

Safety Data Sheet

Limonene



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1. Identification

Product Description	Limonene
CAS #	5989-27-5
FEMA Number	2633
True Terpenes Item #	RM10017
Recommended Use	Concentrated aromatic and flavor ingredient which may be used in flavor and fragrance compounds according to legal and IFRA or FEMA GRAS/FDA guidelines.
Recommended Restrictions	For manufacturing use only
Company	True Terpenes (888) 954-8550 TrueTerpenes.com
Emergency Contact	Poison Control Helpline: 1 (800) 222-1222

2. Hazard(s) Identification



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Physical Hazards	Flammable liquids	Category 3
Health Hazards	Acute toxicity, oral	Category 5
	Acute toxicity, dermal	Category 5
	Skin corrosion/irritation	Category 2
	Sensitization, skin	Category 1
	Aspiration hazard	Category 1
Environmental Hazards	Hazardous to the aquatic environment, acute hazard	Category 1
	Hazardous to the aquatic environment, long-term hazard	Category 1

Label Elements



Signal Word Danger

Hazard Statement Flammable liquid and vapor. May be harmful if swallowed or in contact with skin. May be fatal if swallowed and enters airways. Causes skin irritation. May cause an allergic skin reaction. Very toxic to aquatic life with long lasting effects.

Precautionary Statement

Prevention Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use non-sparking tools. Take



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	action to prevent static discharges. Avoid breathing mist or vapor. Wash thoroughly after handling. Contaminated work clothing should not be allowed out of the workplace. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.
Response	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. Call a POISON CENTER/doctor if you feel unwell. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse. In case of fire: Use appropriate media to extinguish. Collect spillage.
Storage	Store in a well-ventilated place. Keep cool. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not Otherwise Classified (HNOC)	None known.
Supplemental Information	100% of the mixture consists of component(s) of unknown acute inhalation toxicity.

3. Composition / Information on Ingredients

Substances

Chemical Name	Common Name and Synonyms	CAS Number	Percent
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CARVENE	DIPENTENE (+)-P-MENTHA-1,8-DIENE (R)-(+)-Limonene (R)-4-Isopropenyl-1-methyl-1-cyclohexene (4R)-1-methyl-4-prop-1-en-2-ylcyclohexene	5989-27-5	100
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4. First-Aid Measures

Inhalation

If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. For breathing difficulties, oxygen may be necessary. Call a physician if symptoms develop or persist.

Skin Contact

Take off immediately all contaminated clothing. Get medical attention if irritation develops and persists. Wash skin thoroughly with soap and water for several minutes.

Eye Contact

Remove contact lenses, if present and easy to do. Get medical attention if irritation develops and persists. Promptly wash eyes with plenty of water while lifting the eye lids.

Ingestion

Call a physician or poison control center immediately. If swallowed, rinse mouth with water (only if the person is conscious). Do not induce vomiting. If vomiting occurs, the head should be kept low so that stomach vomit doesn't enter the lungs.

Most Important Symptoms / Effects, Acute and Delayed

Aspiration may cause pulmonary edema and pneumonitis. Direct contact with eyes may cause temporary irritation. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash.



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Indication of Immediate Medical Attentional and Special Treatment Needed

Not available.

General Advice

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-Fighting Measures

Suitable Extinguishing Media

Water spray, fog, CO2, dry chemical, or alcohol resistant foam.

Unsuitable Extinguishing Media

Do not use a solid water stream as it may scatter and spread fire.

Specific Hazards Arising from the Chemical

Fire may produce irritating, corrosive and/or toxic gases.

Special Protective Equipment and Precautions for Firefighters

Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Structural firefighters protective clothing will only provide limited protection. Wear self-contained breathing apparatus with a full facepiece operated in the positive pressure demand mode when fighting fires.

Firefighting Equipment / Instructions

In case of fire and/or explosion do not breathe fumes. Use standard firefighting procedures and consider the hazards of other involved materials. Move containers from fire area if you can do so without risk. Water runoff can cause environmental damage. Ventilate closed spaces before entering them. Keep run-off water out of sewers and water sources. Dike for water control.



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Specific Methods

Use water spray to cool unopened containers.

General Fire Hazards

Static charges generated by emptying package in or near flammable vapor may cause flash fire.

6. Accidental Release Measures

Personal Precautions, Protective Equipment and Emergency Procedures

Keep unnecessary personnel away. Eliminate all sources of ignition. Avoid contact with skin or inhalation of spillage, dust or vapor. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them.

Methods and Materials for Containment and Cleaning Up

Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb with inert absorbent such as dry clay, sand or diatomaceous earth, commercial sorbents, or recover using pumps.

