



**ISO 9001:2015**  
Certification  
ISO 16128-1 ISO 16128-2-2017 EPA [www.epa.gov/greenchemistry](http://www.epa.gov/greenchemistry)

**KAMPOYAKI NATURAL  
PRODUCTS BIO-CHEMISTRY**

[www.kampoyaki-research.com](http://www.kampoyaki-research.com)

Email: [thiru-sam@kampoyaki-research.com](mailto:thiru-sam@kampoyaki-research.com)

## LIMONENE

### Datasheet

Kampoyaki Novo-Drug Screening Libraries 4<sup>th</sup> Edition (Revised in July, 2016)

### PRODUCT INFORMATION

**Name:** Limonene

**Catalog No.:** KRN93050

**Cas No.:** 138-86-3

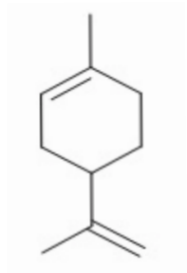
**Purity:** >=98%

**M.F:** C<sub>10</sub>H<sub>16</sub>

**M.W:** 136.2

**Physical Description:** Oil

**Synonyms:** Cyclohexene,1-methyl-4-(1-methylethenyl)-;(4S)-1-methyl-4-(prop-1-en-2-yl) cyclohexene;DL-Limonene.



Batatasin III may have a long-term inhibitory effect on whole plant growth, shows germination inhibitory activity. Batatasin III may impose a lethal effect on the aquatic fauna in small streams.

### POTENTIAL USES

1. Reference standards;
2. Pharmacological research;
3. Food and cosmetic research;
4. Synthetic precursor compounds;
5. Active Pharmaceutical Intermediates (API) & Fine Chemicals;
6. Ingredient in supplements, beverages;
7. Agricultural research;
8. Botanical Bio- Allelopathy,
9. Natural Botanical Molecules as Botanical Bio-Herbicides
10. As Botanical Bio- Anti-Blight Fungicides

### SOURCE

The peel of Citrus limon.

### BIOLOGICAL ACTIVITY OR INHIBITORS

---

Limonene is used as insecticide to control ectoparasites of pet animals, but it has activity against many insects, mites, and microorganisms, in few cases limonene-treated plants have become attractive to plant damaging insects and phytotoxic effects on cultivated plants have been observed; suggests that limonene and other monoterpenes may have use in pest and weed control in organic agriculture after phytotoxicity on crop plants.[1] Limonene,  $\alpha$ -pinene, and  $\beta$ -pinene have hygroscopic properties of aerosol formed by oxidation.[2] d-Limonene has inhibition of 7,12-dimethylbenz[a]anthracene (DMBA)-induced mammary cancer, and can cause the regression of frank mammary tumors. [3] Air oxidation of d-limonene is essential for its sensitizing potential, and that potent allergens are created.[4]

## SOLVENT

---

Chloroform, Dichloromethane, Ethyl Acetate, DMSO, Acetone, etc.

## HPLC METHOD (5)

---

**Mobile phase:** 0.01% Trifluoroacetic acid in water- 0.01% Trifluoroacetic acid in 70% acetonitrile,- gradient elution ;

**Flow rate:** 1.0 ml/min;

**Column temperature:** 30 °C;

**The wave length of determination:** 260 nm.


## STORAGE

---

2-8°C, Protected from air and light, refrigerate or freeze.

## REFERENCES

---

- [1] Ibrahim M, Kainulainen P, Aflatuni A, et al. *Agricultural & Foodence in Finland*, 2008,10(3):243-59.  
[2] Virkkula A, Dingenen R V, Raes F, et al. *Journal of Geophysical Research Atmospheres*, 1999, 104(D3):3569-79.  
[3] Elegbede J A, Elson C E, Qureshi A, et al. *Carcinogenesis*, 1984, 5(5):661-4.  
[4] Karlberg A T, Magnusson K, Nilsson U. *Contact Dermatitis*, 1992, 26(5):332-40.  
[5] Cho H J, Jhee K H, Yoo D C, et al. *Korean J. Food Sci. Technol.*, 2008, 40(3):277-82.
- 
- 



