

SECTION 1: Identification of the substance/mixture

1.1. Product identifier

Product form	: Substance
Substance name	: D-Limonene
Formula	: C ₁₀ H ₁₆
Molecular weight	: 136.23 g/mol
CAS No.	: 5989-27-5
Product code	: LW-DLIMONENE
Synonyms	: (R)-(+)-Limonene

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture	: Laboratory chemicals, Manufacture of substances
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1.3. Emergency telephone number

Emergency number	: 1.800.424.9300 (USA) +1.703.527.3887 (INT)
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SECTION 2: Hazards Identification

2.1. Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226

Skin irritation (Category 2), H315

Skin sensitization (Category 1), H317

Aspiration hazard (Category 1), H304

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2. GHS Label elements, including precautionary statements

Pictogram	: 
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Signal word : Danger

Hazard statement(s)

H226 : Flammable liquid and vapour.

H304 : May be fatal if swallowed and enters airways.

H315 : Causes skin irritation.

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- H317 : May cause an allergic skin reaction.
- H410 : Very toxic to aquatic life with long lasting effects.
- Precautionary statement(s)
- 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.
- P242 : Use only non-sparking tools.
- P243 : Take precautionary measures against static discharge.
- P261 : Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
- P264 : Wash skin thoroughly after handling.
- 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.
- P301 + P310 : IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
- P303 + P361 + P353 : IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
- P321 : Specific treatment (see supplemental first aid instructions on this label).
- P331 : Do NOT induce vomiting.
- P333 + P313 : If skin irritation or rash occurs: Get medical advice/ attention.
- P362 : Take off contaminated clothing and wash before reuse.
- P370 + P378 : In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
- P391 : Collect spillage.
- P403 + P235 : Store in a well-ventilated place. Keep cool.
- P405 : Store locked up.
- P501 : Dispose of contents/ container to an approved waste disposal plant.

2.3. Hazards not otherwise classified (HNOC) or not covered by GHS

none

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SECTION 3: Composition/information on ingredients

3.1. Substances

Hazardous components

Component	Classification	Concentration
D-Limonene	Flam. Liq. 3; Skin Irrit. 2; Skin Sens. 1; Asp. Tox. 1; Aquatic Acute 1; Aquatic Chronic 1; H226, H304, H315, H317, H410	<= 100 %
For the full text of the H-Statements mentioned in this Section, see Section 16.		

SECTION 4: Description of first aid measures

4.1. Description of first aid measures

- General advice : Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.
- First-aid measures after inhalation : If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
- First-aid measures after skin contact : Wash off with soap and plenty of water. Consult a physician.
- First-aid measures after eye contact : Flush eyes with water as a precaution.
- First-aid measures after ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2. Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

4.3. Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2. Special hazards arising from the substance or mixture

Carbon oxides

5.3. Advice for firefighters

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Wear self-contained breathing apparatus for firefighting if necessary.

5.4. More Information

Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

For personal protection see section 8.

6.2. Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3. Methods and material for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4. Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build-up of electrostatic charge.

For precautions see section 2.2.

7.2. Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature 2 - 8 °C

7.3. Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Components with workplace control parameters

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Component	CAS-No.	Value	Control parameters	Basis
D-Limonene	5989-27-5	TWA	20.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Upper Respiratory Tract irritation Lung damage Skin irritation Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Not classifiable as a human carcinogen Sensitizer varies		

8.2. Exposure controls

Appropriate engineering controls : Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

8.3. Personal protective equipment

Eye protection : Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin Protection : Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 480 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 31 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

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data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

- Body protection : Complete suit protecting against chemicals, Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
- Respiratory protection : Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
- Environmental exposure controls : Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

- Appearance : Form: liquid
Color: colorless
- Odor : characteristic
- Odor Threshold : No data available
- pH : No data available
- Melting point/freezing point : Melting point/range: -74.3 °C (-101.7 °F)
- Initial boiling point and boiling range : 176 - 177 °C (349 - 351 °F) - lit.
- Flash point : 50 °C (122 °F)
- Evaporation rate : No data available

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Flammability (solid, gas)	: No data available
Upper/lower flammability or explosive limits	: Upper explosion limit: 6.1 %(V) Lower explosion limit: 0.7 %(V)
Vapor pressure	: 50 hPa (38 mmHg) at ca.50 °C (122 °F)
Vapor density	: 4.70 - (Air = 1.0)
Relative density	: 0.842 g/cm ³ at 20 °C (68 °F)
Water solubility	: immiscible
Partition coefficient: n-octanol/water	: log Pow: 4.2
Auto-ignition temperature	: 245 °C (473 °F) at 995 hPa (746 mmHg)
Decomposition temperature	: No data available
Viscosity	: No data available
Explosive properties	: No data available
Oxidizing properties	: No data available
9.2. Other information	
Relative vapor density	: 4.70 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1. Reactivity

No data available

10.2. Chemical stability

Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

No data available

10.4. Conditions to avoid

Heat, flames and sparks.

