

Citriodiol[®]
Nature's Repellent



TECHNICAL DATASHEET



Producers and suppliers of naturally sourced repellents

Citriodiol®

Nature's Repellent



Trade name	Citriodiol®
CAS no.	1245629-80-4
Substance type	Naturally derived UVCB
INCI name	Does not apply to biocides
HS Code	3301 29

Common Names

- EU - Eucalyptus citriodora oil, hydrated, cyclized (EC Oil (H/C))
- USA - Oil of lemon eucalyptus (OLE)
- Canada - Oil of lemon eucalyptus, hydrated, cyclized
- Australia - Oil of Lemon Eucalyptus (hydrated, cyclized)

Description

A naturally sourced active substance for use in insect repellents, effective against a range of biting insects and other arthropods. Citriodiol® is formed from a simple modification of sustainably harvested Eucalyptus citriodora oil (also known as Corymbia citriodora). The main component in Citriodiol® is p-menthane-3,8-diol (CAS No. 42822-86-6), a compound found naturally in the leaves of the Eucalyptus citriodora tree.

Recommended Use

Citriodiol® is an active substance for use in insect repellents. It requires formulation into a ready to use consumer product for protection against the following biting insects and other arthropods.

- Mosquitoes, including the Aedes, Anopheles, Culex, Ochlerotatus and Psorophora genera
- Midges
- Ticks, including Ixodes genus
- Flies, including Sand flies and Stable flies
- Land leeches
- Head lice

Citriodiol® can be formulated into many types of product. Formulations we can provide include:

- Hydroalcoholic spray
- Roll-on / Cream emulsion
- Sprayable emulsion
- Aerosol/Bag-on-valve (BoV)
- Wet wipes

Features and Benefits

Features

Benefits

Naturally derived active substance	Renewable resource, sustainably sourced from around the world to make the best use of the earth's resources and assure supply. Citriodiol® has been approved by ECOCERT, please see page 7 for more information.
Highly effective against Aedes and Anopheles mosquitoes	Provides protection against vectors that transmit the viruses that cause Malaria, Dengue fever, yellow fever, West Nile fever, chikungunya and the Zika virus along-side other lesser known diseases
Low transdermal absorption	Compared with other dermally applied actives, very little Citriodiol® is absorbed through the skin and into the bloodstream, reducing the impact it has on the consumer's body
Suitable for pregnant women and small children	Can be used on children from 6 months old*
As effective as the alternatives	Comparable efficacy to synthetic actives allowing consumers to have an effective, naturally sourced choice
Rapidly biodegradable	No accumulation of residues that later become pollutants
No plasticising effect	Will not damage other materials unlike some of the alternatives, keeping sporting equipment, eyewear etc. free from harm

*Depends on the jurisdiction, however Citrefine does not recommend use of insect repellents on children under the age of 6 months

Efficacy

Formulated products containing Citriodiol® will typically see the following efficacy, however these will be dependent on the formulation itself, the standard of efficacy required and the target organism.



Concentration is percentage of Citriodiol®

Efficacy Information

There are approximately 3,500 species of mosquito. While the repellency of Citriodiol® has been tested against a number of these, if there is a particular species impacting your market, we recommend species-specific testing to ensure consumers have the best information available about when they should reapply to avoid being bitten. Information on insect genera and species that have been tested is available from Citrefine upon request. We can recommend experienced laboratories for performing efficacy testing and can also assist with protocol development if required, Please contact us for further information.

Directions - Working with Citriodiol®

Citriodiol® is a viscous liquid containing crystals of p-menthane-3,8-diol. It is essential that these crystals are melted and the mixture stirred until homogenous before the material is used. To homogenise Citriodiol®, heat it to a temperature of 50-60°C while stirring until no crystals are visible, ensuring in particular that there are no crystals remaining at the bottom of the container. Please note that at temperatures above 70°C, the product will start to discolour. Please ask for our guideline on how to homogenise Citriodiol®.