**ISO 9001:2015**  
Certification

ISO 16128-1 ISO 16128-2-2017 EPA www.epa.gov/greenchemistry

## KAMPOYAKI HERBS PTE LTD

16 New Industrial Road, #05-05 Hudson Techno Centre  
Singapore 536204.

**Tel:** +65 63833202 | **Fax:** +65 63833632

**Web:** www.kampoyaki-research.com

**E-mail:** thiru-sam@kampoyaki-research.com

**E-mail:** kampoyak@singnet.com.sg

## CERTIFICATE OF ANALYSIS

**Name:** Limonene

**Catalog No.:** KRN93050

**Cas No.:** 138-86-3

**Purity:**  $\geq 98\%$

**M.F:**  $C_{10}H_{16}$

**Physical Description:** Oil

**Solvent:** Chloroform, Dichloromethane, Ethyl Acetate, DMSO, Acetone, etc.

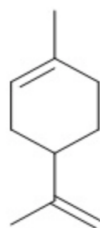
**Weight** 20mg

**Lot No.** KRS201802

**Storage** Protected from air and light, refrigerate or freeze (2-8 °C)

**Intended Use** For laboratory use only

**Shelf Life** 2 years



## CHARACTERIZATION DATA SUMMARY

### Analytical Test

Identification by ,  $^{13}C$ -NMR ,  
Purity tested

### Results

Consistent with the above structure  
 $\geq 98\%$



**ISO 9001:2015**  
Certification  
ISO 16128-1 ISO 16128-2-2017 EPA www.epa.gov/greenchemistry

## KAMPOYAKI HERBS PTE LTD

16 New Industrial Road, #05-05 Hudson Techno Centre  
Singapore 536204.

**Tel:** +65 63833202 | **Fax:** +65 63833632

**Web:** [www.kampoyaki-research.com](http://www.kampoyaki-research.com)

**E-mail:** [thiru-sam@kampoyaki-research.com](mailto:thiru-sam@kampoyaki-research.com)

**E-mail:** [kampoyak@singnet.com.sg](mailto:kampoyak@singnet.com.sg)

# GHS SAFETY DATA SHEET

**Version 4.2**

**Revision Date 01/01/2018**

**Print Date 01/08/2019**

## 1. PRODUCT AND COMPANY IDENTIFICATION

**GHS Product Name:** Limonene

**Product code:** KRN93050

**Company:** KAMPOYAKI HERS PTE LTD

**Address:** 16 New Industrial Road, #05-05 Hudson Techno Centre Singapore 536204

**Tel:** +65-63833202

**Fax:** +65-63833632

**Website:** [www.kampoyaki-research.com](http://www.kampoyaki-research.com)

**E-mail:** [thiru-sam@kampoyaki-research.com](mailto:thiru-sam@kampoyaki-research.com) | [kampoyak@singnet.com.sg](mailto:kampoyak@singnet.com.sg)

## 2. HAZARDS IDENTIFICATION

### 2.1 GHS classification

**Physical Hazards:** Not classified

**Health Hazards:** Not classified

**Environmental Hazards:** Not classified

## 2.2 GHS label elements, including precautionary statements

---

**Pictograms or hazard symbols:** None

**Signal word:** No signal word

**Hazard statements:** None

**Precautionary statements:** None

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

---

**Chemical Name:** Limonene

**CAS#:** 138-86-3

**Purity:** >=95%

**Formula:** C<sub>10</sub>H<sub>16</sub>

**Molecular Weight:** 136.2

**Hazard Symbols:** ---

**Risk Phrases:** ---

## 4. FIRST AID MEASURES

---

### 4.1 Description of first aid measures

---

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Consult a doctor.

**Skin:** Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Consult a doctor.

**Ingestion:** Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water. Consult a doctor.

**Inhalation:** Remove from exposure and move to fresh air immediately. Consult a doctor.

### 4.2 Indication of immediate medical attention and special treatment needed

---

Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

## 5. FIRE FIGHTING MEASURES

---

### 5.1 Suitable extinguishing

---

**Media:** Dry chemical, foam, water spray, carbon dioxide.

**Precautions for firefighters:** Fire-extinguishing work is done from the windward and the suitable fire-extinguishing method according to the surrounding situation is used. Uninvolved persons should evacuate to a safe place. In case of fire in the surroundings: Remove movable containers if safe to do so.

## 5.2 Special protective

---

**Equipment for firefighters:** When extinguishing fire, be sure to wear personal protective equipment.

## 6. ACCIDENTAL RELEASE MEASURES

---

### 6.1 Personal precautions, protective equipment and emergency procedures

---

Avoid dust formation. Avoid breathing vapors, mist or gas.

### 6.2 Environmental precautions

---

Do not let product enter drains.

### 6.3 General Information

---

Use proper personal protective equipment as indicated in Section 8.

