SECTION-1: Identification of the substance / mixture and the company / undertaking

Catalogue Number	CS-O-11177
Product Name	Limonene
CAS No.	138-86-3
Category	API
Synonyms	(+/-)-Limonene;Dipentene; (+/-)-p-Mentha-1;8-diene
Brand	Clearsynth Labs Ltd.
Identified uses	Laboratory Chemicals
Uses advised against	Not available
Company	Clearsynth Labs Ltd. Mumbai, India
Emergency Phone #	+91-22-245045900
REACH No.	Not available

SECTION 2: Hazards identification

Disclaimer: This is sample MSDS. Please email **sales@clearsynth.com** for more details.

2.1 Classification of the substance or mixture-Regulation (EC) No 1272/2008:

Skin irritation (Category 2)
Serious eye damage/eye irritation (Category 2)

2.2 Label Elements

Signal Word: Warning

Hazard Statement(s)

Code	Statement
H226	Not available
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.

H400	Not available
H410	Not available
H304	Not available
H319	Causes serious eye irritation.

Precautionary Statement(s)

Code	Statement
P210	Not available
P233	Not available
P240	Not available
P241	Not available
P242	Not available
P243	Not available
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P264	Wash hands thoroughly after handling.
P272	Not available
P273	Not available
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352	IF ON SKIN: Wash with plenty of water and soap.
P303+P361+P353	Not available
P321	Specific treatment (see … on this label).
P332+P317	If skin irritation occurs: Get medical help.
P333+P317	Not available
P362+P364	Take off contaminated clothing and wash it before reuse.
P370+P378	Not available
P391	Not available
P403+P235	Not available
P501	Dispose of contents/container in accordance with local/regional/national/international regulatio
P264+P265	Not available
P301+P316	Not available

P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if presen
P331	Not available
P337+P317	If eye irritation persists: Get medical help.
P405	Store locked up.

SECTION 3: Composition / information on ingredients

3.1 Substance

Component : Limonene
CAS Number : 138-86-3
Molecular Formula : C10H16
Molecular Weight : 136.2
Parent Chemical : Limonene
Synonyms : (+/-)-Limonene;Dipentene; (+/-)-p-Mentha-1;8-diene
Concentration : Not available

SECTION 4: First aid measures

SECTION 4: First-aid measures

4.1 Description of first aid measures
- General advice: Remove contaminated clothing and shoes. Seek medical attention if symptoms persist or are severe.
- Inhalation: Move person to fresh air. If breathing is difficult, seek medical attention.
- Skin contact: Wash with plenty of soap and water. If irritation develops or persists, get medical advice/attention.
- Eye contact: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. Get medical attention if irritation persists.
- Ingestion: Rinse mouth. Do NOT induce vomiting. Seek medical attention.

4.2 Most important symptoms and effects, both acute and delayed
- Not available.

4.3 Indication of any immediate medical attention and special treatment needed
- Treat symptomatically. No data available.

SECTION 5: Firefighting measures

SECTION 5: Fire-fighting measures

5.1 Extinguishing media
- Suitable extinguishing media: Dry chemical, carbon dioxide (CO2), alcohol-resistant foam.
- Unsuitable extinguishing media: Not available.

5.2 Special hazards arising from the substance or mixture
- Combustible/flammable liquid; vapors may form explosive mixtures with air.
- Hazardous combustion products: Carbon oxides. Other decomposition products: Not available.

5.3 Advice for firefighters
- Wear self-contained breathing apparatus (SCBA) and full protective gear.
- Cool containers with water spray to prevent rupture due to heat.
- Use water spray to reduce vapors; avoid directing water stream into burning liquid.

SECTION 6: Accidental release measures

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
- Evacuate unnecessary personnel. Provide adequate ventilation.
- Avoid breathing vapors/mist. Avoid contact with skin and eyes.
- Remove ignition sources. Use non-sparking tools.
- Wear appropriate personal protective equipment (see Section 8).

6.2 Environmental precautions
- Prevent further leakage or spillage if safe to do so.
- Avoid release to the environment. Prevent entry into drains, surface water, or soil.

