Material Safety Data Sheet

(±)-Menthol
sc-250299

Hazard Alert Code Key: EXTREME HIGH MODERATE LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
(±)-Menthol

STATEMENT OF HAZARDOUS NATURE

NFPA

SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800

EMERGENCY
ChemWatch
Within the US & Canada: 877–715–9305
Outside the US & Canada: +800 2436 2255
(1–800-CHEMCALL) or call +613 9573 3112

SYNONYMS
C10-H20-O, CH3C6H9(C3H7)OH, 1-menthol, p-menthan-3-ol, hexahydrothymol, 2-isopropyl-5-methylcyclohexanol, 5-methyl-2-(1-methylethyl)cyclohexanol, l-menthol, "cyclohexanol, 2-isopropyl-5-methyl-", "peppermint camphor", (-)-menthol, "1-menthol natural USP/ FCC"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Toxicity:</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Body Contact:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Reactivity:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chronic:</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

CANADIAN WHMIS SYMBOLS

Min=0, Low=1, Moderate=2, High=3, Extreme=4
EMERGENCY OVERVIEW

RISK
Risk of serious damage to eyes.
Irritating to respiratory system and skin.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
- Ingestion of menthol may produce severe abdominal pains, nausea, vomiting, ataxia, drowsiness and coma.
The fatal dose for man is calculated to be 2 gm.

EYE
- If applied to the eyes, this material causes severe eye damage.

SKIN
- This material can cause inflammation of the skin on contact in some persons.
- The material may accentuate any pre-existing dermatitis condition.
- Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.
Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
- Cases of instant collapse have been reported in infants following local application of menthol.
- Hypersensitivity reactions have also been reported following application of menthol-containing creams.

INHALED
- The material can cause respiratory irritation in some persons.
The body’s response to such irritation can cause further lung damage.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
- Inhalation of essential oil volatiles may cause dizziness, rapid, shallow breathing, increased heart rate, respiratory irritation, loss of consciousness or convulsions.
- Urination may stop, and there may be swelling and inflammation of the lungs.
- Inhalation of vapors or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.
- In young children nasal drops, containing menthol, may cause spasm of the glottis.

CHRONIC HEALTH EFFECTS
- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
There is limited evidence that, skin contact with this product is more likely to cause a sensitization reaction in some persons compared to the general population.
Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung.
Sensitization may result in allergic dermatitis responses including rash, itching, hives or swelling of extremities.

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>menthol</td>
<td>89-78-1</td>
<td>&gt; 99</td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES

SWALLOWED
- If swallowed do NOT induce vomiting. · If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

EYE
- If this product comes in contact with the eyes: · Immediately hold eyelids apart and flush the eye continuously with running water. · Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

SKIN
- If skin contact occurs: · Immediately remove all contaminated clothing, including footwear · Flush skin and hair with running water (and soap if available).
INHALED
· If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested.

NOTES TO PHYSICIAN
■ Treat symptomatically.
For menthol intoxications:
· Empty the stomach by lavage and aspiration.
· Give a purgative such as sodium sulfate, 30 g in 250 ml of water.
· Convulsions may be controlled by the intravenous administration of diazepam 5 to 10 mg. or if necessary, a short-acting barbiturate such as thiopentone sodium
Martindale: The Extra Pharmacopoeia, 27th Ed.

<table>
<thead>
<tr>
<th>Section 5 - FIRE FIGHTING MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vapour Pressure (mmHG): Not available.</td>
</tr>
<tr>
<td>Upper Explosive Limit (%): Not available.</td>
</tr>
<tr>
<td>Specific Gravity (water=1): 0.89</td>
</tr>
<tr>
<td>Lower Explosive Limit (%): Not available.</td>
</tr>
</tbody>
</table>

EXTINGUISHING MEDIA
· Alcohol stable foam.
· Dry chemical powder.

FIRE FIGHTING
· Alert Emergency Responders and tell them location and nature of hazard.
· Wear breathing apparatus plus protective gloves.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
· Combustible solid which burns but propagates flame with difficulty.
· Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
· Combustion products include: carbon monoxide (CO), carbon dioxide (CO2), other pyrolysis products typical of burning organic material.
· May emit poisonous fumes.
· May emit corrosive fumes.
· CARE: Water in contact with hot liquid may cause foaming and a steam explosion with wide scattering of hot oil and possible severe burns. Foaming may cause overflow of containers and may result in possible fire.