10.5. Incompatible materials

Strong oxidizing agents

10.6. Hazardous decomposition products

Other decomposition products - No data available

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : LD50 Oral - Rat - 4,400 mg/kg

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	Remarks: Behavioral: Change in motor activity (specific assay). Respiratory disorder Skin and Appendages: Other: Hair. Inhalation: No data available LD50 Dermal - Rabbit - > 5,000 mg/kg No data available
Skin corrosion/irritation	: No data available
Serious eye damage/irritation	: Eyes - Rabbit Result: No eye irritation (OECD Test Guideline 405)
Respiratory or skin sensitization	: - Mouse Result: May cause sensitization by skin contact. (OECD Test Guideline 429)
Germ cell mutagenicity	: Mouse lymphocyte Result: negative Rat - male Result: negative

Carcinogenicity

Carcinogenicity - Rat - Oral

Tumorigenic: Carcinogenic by RTECS criteria. Kidney, Ureter, Bladder: Kidney tumors. Tumorigenic Effects: Testicular tumors.

Carcinogenicity - Mouse - Oral

Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal: Tumors.

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (D-Limonene)
NTP:	: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
Reproductive toxicity	: No data available
Specific target organ toxicity (single	: No data available

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exposure)

Specific target organ toxicity (repeated exposure) : No data available

Aspiration hazard : No data available

Additional Information : Repeated dose toxicity
Mouse - male and female - NOAEL : 1,650 mg/kg - LOAEL : 3,300 mg/kg – OECD Test Guideline 407

RTECS: GW6360000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence

Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1. Toxicity

Toxicity to fish : flow-through test LC50 - Pimephales promelas (fathead minnow) - 0.72 mg/l - 96 h
(OECD Test Guideline 203)

Toxicity to daphnia and other aquatic invertebrates : Immobilization EC50 - Daphnia magna (Water flea) - 0.36 mg/l - 48 h
(OECD Test Guideline 202)

Toxicity to bacteria : EC50 - Sludge Treatment - 3.94 mg/l
(OECD Test Guideline 209)

12.2. Persistence and degradability

Biodegradability : Result: 71 % - Readily biodegradable
(OECD Test Guideline 301B)

12.3. Bioaccumulative potential : No data available

12.4. Mobility in soil : No data available

12.5. Results of PBT and vPvB assessment : PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6. Other adverse effects : An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

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13.1. Waste treatment methods

- Product : Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.
- Contaminated Packaging : Dispose of as unused product.

SECTION 14: Transport information

DOT (US)

- UN number : 2052
- Class : 3
- Packing group : III
- Proper shipping name : Dipentene
- Reportable Quantity (RQ) :
- Poison Inhalation Hazard : No

IMDG

- UN number : 2052
- Class : 3
- Packing group : III
- EMS-No : F-E, S-E
- Proper shipping name : DIPENTENE
- Marine pollutant : Yes

IATA

- UN number : 2052
- Class : 3
- Packing group : III
- Proper shipping name : Dipentene

SECTION 15: Regulatory information

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

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	5989-27-5	2009-07-17

New Jersey Right To Know Components

D-Limonene	CAS-No.	Revision Date
	5989-27-5	2009-07-17

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	: Acute aquatic toxicity
Aquatic Chronic	: Chronic aquatic toxicity
Asp. Tox.	: Aspiration hazard
Flam. Liq.	: Flammable liquids
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.
H400	: Very toxic to aquatic life.
H410	: Very toxic to aquatic life with long lasting effects.
Skin Irrit.	: Skin irritation

HMIS Rating

Health Hazard	: 2
Chronic Health Hazard	: *
Flammability	: 2
Physical Hazard	: 0

NFPA Rating

Health hazard	: 2
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Fire Hazard : 2

Reactivity Hazard : 0

Further Information

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