

d-Limonene

Data Sheet - Safety Sheet

Product Data Sheet

Preparation Date: August 15, 2000

DESCRIPTION

D-Limonene is a biodegradable solvent occurring in nature as the main component of citrus peel oil. D-Limonene's interesting chemical properties, pleasant citrus aroma, & FDA-GRAS rating ("generally recognized as safe") have earned the product phenomenal acceptance in many diverse chemical applications. D-Limonene can be used in its pure form, blended with most other solvents & drying oils, or easily emulsified to make water soluble cleaning products.

APPEARANCE & ODOR

Clear water-white to slightly yellow liquid with a mild to strong citrus aroma depending on grade.

USES & APPLICATIONS

Replacement for toxic chlorinated solvents, glycol ether, MEK (methyl ethyl ketone), xylene, Freon, and CFC's, parts cleaner, engine degreaser (automotive, aircraft, and aerospace industries), electronics cleaning, tar and asphalt remover, asbestos shingle remover, graffiti remover, grease trap maintainer, lift station and sewage treatment applications, hand cleaner, floor cleaner, printing press cleaner, carpet stain cleaner, metal cleaner, aerosol ingredient, fragrance additive, odorant for petroleum industry, heat transfer medium, and possible candidate for a variety of medical applications including cancer and AIDS research.

PACKAGING

D-Limonene is packaged in epoxy-lined containers as follows:

1-Gallon Pail	7 Pounds Net Weight	3.2 kg. Net Weight
5-Gallon Pail	35 Pounds Net Weight	16 kg. Net Weight
55-Gallon Pail	390 Pounds Net Weight	177 kg. Net Weight

Drums are typically orange or black DOT approved steel drums coated with an epoxy-phenolic resin liner. All drums of our domestic d-Limonene are filled to a net weight of 390 lbs. Dimensions of 55-gallon drums are: length 23", width 23", and depth 35". Imported drums of Brazilian d-Limonene are slightly smaller and

typically filled to net weight of 375 lbs. Tank truck shipments average 6500 gallons (45,000 lbs). Overseas ISO tank shipments are either 20,000 liters (16,800 kg) or 24,000 liters (120,000 kg). Sample quantities (gallons & pints) are packaged in fluorinated plastic containers or glass (1 oz. samples).

STORAGE & HANDLING

Filled drums should be stored in well ventilated, covered areas at temperatures which should not exceed 70° F (21° C) for extended periods of time. Air should be excluded from partially filled drums by displacement with Nitrogen or CO₂. Citrus oils are subject to oxidation. This process may be inhibited by the addition of antioxidants. d-Limonene samples and certificates of analysis are available upon request.

Caution: The user should conduct his/her own experiments and establish proper procedures and controls before attempting use on critical parts

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Material Safety Data Sheet

Preparation Date: August 15, 2000

Emergency Phone Numbers:

Florida Chemical: (863) 294-8483

CHEMTREC 24 Hour Number (800) 424-9300

In Canada, CANUTEC (613) 996-6666

Section I - IDENTIFICATION

Trade Name: D-Limonene - Technical grade, Orange Terpenes, Food grade, Lemon-Lime grade

CAS Number: 5989-27-5 - Technical grade & Lemon-Lime grade

CAS Number: 94266-27-4 - Food grade

CAS Number: 68647-72-3 - Orange Terpenes

Section II - HAZARDOUS COMPONENTS

Volatile Ingredients: D-Limonene (solvent) is the major component (technical grade 95%, food grade 96%, lemon-lime 70%) with balance other terpene hydrocarbons and oxygenated compounds - octanal, nonanal, decanal, linalool predominant. Product is a by-product of citrus, entirely of natural origin, and to the best of our knowledge and belief contains no artificial flavors, sulfites, nitrites, or pesticide residue exceeding tolerances established by the FDA. D-Limonene does NOT contain lead, cadmium, mercury, or hexavalent chromium or come in contact with these chemicals since it is a citrus derived essential oil produced by steam distillation. Further, d-Limonene is packaged in food grade containers with inert liners that do NOT contain lead, cadmium, mercury, or hexavalent chromium. D-Limonene does NOT contain and is NOT manufactured with any of the Class I or II ozone-depleting substances listed under the United States Clean Air Act of 1990.

