Dermal Toxicity (Rabbit, LD₅₀):** >5,000 mg/kg (low toxicity)
- **Skin Irritation (Rabbit):** Mild to moderate irritation (Category 2), reversible within 72 hours
- **Eye Irritation (Rabbit):** Moderate irritation (Category 2A), reversible within 48 hours
- **Inhalation Toxicity (Rat, LC₅₀):** 23,700 mg/m³ (4-hour exposure) (low inhalation toxicity)
- **Skin Sensitization:** Mild sensitizing potential in sensitive individuals (Guinea pig test)
- **Carcinogenicity:** Not classified as carcinogenic by IARC, EPA or NTP
- **Reproductive Toxicity:** No known reproductive toxicity based on current data (NOAEL: 500 mg/kg/day)
- **Specific Target Organ Toxicity:** May cause respiratory tract irritation at high concentration (single exposure)

SECTION 12: Ecological Information

- **Fish Toxicity (Rainbow Trout, LC₅₀):** 20 mg/L (96-hour exposure)
- **Daphnia Toxicity (EC₅₀):** 12 mg/L (48-hour exposure)
- **Algae Toxicity (Chlorella, EC₅₀):** 18 mg/L (72-hour exposure)
- **Persistence and Degradability:** Moderately biodegradable (BOD₅/COD = 0.42; 60-70% biodegradation in 28 days)
- **Bioaccumulative Potential:** Moderate (Log K_{oc} = 4.5; bioaccumulation factor (BCF) = 500-1000 in fish)
- **Mobility in Soil:** High mobility; may leach into groundwater if released to soil
- **PBT/vPvB Assessment:** Not classified as PBT/vPvB (moderately biodegradable, no persistent bioaccumulation)

SECTION 13: Disposal Considerations

13.1 Waste Treatment Methods

- **Product Waste:** Dispose of through licensed hazardous waste treatment facilities in accordance with local/national/international regulations. Incineration with waste gas treatment (to remove organic vapors and CO) is recommended (explosion-proof incinerator).
- **Contaminated Packaging:** Rinse packaging thoroughly with an organic solvent (ethanol/acetone); collect the rinse liquid for disposal. Dispose of the rinsed packaging as hazardous waste or recycle after professional explosion-proof treatment.
- ****Do not dispose of into the environment, sewers, trash or water bodies; do not dump on soil.**

SECTION 14: Transport Information

- **UN Number:** 2052
- **UN Proper Shipping Name:** Limonene
- **Transport Hazard Class:** 3 (Flammable Liquids)
- **Packaging Group:** III
- **Environmental Hazards:** IMDG Marine Pollutant: Yes
- **Special Precautions for Transport:**

- Transport in sealed, explosion-proof HDPE/glass containers; avoid collision, leakage, breakage and static electricity.
- Keep away from heat, sparks, open flames, hot surfaces and direct sunlight during transport (temperature $\leq 30^{\circ}\text{C}$).
- Do not transport with strong oxidizing agents, strong acids, strong bases, food, food additives or cosmetics in the same vehicle.
- Comply with IMDG, IATA, ADR/RID and national transport regulations for Class 3 flammable liquids; use explosion-proof transport vehicles for bulk transport.

SECTION 15: Regulatory Information

15.1 National & International Regulations

- **China:** Hazardous Chemicals Safety Management Regulation (Class 3 flammable liquid); National Food Safety Standard (approved for food flavor use); Cosmetic Safety and Technical Specifications (approved for cosmetic use).
- **International:** GHS Classification (Rev.9); REACH (EU: registered, not in SVHC Candidate List); TSCA (US: listed on TSCA Inventory); FDA (US: GRAS for food use); IMDG/IATA/ADR (Class 3 flammable liquids).

15.2 Other Regulations

- Comply with local environmental protection, hazardous waste disposal and occupational health and safety regulations; comply with fire protection regulations for flammable liquid storage and handling.

SECTION 16: Other Information

- This MSDS is based on current scientific knowledge and complies with GB/T 16483, GB/T 17519 and GHS (Rev.9) standards.
- The product contains an antioxidant stabilizer (BHT, $\leq 0.01\%$) to prevent peroxide formation; no other additives are present.
- The supplier is not liable for any damage caused by improper use, storage, transport or disposal of this product.
- For updated information, contact the supplier directly.