The product is immiscible with water and will spread on the water surface.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Prevent product from entering drains. Absorb in vermiculite, dry sand or earth and place into containers.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills in original containers for re-use. This material and its



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container must be disposed of as hazardous waste. Collect and dispose of spillage as indicated in section 13 of the SDS.

Environmental Precautions

Prevent further leakage or spillage if safe to do so. Do not contaminate water. Avoid release to the environment. Retain and dispose of contaminated wash water. Contact local authorities in case of spillage to drain/aquatic environment.

7. Handling and Storage

Precautions for Safe Handling

Do not handle or store near an open flame, heat or other sources of ignition. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Avoid breathing vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Wash thoroughly after handling.

Conditions for Safe Storage, Including any Incompatibilities

Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area.

8. Exposure Controls / Personal Protection

Occupational Exposure Limits



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US. ACGIH Threshold Limit Values

Material	Type	Value
CARVENE (CAS 5989-27-5)	TWA	165.5 mg/m ³ 30 ppm

Biological Limit Values No biological exposure limits noted for the ingredient(s).

Appropriate Engineering Controls Use explosion-proof ventilation equipment to stay below exposure limits.

Individual Protection Measures, Such as Personal Protective Equipment

Eye / Face Protection Wear safety glasses with side shields (or goggles). Face shield is recommended.

Skin Protection

Hand Protection Chemical resistant gloves.

Other Use of an impervious apron is recommended.

Respiratory Protection Respiratory protection not required. If ventilation is insufficient, suitable respiratory protection must be provided.

Thermal Hazards Wear appropriate thermal protective clothing, when necessary.

General Hygiene Considerations When using do not smoke. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.



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9. Physical and Chemical Properties

Appearance	Refer to Spec Sheet
Physical State	Liquid
Form	Liquid
Color	Refer to Spec Sheet
Odor	Characteristic
Odor Threshold	Not available
pH	Not available
Melting Point / Freezing Point	-139.9 °F (-95.5 °C)
Initial Boiling Point and Boiling Range	347.9 - 348.8 °F (175.5 - 176 °C) 101.725 kPa
Flash Point	113.0 °F (45.0 °C) Closed Cup
Evaporation Rate	Not available
Flammability (solid, gas)	Not applicable
Upper / Lower Flammability or Explosive Limits	
Flammability Limit - Lower (%)	Not available
Flammability Limit - Upper	Not available



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(%)	
Explosive Limit - Lower (%)	Not available
Explosive Limit - Upper (%)	Not available
Vapor Pressure	1.54 mm Hg at 25 °C
Vapor Density	4.7
Relative Density	Not available
Solubility(ies)	
Solubility (water)	Insoluble
Partition Coefficient (n-octanol/water)	4.232
Auto-ignition Temperature	458 °F (236.67 °C)
Decomposition Temperature	Not available
Viscosity	Not available
Other Information	
Density	0.84 g/cm ³ estimated at 25 °C
Explosive Properties	Not explosive
Flammability Class	Combustible II estimated
Heat of Combustion (NFPA 30B)	39.8 kJ/g
Molecular Formula	C ₁₀ H ₁₆
Molecular Weight	136.23 g/mol



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Oxidizing Properties	Not oxidizing
Specific Gravity	0.84 at 25 °C
Surface Tension	26 mN/m (68 °F (20 °C))

10. Stability and Reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical Stability	Material is stable under normal conditions.
Possibility of Hazardous Reaction	No dangerous reaction known under conditions of normal use.
Conditions to Avoid	Avoid heat, sparks, open flames and other ignition sources. Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible Materials	Strong oxidizing agents.
Hazardous Decomposition Products	No hazardous decomposition products if stored and handled as indicated.



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11. Toxicological Information

Information on Likely Routes of Exposure

Inhalation	No adverse effects due to inhalation are expected.
Skin Contact	May be harmful in contact with skin. Causes skin irritation. May cause an allergic skin reaction.
Eye Contact	Direct contact with eyes may cause temporary irritation.
Ingestion	May be harmful if swallowed. Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia.

Symptoms Related to the Physical, Chemical and Toxicological Characteristics	Aspiration may cause pulmonary edema and pneumonitis. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash.
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Information on Toxicological Effects

Acute Toxicity	May be fatal if swallowed and enters airways. May be harmful in contact with skin.
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Product	Species	Test Results
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CARVENE (CAS 5989-27-5)

Acute

Dermal LD50	Rabbit	5 g/kg
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Not listed.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not available.

Reproductive Toxicity This product is not expected to cause reproductive or developmental effects.

Specific Target Organ Toxicity - Single Exposure Not classified.