Hazardous Materials Identification System - HMIS:

<u>1</u>	<u>Health Hazard - Mild skin irritant</u>
<u>2</u>	<u>Flammability - Flashpoint above 100° F (38° C)</u>
<u>0</u>	<u>Reactivity - Stable</u>
<u>G</u>	<u>Protection - Safety glasses & gloves recommended</u>

Section III - PHYSICAL DATA

	<u>Technical Grade</u>	<u>Food Grade</u>	<u>Lemon-Lime Grade</u>
<u>Appearance</u>	<u>Yellow to water-white oil</u>	<u>Water-white oil</u>	<u>Water-white oil</u>
<u>Odor</u>	<u>Strong orange aroma</u>	<u>Mild orange aroma</u>	<u>Mild lemon-lime aroma</u>
<u>Specific Gravity (25°C)</u>	<u>0.838 - 0.843</u>	<u>0.838 - 0.843</u>	<u>0.841 - 0.848</u>
<u>Refractive Index (20°C)</u>	<u>1.4710 - 1.4740</u>	<u>1.4710 - 1.4740</u>	<u>1.470 - 1.4770</u>
<u>Optical Rotation (25°C)</u>	<u>+96° - +104°</u>	<u>+96° - +104°</u>	<u>+70° - +75°</u>
<u>Flashpoint (cc)</u>	<u>115° F (46°C)</u>	<u>113° F (45°C)</u>	<u>119° F (48°C)</u>
<u>Boiling Point</u>	<u>310° F (154°C)</u>	<u>325° F (163°C)</u>	<u>332° F (167°C)</u>
<u>Evaporation Rate</u>	<u>Medium/Fast</u>	<u>Medium/Fast</u>	<u>Medium/Fast</u>
<u>Water Solubility</u>	<u>Insoluble</u>	<u>Insoluble</u>	<u>Insoluble</u>
<u>Vapor Pressure (20°C)</u>	<u>2mmHg</u>	<u>2mmHg</u>	<u>2mmHg</u>
<u>Percent Volatile by Volume</u>	<u>95+%</u>	<u>95+%</u>	<u>95+%</u>

Section IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (cc): 115°F (46°C), 113°F (45°C), 119°F (48°C)(Technical grade, Food grade, Lemon-Lime grade respectively)

Flammable Limits: LEL = 0.7% UEL = 6.1% (Identified for Technical grade only)

Extinguishing Media: Carbon dioxide, foam or dry chemical

Special Fire Fighting Procedures: SCBA recommended. Smother to exclude air. Do not use water. Handle as an oil fire.

Unusual Fire and Explosive Hazards: Combustible liquid. Keep away from heat, sparks, and open flame. Guard against spontaneous combustion of improperly discarded oily rags.

Incompatibility (Materials to avoid): Strong oxidizing agents and acidic agents including acidic clays, peroxides, halogens, vinyl chloride, and iodine pentafluoride.

Hazardous Decomposition Materials: Smoke may be acid and fume irritating. Burning generates CO, CO₂, and smoke.

Hazardous Polymerization: None described

Conditions to Avoid for Polymerization: Polymerization catalysts such as aluminum chloride and acidic clays.

Stability Considerations: Stable

Conditions to Avoid for Stability: Avoid temperatures over 115° F (46°C)

Section V - HEALTH HAZARD DATA

Health Hazards (Acute and Chronic): Product is harmful if swallowed. Ingestion may cause vomiting, headache, and other medical problems. May be irritating to skin and eyes. Skin contact may cause slight redness. Contains a potential skin sensitizer. Eye contact can cause moderate to high irritation. Inhalation can cause nose, throat, and respiratory tract irritation, coughing and headache. Prolonged or repeated exposure can cause drying, defatting, and dermatitis of skin.

Signs and Symptoms of Exposure: Product may be irritating to the skin, eyes, nose and throat.

Medical Conditions Generally Aggravated by Exposure: Persons with allergies or pre-existing skin conditions should avoid contact with this product.

Emergency & First Aid Procedures Eyes: Remove contact lenses at once. Flush with water for at least 15 minutes. If irritation persists, seek medical attention.

Skin: Wash affected area with copious amounts of soap and water. If irritation develops, seek medical attention.

Ingestion: Seek medical attention immediately. Do not induce vomiting. Rinse mouth with water, then drink one glass of water. Do not leave victim unattended. Never give anything by mouth if victim is unconscious, is rapidly losing consciousness, or is convulsing.

Inhalation: If symptoms of overexposure are experienced, evacuate to fresh air. If symptoms persist, seek medical attention.