### 6.4 Spills/Leaks

---

Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Decontaminate spill site with 10% caustic solution and ventilate area until after disposal is complete

## 7. HANDLING AND STORAGE

---

### 7.1 Precautions for safe handling:

---

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Keep away from sources of ignition. Avoid prolonged or repeated exposure.

### 7.2 Storage

---

Store in a well closed container. Protected from air and light, refrigerate or freeze.(2-8°C)

### 7.3 Specific end uses

---

Use in a laboratory fume hood where possible. Refer to employer is COSHH risk assessment.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

---

### 8.1 Engineering controls

---

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.

**Control parameters:** Not set up

### 8.2 Personal protective equipment

---

**Respiratory protection:** Dust respirator. Follow local and national regulations.

**Hand protection:** Protective gloves.

**Eye protection:** Wear safety glasses and chemical goggles if splashing is possible.

**Skin and body protection:** Wear appropriate protective gloves and clothing to prevent skin exposure.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

---

- a) Appearance Yellow powder
- b) Odour no data available
- c) Odour Threshold no data available
- d) pH no data available
- e) Melting point/freezing point no data available
- f) Initial boiling point and boiling range no data available
- g) Flash point no data available
- h) Evaporation rate no data available
- i) Flammability (solid, gas) no data available
- j) Flammability or explosive limits no data available
- k) Vapour pressure no data available
- l) Vapour density
- m) Relative density no data available
- n) Water solubility no data available
- o) Partition coefficient: no data available
- p) Autoignition temperature no data available
- q) Decomposition temperature no data available
- r) Viscosity no data available
- s) Explosive properties no data available
- t) Oxidizing properties no data available

## 10 - STABILITY AND REACTIVITY

---

### 10.1 Reactivity

---

Stable under recommended transport or storage conditions.

### 10.2 Chemical Stability

---

Stable under normal temperatures and pressures.

### 10.3 Conditions to Avoid

---

Incompatible materials, strong oxidants, heat.

### 10.4 Incompatibilities with Other Materials

---

Strong oxidising/reducing agents, strong acids/alkalis.

### 10.5 Hazardous Decomposition Products

---

Nitrogen oxides, carbon monoxide, irritating and toxic fumes and gases, carbon dioxide, nitrogen.

### 10.6 Hazardous Polymerization

---

Has not been reported.

## 11. TOXICOLOGICAL INFORMATION

---

<b>Acute Toxicity:</b>	No data available
<b>Skin corrosion/irritation:</b>	No data available
<b>Serious eye damage/irritation:</b>	No data available
<b>Germ cell mutagenicity:</b>	No data available
<b>Carcinogenicity:</b>	---
<b>IARC:</b>	No data available
<b>NTP:</b>	No data available
<b>Reproductive toxicity:</b>	No data available

## 12. ECOLOGICAL INFORMATION

---

<b>Toxicity:</b>	No data available
<b>Persistence and degradability:</b>	No data available
<b>Bioaccumulative potential:</b>	No data available
<b>Mobility in soil:</b>	No data available
<b>Results of PBT and vPvB assessment:</b>	No data available
<b>Other adverse effects:</b>	May be harmful to the aquatic environment.

## 13. DISPOSAL CONSIDERATIONS

---

Dispose of in a manner consistent with federal, state, and local regulations.

## 14. TRANSPORT INFORMATION

---

### 14.1 Hazards Class:

---

Does not meet the criteria for classification as hazardous for transport

### 14.2 UN proper shipping name

---

**ADR/RID:** Not dangerous goods

**IMDG:** Not dangerous goods

**IATA:** Not dangerous goods

### 14.3 Transport hazard class(es)

---

Does not meet the criteria for classification as hazardous for transport.



## 15. REGULATORY INFORMATION

### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

No data available

### 15.2 Chemical Safety Assessment

No data available

## 16. ADDITIONAL INFORMATION

This GHS SDS above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

**End of GHS safety data sheet**



**ISO 9001:2015**  
Certification  
ISO 16128-1 ISO 16128-2-2017 EPA www.epa.gov/greenchemistry

### **KAMPOYAKI HERBS PTE LTD**

16 New Industrial Road, #05-05 Hudson Techno Centre  
Singapore 536204.

**Tel:** +65 63833202 | **Fax:** +65 63833632

**Web:** [www.kampoyaki-research.com](http://www.kampoyaki-research.com)

**E-mail:** [thiru-sam@kampoyaki-research.com](mailto:thiru-sam@kampoyaki-research.com)

**E-mail:** [kampoyak@singnet.com.sg](mailto:kampoyak@singnet.com.sg)