6.3 Methods and material for containment and cleaning up
- Contain spill with inert absorbent material (e.g., sand, earth, vermiculite).
- Collect into suitable, labeled containers for disposal.
- Clean spill area with suitable detergent; avoid generating aerosols.

6.4 Reference to other sections
- Disposal considerations: see Section 13. Exposure controls/PPE: see Section 8.

SECTION-7: Handling and storage

SECTION 7: Handling and storage

7.1 Precautions for safe handling
- Handle in accordance with good industrial hygiene and safety practice.
- Avoid breathing vapors/mist. Avoid contact with skin, eyes, and clothing.
- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- Use explosion-proof equipment where required. Ground/bond container and receiving equipment.
- Use only non-sparking tools. Prevent electrostatic discharge.

7.2 Conditions for safe storage, including any incompatibilities
- Store in tightly closed container in a cool, dry, well-ventilated place.
- Keep container tightly closed when not in use.
- Store away from oxidizing agents and sources of ignition.
- Storage class/temperature: Not available.

7.3 Specific end use(s)
- Not available.

SECTION 8: Exposure controls / personal protection

SECTION 8: Exposure controls/personal protection

8.1 Control parameters
- Occupational exposure limits: Not available.
- Biological limit values: Not available.

8.2 Exposure controls
- Engineering controls: Use local exhaust ventilation or general ventilation to maintain airborne concentrations below applicable limits (if established). Use explosion-proof ventilation where appropriate.
- Personal protective equipment (PPE):
- Eye/face protection: Safety glasses with side shields or chemical splash goggles.
- Skin protection: Wear protective gloves (material selection dependent on use conditions; no data available). Wear protective clothing as needed.
- Respiratory protection: If ventilation is inadequate or exposure is possible, use appropriate respiratory protection. Specific respirator type: Not available.
- Hygiene measures: Wash hands thoroughly after handling. Do not eat, drink, or smoke when using this product. Remove contaminated clothing and wash before reuse.
- Environmental exposure controls: Avoid release to the environment; implement spill containment and vapor control as appropriate.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Test	Result
Appearance	No data available
IR spectrum	No data available
pH	No data available
Solubility	No data available

Property	Value
a) Physical State	No data available
b) Color	No data available
c) Odor	No data available
d) pH	No data available
e) Vapour Pressure	No data available
f) Viscosity	No data available
g) Initial Boiling Point and boiling range	No data available
h) Melting Point / Freezing Point	No data available

Property	Value
i) Auto Ignition Temperature	No data available
j) Flash Point	No data available
k) Explosion Limit, Lower	No data available
l) Explosion Limit, Upper	No data available
m) Decomposition Temperature	No data available
n) Loss on Drying	No data available
o) Relative Density	No data available
p) Solubility (in DMSO)	No data available
q) Oxidizing Properties	No data available

SECTION 10: Stability and reactivity

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, sparks, and other ignition sources.
- Excessive heat and formation of vapors.

10.5 Incompatible materials
- Strong oxidizing agents.
- Other incompatibilities: Not available.

10.6 Hazardous decomposition products
- Carbon oxides.
- Other decomposition products: Not available.

SECTION 11: Toxicological information

11.1 Information on toxicological effects
- Acute toxicity: IDENTIFICATION AND USE: Limonene is a colorless liquid. It is not registered for current pesticide use in the U.S., but approved pesticide uses may change periodically and so federal, state and local authorities must be consulted for currently approved uses. Limonene is used as a solvent in degreasing metals prior to industrial painting, for cleaning in the electronic and printing industries, and in paint as a solvent. Limonene is also used as a flavor and fragrance additive in food, household cleaning products and perfumes. It is also used as gallstone