Specific Target Organ Toxicity - Repeated Exposure Repeated dose toxicity - mouse - male and female - No observed adverse effect level - 1,650 mg/kg - Lowest observed adverse effect level - 3,300 mg/kg

Aspiration Hazard May be fatal if swallowed and enters airways.

12. Ecological Information

Ecotoxicity Very toxic to aquatic life with long lasting effects.

Product	Species	Test Results
CARVENE (CAS 5989-27-5)		
Aquatic		
Crustacea EC50	Water flea (Daphnia pulex)	69.6 mg/l, 48 hours



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Fish LC50	Fathead minnow (<i>Pimephales promelas</i>)	> 0.619 - < 0.796 mg/l, 96 hours
	Rainbow trout, donaldson trout (<i>Oncorhynchus mykiss</i>)	35 mg/l, 4 days
Other	Activated Sludge	3.94 mg/l

* Estimates for product may be based on additional component data not shown.

Persistence and Degradability Biodegradability Result: 71 % - Readily biodegradable.
(OECD Test Guideline 301B)

Bioaccumulative Potential Partition coefficient n-octanol / water (log Kow)
4.232

Mobility in Soil No data available.

Other Adverse Effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal Considerations

Disposal Instructions

Do not discharge into drains, water courses or onto the ground. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international



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	regulations.
Local Disposal Regulations	Dispose in accordance with all applicable regulations.
Hazardous Waste Code	Not established.
Waste from Residues / Unused Products	Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated Packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport Information

ADN

UN Number	2319
UN Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Transport Hazard Class(es)	3
Subsidiary Class(es)	-
Packing Group	III
Environmental Hazards	Yes
Labels Required	3



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ADR

UN Number	2319
UN Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Transport Hazard Class(es)	3
Subsidiary Class(es)	-
Packing Group	III
Environmental Hazards	Yes
Labels Required	3

RID

UN Number	2319
UN Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Transport Hazard Class(es)	3
Subsidiary Class(es)	-
Packing Group	III
Environmental Hazards	Yes
Labels Required	3
Special Precautions for User	Read safety instructions, SDS and emergency procedures before handling.

DOT BULK

UN Number	2319
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UN Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Hazard Class(es)	3
Packing Group	III
Environmental Hazards	
Marine Pollutant	Yes
Packaging Exceptions	150
Packaging Bulk	242
Labels Required	3

DOT NON-BULK

Not regulated as dangerous goods.

IATA

UN Number	2319
UN Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Transport Hazard Class(es)	3
Subsidiary Class(es)	-
Packing Group	III
Environmental Hazards	No
Labels Required	3

IMDG

UN Number	2319
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UN Proper Shipping Name	TERPENE HYDROCARBONS, N.O.S. (D-LIMONENE)
Transport Hazard Class(es)	3
Subsidiary Class(es)	-
Packing Group	III
Environmental Hazards	
Marine Pollutant	Yes
Labels Required	3
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable.
ADN; ADR; DOT BULK; IATA; IMDG; RID	



Marine Pollutant



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15. Regulatory Information

US Federal Regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency Release Notification

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not available.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Not regulated.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely Hazardous Substance

Not listed.

SARA 311/312 Hazardous Chemical

Yes



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Classified Hazard Categories

Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - No

SARA 313 (TRI reporting)

Not regulated.

Other Federal Regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA)

Not regulated.

US State Regulations

US. New Jersey Worker and Community Right-to-Know Act

CARVENE (CAS 5989-27-5)

International Inventories

Country(s) or Region	Inventory Name	On Inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes



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Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States and Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

*A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other Information



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Revision Date New Document
Version # 00

HMIS® Ratings

Health 2
Flammability 2
Physical Hazard 0

Disclaimer

True Terpenes cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available. The above information relates only to this product and not to its use in combination with any other material or any particular process and is designed only as guidance for the safe handling, use, processing, storage, transportation, and disposal and should not be considered as a guarantee or quality specification. This product has not been evaluated for safe use in e-cigarettes or any vaping application where the product(s) is/are intentionally vaporized and inhaled. True Terpenes has performed no testing on these products in e-cig/vaping applications. It is the sole responsibility of the individual(s) purchasing this product to assess its' safety in the final application. The above information relates only to this product and not to its use in combination with any other material or any particular process and is designed only as guidance for the safe handling, use, processing, storage, transportation, disposal, and should not be considered as a guarantee or quality specification. The above information is based on data provided by and collected from recognized sources such as distributors, manufacturers, and technical groups and is



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considered to be accurate to the best of True Terpenes knowledge as of the date of this document. It is the responsibility of the user to review all safety information about this product and determine its safety and suitability in their own processes and operations. Appropriate warnings and safe handling procedures should be provided to all handlers and users, taking into account the intended use and the specific conditions and factors relating to such use in accordance with all applicable laws and regulations.