Section VI - TOXICOLOGY DATA

Acute Eye Irritation: Eye irritation, rabbit. Severely irritating.

Acute Skin Irritation: Skin irritation, rabbit. Severely irritating.

Acute Dermal Toxicity: LD50 - >5 g/kg, rabbit.

Acute Respiratory Irritation: No test data found for product.

Acute Inhalation Toxicity: No test data found for product.

Acute Oral Toxicity: LD50 - >5 g/kg, rat.

Chronic Toxicity: This product does not contain any substances that are considered by OSHA, NTP, IARC or ACGIH to be "probable" or "suspected" human carcinogens.

Ecotoxicological Information: Product may be toxic to aquatic organisms.

Section VII - SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled: Use protective gloves to avoid skin contact. Small spills can be wiped up. Large spills should be absorbed by dirt, sand, or other suitable absorbents for disposal. Do not hose spills down drains, sewers, or waterways. D-Limonene may be toxic to aquatic organisms. Move leaking containers to well ventilated area. No

smoking. Eliminate any source of ignition. Minimize inhalation. Use NIOSH approved respiratory protection device in areas of high vapor concentration.

CAUTION: slippery on floor.

Waste Disposal Method: Incinerate or Dispose in Accordance with Local, State, and Federal Regulations. Taking regulations into consideration, waste may be incinerated or handled through EPA spill control plan via land fill or dilution.

Section VIII - SPECIAL PROTECTION INFORMATION

Respiratory Protection: Not normally required. If vapor concentration becomes high, use NIOSH approved respirators.

Ventilation: Local exhaust should be adequate. Mechanical ventilation otherwise recommended if necessary.

Skin Protection: Oil resistant gloves.

Eye Protection: Safety goggles or glasses suggested.

Other Protective Equipment: Oil resistant apron, emergency eye wash and shower stations.

Appropriate Hygienic Practices: Wash thoroughly after handling. Launder contaminated clothing before re-use.

Section IX - SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing: Usual precautions for combustible liquids.

Handling and Storage Precautions: Store in sprinklered warehouse. Avoid contact with incompatible chemicals listed in Section IV. Store in tightly sealed, full containers at temperatures below 70° F (21°C). Partially filled containers should be blanketed with nitrogen.

Other Precautions: Product may expand slightly in storage causing pressure to build in container. Open container carefully if product appears to be under pressure. Drum lining may occasionally chip and fall to bottom of container after long storage or excessive handling. As a precaution, pour liquid through filter/strainer to catch small pieces of liner before blending or repackaging. Commercially clean empty containers before re-use. CAUTION: Do not weld or cut empty containers (Vapors May Ignite).

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Section X - REGULATORY INFORMATION

<u>Inventory</u>	<u>Status</u>
<u>United States (TSCA)</u>	<u>Listed on the inventory.</u>
<u>Canada (DSL)</u>	<u>Listed on the inventory.</u>

<u>European Union (EINECS)</u>	<u>Listed on the inventory.</u>
<u>Australia (AICS)</u>	<u>Listed on the inventory.</u>
<u>Japan (MITI)</u>	<u>Listed on the inventory.</u>
<u>South Korea (KECL)</u>	<u>Listed on the inventory.</u>

Section XI - TRANSPORTATION INFORMATION

All such statements or descriptions are informational only and are not made or given as a warranty of fitness for particular purpose. Buyer is solely responsible for determining the adequacy of each label, or package for the particular use or uses to which they are applied. Seller does not assume buyer's responsibility for compliance with or any Federal, State or local laws, rules ordinances or regulations. The listed Transportation Classification does not address regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors.

TDG Status: **Hazardous** DOT Label/Placard [exemption § 173.150(f) applies:
IMO Status: **Hazardous** Highway/Rail: per requirements for Combustible Liquids
IATA Status: **Hazardous** Air/Ship: per requirements for Flammable Liquids

SHIPPING CLASSIFICATION:

Proper Shipping Name: **TERPENE HYDROCARBONS, N.O.S.**
Hazard Class: **3**
Identification No.: **UN2319**
Packing Group: **III**

Section XII - ADDITIONAL INFORMATION

National Fire Protection Association Hazard Ratings - NFPA(R):

1 Health Hazard - Slight
2 Flammability - Moderate
0 Reactivity - Minimal

Key Legend Information:

ACGIH American Conference of Governmental Industrial Hygienists
OSHA Occupational Safety and Health Administration
NTP National Toxicology Program
IARC International Agency for Research on Cancer

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