solubilizer. HUMAN EXPOSURE AND TOXICITY: Limonene is a skin irritant in humans. The oxidized forms of limonene are known to cause allergic contact dermatitis. Limonene liquid has been reported to irritate eyes, ingestion causes irritation of GI tract. Albuminuria and hematuria are probable if ingested in sufficient quantity. It is also associated with mouth and throat irritation, shortness of breath, and impaired lung function. ANIMAL STUDIES: Limonene is a skin irritant in experimental animals. The critical organ in animals (except for male rats) following oral or ip administration is the liver. Exposure to limonene affects the amount and activity of different liver enzymes, liver weight, cholesterol levels and bile flow. These changes have been noted in mice, rats and dogs. Limonene and its epoxides were not mutagenic when tested at concentrations of 0.3-3333 ug/plate in in vitro assays using different strains of Salmonella typhimurium, in the presence or absence of metabolic activation. When incubated with Syrian hamster embryo cells up to 100 ug/mL or 3 mM, limonene did not induce statistically significant cell transformation. There is no evidence that limonene was teratogenic or produced embryotoxic effects in the absence of maternal toxicity. ECOTOXICITY STUDIES: Terrestrial organisms are most likely exposed to limonene via the air. The few studies of terrestrial species (i.e. insects) using vapor exposure revealed effects of limonene at ppm levels. In the aquatic environment, limonene exhibits high acute toxicity to fish and Daphnia. LC50 (mice) = 67,500 mg/m3

- Skin corrosion/irritation: /HUMAN EXPOSURE STUDIES/ Myoga is a fragrant plant which is the special product of Japan and is cultivated throughout Japan. According to earlier investigation of myoga cultivators in Japan, 8 of 35 cultivators experienced contact dermatitis in the harvest season. The purpose of this study was to assess the allergenicity of myoga and its major volatile components. The volatile components of myoga were analyzed by gas chromatograph (GC). They included alpha-pinene, beta-pinene and R-(+)-limonene. We performed a toxicity study of each of the major fragrant components of myoga using acute dermal irritation assays and the Guinea-Pig Maximization test (GPMT) in order to probe the mechanism of allergic contact dermatitis. In acute dermal irritation assays, alpha-pinene, beta-pinene and limonene showed positive responses at concentrations of 4%; limonene oxide at 20% and myoga showed a positive response at concentrations of 100%. From the results of the GPMT, according to Kligman scores, limonene oxide was identified as an extreme skin sensitizer and myoga as a mild skin sensitizer. The results of the present study show that R-(+)-limonene is the most important allergen amongst the chemical components of myoga, and we consider it to be the reason why myoga cultivators experience allergic contact dermatitis.
- Serious eye damage/eye irritation: No data available.
- Respiratory or skin sensitization: /HUMAN EXPOSURE STUDIES/ Dipentene tested /as irritation test/ at 20% in petrolatum produced no irritation after a 48 hr closed patch test in 25 human subjects. A maximization test... was carried out on 25 volunteers. The material was tested at concentration of 20%, in petrolatum and produced no sensitization reactions. /HUMAN EXPOSURE STUDIES/ Myoga is a fragrant plant which is the special product of Japan and is cultivated throughout Japan. According to earlier investigation of myoga cultivators in Japan, 8 of 35 cultivators experienced contact dermatitis in the harvest season. The purpose of this study was to assess the allergenicity of myoga and its major volatile components. The volatile components of myoga were analyzed by gas chromatograph (GC). They included alpha-pinene, beta-pinene and R-(+)-limonene. We performed a toxicity study of each of the major fragrant components of myoga using acute dermal irritation assays and the Guinea-Pig Maximization test (GPMT) in order to probe the mechanism of allergic contact dermatitis. In acute dermal irritation assays, alpha-pinene, beta-pinene and limonene showed positive responses at concentrations of 4%; limonene oxide at 20% and myoga showed a positive response at concentrations of 100%. From the results of the GPMT, according to Kligman scores, limonene oxide was identified as an extreme skin sensitizer and myoga as a mild skin sensitizer. The results of the present study show that R-(+)-limonene is the most important allergen amongst the chemical components of myoga, and we consider it to be the reason why myoga cultivators experience allergic contact dermatitis.
- Germ cell mutagenicity: IDENTIFICATION AND USE: Limonene is a colorless liquid. It is not registered for current pesticide use in the U.S., but approved pesticide uses may change periodically and so federal, state and local