FIRE INCOMPATIBILITY
■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION
Glasses:
Chemical goggles.
Gloves:
Respirator:
Particulate

<table>
<thead>
<tr>
<th>Section 6 - ACCIDENTAL RELEASE MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINOR SPILLS</td>
</tr>
</tbody>
</table>
* Remove all ignition sources.
* Clean up all spills immediately.
* Avoid contact with skin and eyes.
* Control personal contact by using protective equipment.
* Use dry clean up procedures and avoid generating dust.
* Place in a suitable, labelled container for waste disposal.

MAJOR SPILLS
■ Moderate hazard.
* CAUTION: Advise personnel in area.
* Alert Emergency Responders and tell them location and nature of hazard.

<table>
<thead>
<tr>
<th>Section 7 - HANDLING AND STORAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCEDURE FOR HANDLING</td>
</tr>
</tbody>
</table>
* Avoid all personal contact, including inhalation.
* Wear protective clothing when risk of exposure occurs.
Empties containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
* Do NOT cut, drill, grind or weld such containers.
* In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.
## RECOMMENDED STORAGE METHODS
- Glass container.
- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

## STORAGE REQUIREMENTS
- Store in original containers.
- Keep containers securely sealed.

### Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

<table>
<thead>
<tr>
<th>Source</th>
<th>Material</th>
<th>TWA ppm</th>
<th>TWA mg/m³</th>
<th>STEL ppm</th>
<th>STEL mg/m³</th>
<th>Peak ppm</th>
<th>Peak mg/m³</th>
<th>TWA F/CC</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada - British Columbia Occupational Exposure Limits</td>
<td>menthol (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))</td>
<td>10 (N)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants</td>
<td>menthol (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants</td>
<td>menthol (Particulates not otherwise regulated Respirable fraction)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US - California Permissible Exposure Limits for Chemical Contaminants</td>
<td>menthol (Particulates not otherwise regulated Respirable fraction)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US - Oregon Permissible Exposure Limits (Z-1)</td>
<td>menthol (Particulates not otherwise regulated (PNOR) (f) Total Dust)</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US - Michigan Exposure Limits for Air Contaminants</td>
<td>menthol (Particulates not otherwise regulated, Respirable dust)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada - Prince Edward Island Occupational Exposure Limits</td>
<td>menthol (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means "particles not otherwise regulated."*
US - Oregon Permissible Exposure Limits (Z-1)

menthol
(Particulates not otherwise regulated (PNOR) (f)
Respirable Fraction)

- 5

ENDOELTABLE

PERSONAL PROTECTION

RESPIRATOR
Particulate
Consult your EHS staff for recommendations

EYE
· Safety glasses with side shields.
· Chemical goggles.

HANDS/FEET

NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
· frequency and duration of contact,
· chemical resistance of glove material,
· glove thickness and
· dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
· When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
· When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
· Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.
· polychloroprene
· nitrile rubber
· butyl rubber
· fluorocaulouch
· polyvinyl chloride

Gloves should be examined for wear and/ or degradation constantly.

OTHER
· Overalls.
· P.V.C. apron.
· Barrier cream.
· Skin cleansing cream.
· Eye wash unit.

ENGINEERING CONTROLS
· Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
· Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES
Solid.
Does not mix with water.
Floats on water.

<table>
<thead>
<tr>
<th>State</th>
<th>Molecular Weight</th>
<th>156.30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting Range (°F)</td>
<td>105.8- 109.4 (l-form).</td>
<td>Viscosity</td>
</tr>
<tr>
<td>Boiling Range (°F)</td>
<td>413.6</td>
<td>Solubility in water (g/L)</td>
</tr>
<tr>
<td>Flash Point (°F)</td>
<td>199.4</td>
<td>pH (1% solution)</td>
</tr>
<tr>
<td>Decomposition Temp (°F)</td>
<td>518</td>
<td>pH (as supplied)</td>
</tr>
<tr>
<td>Autoignition Temp (°F)</td>
<td>Not available.</td>
<td>Vapour Pressure (mmHG)</td>
</tr>
<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not available.</td>
<td>Specific Gravity (water=1)</td>
</tr>
<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not available.</td>
<td>Relative Vapor Density (air=1)</td>
</tr>
<tr>
<td>Volatile Component (%vol)</td>
<td>&gt;90</td>
<td>Evaporation Rate</td>
</tr>
</tbody>
</table>

**APPEARANCE**
White crystals with cooling odour and taste; slightly soluble in water. Soluble in alcohol, light petroleum solvents, glacial acetic acid and fixed or volatile oils. May be l- (or (+)) form (from natural sources) or dl- (or (+/-) form (natural or synthetic). The d (or -))- form also occurs.

log Kow 3.25-3.27

**Section 10 - CHEMICAL STABILITY**

**CONDITIONS CONTRIBUTING TO INSTABILITY**
· Presence of incompatible materials.
· Product is considered stable.

**STORAGE INCOMPATIBILITY**
■ Avoid reaction with oxidizing agents.
For incompatible materials - refer to Section 7 - Handling and Storage.

