

## Technical Data Sheet (TDS)

### - D-Limonene

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

**Molecular Formula:** C<sub>10</sub> H<sub>16</sub> | **Molecular Weight:** 136.24 g/mol

#### 1. Product Overview

D-Limonene is a naturally occurring monoterpene, the main component of citrus peel essential oils (orange, lemon, grapefruit). It is a colorless clear liquid with a characteristic fresh citrus fragrance, manufactured by high-purity distillation and purification of natural citrus essential oils (or synthetic synthesis), meeting food, cosmetic and industrial grade standards.

As a multifunctional fine chemical raw material, D-Limonene has excellent solvency, fragrance properties and chemical reactivity. It is widely used in flavor & fragrance, food, cosmetic, cleaning, pharmaceutical and chemical synthesis industries, with the advantages of natural origin (for natural grade), high purity and stable performance.

**Core Characteristics:** High purity (≥98.5%); characteristic citrus fragrance; excellent solvent for oils/fats/waxes; good chemical reactivity for organic synthesis; food/cosmetic grade available; stabilized with antioxidant to prevent peroxide formation.

#### 2. Technical Specifications (Complies with Food/Cosmetic/Industrial Grade Standards)

Item	Specification (Grade: Food/Cosmetic/Industrial)	Result (This Batch)
Appearance	Colorless clear liquid	Colorless clear liquid
Assay (D-Limonene)	≥98.5%	99.2%
Melting Point	-74 ~ -71 °C	-72.5 °C
Boiling Point	175 ~ 177 °C	176.3 °C
Refractive Index (20 °C)	1.4720 ~ 1.4760	1.4742
Relative Density (20/20 °C)	0.840 ~ 0.844	0.842
Flash Point (Closed Cup)	43 ~ 47 °C	45 °C
Optical Rotation (20 °C)	+95° ~ +105°	+99.8°
Water Content	≤0.05%	0.03%
Heavy Metals (Pb)	≤5 ppm	1.5 ppm
Heavy Metals (As)	≤1 ppm	0.2 ppm
Residue on Ignition	≤0.01%	0.005%
Odor	Characteristic fresh citrus fragrance, no off-odor	Conforms to standard
Solubility	Miscible with ethanol, ether, most organic solvents	Conforms to standard
Antioxidant Content (BHT)	≤0.01% (stabilizer)	0.008%

#### 3. Product Advantages

- High Purity & Stable Quality:** Assay ≥98.5%, low impurity and water content; each batch has consistent physical and chemical indicators, no batch-to-batch variation; stabilized with BHT to prevent peroxide formation.
- Natural & Safe:** Natural grade derived from citrus peel essential oils (GRAS certified by FDA for food use); cosmetic grade meets international cosmetic safety standards, low irritation.
- Excellent Sensory Property:** Pure fresh citrus (orange) fragrance, no pungent off-odor; widely used as a core fragrance raw material for flavor and fragrance formulation.
- Superior Solvency:** Excellent solvent for animal/vegetable oils, fats, waxes, resins and organic pollutants; ideal for green cleaning and degreasing applications (environmentally friendly alternative to halogenated solvents).
- Good Chemical Reactivity:** Easy to carry out hydrogenation, oxidation, esterification and other modification reactions; key intermediate for pharmaceutical, pesticide and fine chemical synthesis.



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6. **Versatile Application:** Meets food, cosmetic and industrial grade standards; suitable for multiple industries with customizable purity according to customer requirements.

## 4. Application Fields

### 4.1 Flavor & Fragrance Industry

- **Food Flavor:** Core raw material for citrus (orange/lemon/grapefruit) flavor formulation; used in beverage, candy, pastry, ice cream, dairy products and chewing gum (complies with food additive use standards).
- **Perfume & Cosmetic Fragrance:** Formulation of fresh citrus, fruity and floral fragrances; used in perfume, shampoo, body wash, soap, candle and air freshener.
- **Household Fragrance:** Raw material for citrus-scented household cleaners, fabric softeners and incense.

### 4.2 Food Industry

- Food additive (flavor enhancer and flavoring agent); coating agent for food packaging (safe and non-toxic).

## 5.1 General Usage Principles

- Operate in a well-ventilated area; keep away from heat, sparks and open flames (flammable liquid).
- Avoid direct contact with skin and eyes; wear appropriate PPE during handling (refer to MSDS Section 8).
- For flavor/fragrance formulation: Dilute first with ethanol/propylene glycol (1:5 ~ 1:50) then add to the system; stir evenly to avoid local high concentration.
- For cleaning/degreasing: Use directly or dilute with organic solvent (ethanol/acetone) (1:1 ~ 1:10) according to contamination degree; rinse with water after use (for water-washable surfaces).
- For organic synthesis: Use as a raw material directly; adjust the dosage according to the reaction formula and process requirements; add antioxidant if long-term reaction is required.
- For cosmetic formulation: Add at the final stage of production (temperature  $\leq 40^{\circ}\text{C}$ ) to avoid volatilization; stir evenly.

## 5.2 Recommended Dosage (Adjust according to specific product requirements)

Application Field	Recommended Dosage (w/w)
Food flavor formulation	0.01-0.5% (GB 2760/FDA standard)
Perfume formulation	5-20%
Cosmetic fragrance (shampoo/body wash/soap)	0.1-2%
Industrial degreasing/cleaning	50-100% (direct use) or 10-50% (diluted)
Pharmaceutical/pesticide synthesis	According to reaction process
Feed additive	0.005-0.05%

## 6. Packaging & Storage

### 6.1 Packaging Specifications

- **Lab/Small Scale:** 100 mL, 500 mL glass bottles (sealed, dark)
- **Commercial Medium Scale:** 5 kg, 25 kg HDPE plastic drums (explosion-proof, sealed)
- **Bulk Large Scale:** 200 kg HDPE plastic drums (explosion-proof), 1000 kg IBC totes (inner lining with anti-corrosion film, explosion-proof)
- **Custom Packaging:** Available upon customer request (e.g., 1 L, 10 kg glass/HDPE containers; food grade packaging for food/cosmetic use)

## 7. Safety & Protection

1. The product is a Class 3 flammable liquid; keep away from heat, sparks and open flames in all handling, storage and transport processes.
2. Mild skin and eye irritation; avoid direct contact with skin, eyes and respiratory tract; wear nitrile rubber gloves, chemical splash goggles and protective mask during large-scale handling.
3. Vapor may form explosive mixtures with air; ensure good ventilation in the handling area; use explosion-proof equipment and tools.