authorities must be consulted for currently approved uses. Limonene is used as a solvent in degreasing metals prior to industrial painting, for cleaning in the electronic and printing industries, and in paint as a solvent. Limonene is also used as a flavor and fragrance additive in food, household cleaning products and perfumes. It is also used as gallstone solubilizer. HUMAN EXPOSURE AND TOXICITY: Limonene is a skin irritant in humans. The oxidized forms of limonene are known to cause allergic contact dermatitis. Limonene liquid has been reported to irritate eyes, ingestion causes irritation of GI tract. Albuminuria and hematuria are probable if ingested in sufficient quantity. It is also associated with mouth and throat irritation, shortness of breath, and impaired lung function. ANIMAL STUDIES: Limonene is a skin irritant in experimental animals. The critical organ in animals (except for male rats) following oral or ip administration is the liver. Exposure to limonene affects the amount and activity of different liver enzymes, liver weight, cholesterol levels and bile flow. These changes have been noted in mice, rats and dogs. Limonene and its epoxides were not mutagenic when tested at concentrations of 0.3-3333 ug/plate in in vitro assays using different strains of Salmonella typhimurium, in the presence or absence of metabolic activation. When incubated with Syrian hamster embryo cells up to 100 ug/mL or 3 mM, limonene did not induce statistically significant cell transformation. There is no evidence that limonene was teratogenic or produced embryotoxic effects in the absence of maternal toxicity. ECOTOXICITY STUDIES: Terrestrial organisms are most likely exposed to limonene via the air. The few studies of terrestrial species (i.e. insects) using vapor exposure revealed effects of limonene at ppm levels. In the aquatic environment, limonene exhibits high acute toxicity to fish and Daphnia.
- Carcinogenicity: Evaluation: There is inadequate evidence in humans for the carcinogenicity of d-limonene. There is sufficient evidence in experimental animals for the carcinogenicity of d-limonene. Overall evaluation: In making its overall evaluation of the carcinogenicity to humans of d-limonene, the Working Group concluded that d-limonene produces renal tubular tumors in male rats by a non-DNA reactive alpha-2u-globulin associated response. Therefore, the mechanism by which d-limonene incr the incidence of renal tubular tumors in male rats is not relevant to humans. d-Limonene is not classifiable as to its carcinogenicity to humans (Group 3). /d-Limonene/
- Reproductive toxicity: IDENTIFICATION AND USE: Limonene is a colorless liquid. It is not registered for current pesticide use in the U.S., but approved pesticide uses may change periodically and so federal, state and local authorities must be consulted for currently approved uses. Limonene is used as a solvent in degreasing metals prior to industrial painting, for cleaning in the electronic and printing industries, and in paint as a solvent. Limonene is also used as a flavor and fragrance additive in food, household cleaning products and perfumes. It is also used as gallstone solubilizer. HUMAN EXPOSURE AND TOXICITY: Limonene is a skin irritant in humans. The oxidized forms of limonene are known to cause allergic contact dermatitis. Limonene liquid has been reported to irritate eyes, ingestion causes irritation of GI tract. Albuminuria and hematuria are probable if ingested in sufficient quantity. It is also associated with mouth and throat irritation, shortness of breath, and impaired lung function. ANIMAL STUDIES: Limonene is a skin irritant in experimental animals. The critical organ in animals (except for male rats) following oral or ip administration is the liver. Exposure to limonene affects the amount and activity of different liver enzymes, liver weight, cholesterol levels and bile flow. These changes have been noted in mice, rats and dogs. Limonene and its epoxides were not mutagenic when tested at concentrations of 0.3-3333 ug/plate in in vitro assays using different strains of Salmonella typhimurium, in the presence or absence of metabolic activation. When incubated with Syrian hamster embryo cells up to 100 ug/mL or 3 mM, limonene did not induce statistically significant cell transformation. There is no evidence that limonene was teratogenic or produced embryotoxic effects in the absence of maternal toxicity. ECOTOXICITY STUDIES: Terrestrial organisms are most likely exposed to limonene via the air. The few studies of terrestrial species (i.e. insects) using vapor exposure revealed effects of limonene at ppm levels. In the aquatic environment, limonene exhibits high acute toxicity to fish and Daphnia.
- STOT-single exposure: No data available.
- STOT-repeated exposure: /LABORATORY ANIMALS: Subchronic or Prechronic Exposure/ Administration to dogs at 1.2-3.6 mL/kg/day for 6 months caused frequent vomiting and nausea and decrease in body weight, blood sugar and cholesterol. No significant change observed in organs except in the kidney.