**Section 11 - TOXICOLOGICAL INFORMATION**

**menthol**

**TOXICITY AND IRRITATION**
MENTHOL:
■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral (rat) LD50: 3180 mg/kg</td>
<td>Eye (rabbit): 0.75 mg - SEVERE</td>
</tr>
<tr>
<td>Oral (Mouse) LD50: 2750 mg/kg</td>
<td>Skin: Irritant *</td>
</tr>
<tr>
<td>Oral (Cat) LD50: 3300 mg/kg</td>
<td>Eye: slight *</td>
</tr>
<tr>
<td>Oral (Cat) LD50: 900 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Subcutaneous (Mouse) LD50: 5500 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Subcutaneous (Rat) LD50: 1750 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intraperitoneal (Mouse) LD50: 2000 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intraperitoneal (Rat) LD50: 1500 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intraperitoneal (Guinea pig) LD50: 4000 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intravenous (Cat) LD50: 34 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Inhalation (Rat) TCLo: 16 mg/L/4h</td>
<td></td>
</tr>
<tr>
<td>Oral (Mouse) LD50: 3400 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intraperitoneal (Mouse) LD50: 6600 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Oral (Cat) LD50: 800 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intraperitoneal (Cat) LD50: 800 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intravenous (Cat) LD: 34 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intraperitoneal (Rat) LD50: 700 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intraperitoneal (Rat) LD: 1500 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Intraperitoneal (Mouse) LD: 1800 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Oral (Cat) LD: 1500 mg/kg</td>
<td></td>
</tr>
</tbody>
</table>
Intravenous (Cat) LD: 37 mg/kg

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

Bacterial mutagenicity (Ames) test: negative *

No evidence of carcinogenic, mutagenic or teratogenic effects

After inhalation: mucosal irritation

After swallowing: gastric spasms, nausea, vomiting

Systemic effects: dizziness, ataxia (impaired locomotor coordination), tiredness, depressed respiration. Risk of methaemoglobin formation.

*Merck MSDS

Carcinogen

Section 12 - ECOLOGICAL INFORMATION

No data

Ecotoxicity

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
<th>Bioaccumulation</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>menthol</td>
<td>HIGH</td>
<td></td>
<td>LOW</td>
<td>HIGH</td>
</tr>
</tbody>
</table>

GESAMP/EHS COMPOSITE LIST - GESAMP Hazard Profiles

Alcoholic 293 85 0 0 0 R 0 0 0 0 0 0 0 1 D 1 beverages / CAS:89-78-1 /

Legend: EHS=EHS Number (EHS=GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships) NRT=Net Register Tonnage, A1a=Bioaccumulation log Pow, A1b=Bioaccumulation BCF, A1=Bioaccumulation, A2=Biodegradation, B1=Acuteaquatic toxicity LC50 (mg/l), B2=Chronic aquatic toxicity NOEC (mg/l), C1=Acute mammalian oral toxicity LD50 (mg/kg), C2=Acute mammalian oral dermal toxicity LD50 (mg/kg), C3=Mammalian inhalation toxicity LC50 (mg/kg), D1=Skin irritation & corrosion, D2=Eye irritation & corrosion, D3=Long-term health effects, E1=Tainting, E2=Physical effects on wildlife & benthic habitats, E3=Interference with coastal amenities, for column A2: R=Readily biodegradable, NR=Not readily biodegradable. for column D3: C=Carcinogen, M=Mutagenic, R=Reprotoxic, S=SENSITISING, A=Aspiration hazard, T=Target organ systemic toxicity, L=Lunginjury, N=Neurotoxic, I=Immunotoxic. For column E1: NT=Not tainting (tested), T=Tainting test positive. For column E2: Fp=Persistent floater, F=Float, S=Sinking substances. The numerical scales start from 0 (no hazard), while higher numbers reflect increasing hazard. (GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships)

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Section 14 - TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG
Section 15 - REGULATORY INFORMATION

menthol (CAS: 89-78-1, 2216-51-5, 1490-04-6, 15356-60-2) is found on the following regulatory lists;

Section 16 - OTHER INFORMATION

Ingredients with multiple CAS Nos
Ingredient Name CAS menthol 89-78-1, 2216-51-5, 1490-04-6, 15356-60-2

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Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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