- Aspiration hazard: No data available.

Likely routes of exposure
- Liquid irritates eyes; ingestion causes irritation of GI tract.

Symptoms related to the physical, chemical and toxicological characteristics
- IDENTIFICATION AND USE: Limonene is a colorless liquid. It is not registered for current pesticide use in the U.S., but approved pesticide uses may change periodically and so federal, state and local authorities must be consulted for currently approved uses. Limonene is used as a solvent in degreasing metals prior to industrial painting, for cleaning in the electronic and printing industries, and in paint as a solvent. Limonene is also used as a flavor and fragrance additive in food, household cleaning products and perfumes. It is also used as gallstone solubilizer. HUMAN EXPOSURE AND TOXICITY: Limonene is a skin irritant in humans. The oxidized forms of limonene are known to cause allergic contact dermatitis. Limonene liquid has been reported to irritate eyes, ingestion causes irritation of GI tract. Albuminuria and hematuria are probable if ingested in sufficient quantity. It is also associated with mouth and throat irritation, shortness of breath, and impaired lung function. ANIMAL STUDIES: Limonene is a skin irritant in experimental animals. The critical organ in animals (except for male rats) following oral or ip administration is the liver. Exposure to limonene affects the amount and activity of different liver enzymes, liver weight, cholesterol levels and bile flow. These changes have been noted in mice, rats and dogs. Limonene and its epoxides were not mutagenic when tested at concentrations of 0.3-3333 ug/plate in in vitro assays using different strains of Salmonella typhimurium, in the presence or absence of metabolic activation. When incubated with Syrian hamster embryo cells up to 100 ug/mL or 3 mM, limonene did not induce statistically significant cell transformation. There is no evidence that limonene was teratogenic or produced embryotoxic effects in the absence of maternal toxicity. ECOTOXICITY STUDIES: Terrestrial organisms are most likely exposed to limonene via the air. The few studies of terrestrial species (i.e. insects) using vapor exposure revealed effects of limonene at ppm levels. In the aquatic environment, limonene exhibits high acute toxicity to fish and Daphnia.

SECTION 12: Ecological information

SECTION 12: Ecological information

12.1 Toxicity
- No data available.

12.2 Persistence and degradability
- No data available.

12.3 Bioaccumulative potential
- No data available.

12.4 Mobility in soil
- No data available.

12.5 Results of PBT and vPvB assessment
- Not available.

12.6 Endocrine disrupting properties
- Not available.

12.7 Other adverse effects
- Not available.

SECTION 13: Disposal considerations

SECTION 13: Disposal considerations

13.1 Waste treatment methods
- Dispose of contents/container in accordance with local/regional/national/international regulations.
- Do not discharge to drains or the environment.
- Incineration or disposal via licensed waste contractor may be appropriate.
- Waste code: Not available.

SECTION 14: Transport information

SECTION 14: Transport information

- UN number: Not available.
- UN proper shipping name: Not available.
- Transport hazard class(es): Not available.
- Packing group: Not available.
- Environmental hazards: Not available.
- Special precautions for user: Not available.
- Transport in bulk according to IMO instruments: Not available.

SECTION 15: Regulatory information

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
- Regulatory inventories/status: Not available.
- Specific national/regional regulations: Not available.

15.2 Chemical safety assessment
- Not available.

SECTION 16: Other information

SECTION 16: Other information

- Product name: Limonene
- CAS No.: 138-86-3
- Catalog No.: CS-O-11177
- Synonyms: (+/-)-Limonene; Dipentene; (+/-)-p-Mentha-1;8-diene
- Supplier: Clearsynth Labs Ltd., Mumbai, India
- Emergency phone: +91-22-245045900

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- The information provided is believed to be accurate based on available product information; however, no warranty is expressed or implied. Users are responsible for determining suitability for their particular application and for compliance with applicable laws and regulations.
- Revision date/version: Not available.

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