Storage and Disposal

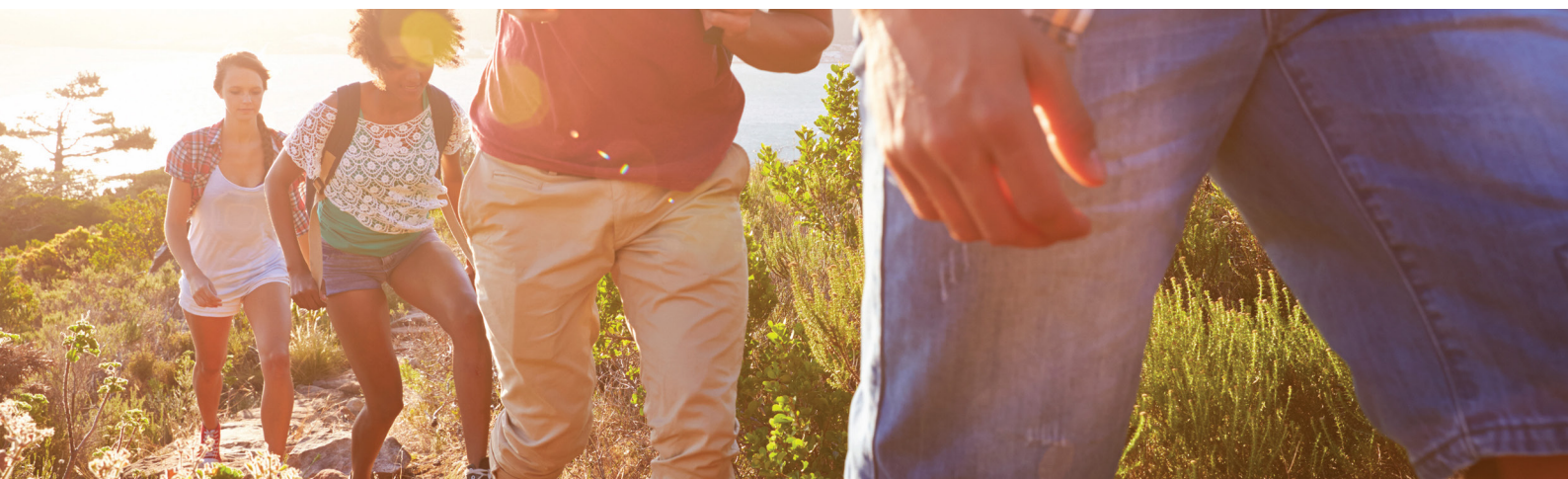
Citriodiol® should be stored in the tightly closed original container in a dry, cool and well ventilated place. Avoid storing in direct sunlight. Dispose of in accordance with local authority regulations. Do not allow into drains or water courses. We recommend that you clarify the exact Waste Code with your local authority. Please see the Citriodiol® SDS for further details.

Safety and SDSs

Citrefine has a large data package covering human and environmental safety. A safety data sheet and certificates addressing the following aspects can also be made available if required.

- Not hazardous for transport
- Not a CMR substance*
- Does not contain nanomaterials
- Is not classified as a PBT substance**
- Does not contain GMO's
- No TSE/BSE risk
- No heavy metals

* CMR = carcinogenic, mutagenic or toxic for reproduction ** PBT = persistent, bioaccumulative or toxic



Technical Data/Specification

Citriodiol®'s specification is a minimum of 64% p-menthane-3,8-diol (PMD), although PMD levels are often higher. The modification process converts the Eucalyptus citriodora oil into Citriodiol® by converting the citronellal contained within the essential oil into additional PMD, a small amount of isopulegol and PMD-citronellal acetal, all of which are found in the essential oil. The remaining naturally occurring compounds are unaffected by the main process. Certain of these minor components work synergistically with PMD to provide greater repellence than is found with pure, synthetically derived PMD.

Appearance	Form: Viscous liquid containing white crystals
	Colour: Pale yellow to brown
Odour	A characteristic odour - citrus, lemon
pH value (water extraction)	6 to 9
Melting Point	≈ 50°C
Flash Point	92°C
Relative density	0.942g/ml at 40°C
Shelf life	5 years

Packaging

Citriodiol® is available in:-

- 25kg** Open top HDPE plastic containers
- 180kg** Open top lacquer-lined steel drums
- 200g & 500g** Samples are available upon request



Example Formulation

Master Formulation (formulation reference GP11-SP001)

Material	CAS No.	% w/w
Phase 1 Citriodiol®	1245629-80-4	30.0000
Phase 2 IPA	67-63-0	11.7900
Phase 3 Denatured* ethanol 100%	64-17-5	27.5100
Phase 4 Water	7732-18-5	30.7000

* Denatured with 0.1% TBA and 10 ppm denatonium benzoate

Method of manufacture

NOTE:

Before dispensing Citriodiol® ensure that it is completely liquid and there are no undissolved crystals present. This can be achieved by heating to 50°C to 60°C with stirring. Please refer to our homogenisation document supplied with each order. If required, please request a copy of this document by contacting us. In order to achieve formulation stability the purity of the denatured ethanol must be 100%. Additional water will cause cloudiness.

- a Weigh out phase 1 and begin mixing
- b Weigh and add phase 2 maintain mixing
- c Weigh and add phase 3 maintain mixing
- d Weigh and add phase 4 slowly whilst maintaining mixing. If the mix goes cloudy cease addition of phase 4 and continue stirring. Continue addition of phase 4 once clear
- e Cease mixing and allow product to de-aerate. Mix again only if product is cloudy



Ecocert Certification

Citriodiol® has been approved by ECOCERT as a raw material that meets The COSMOS Standards for organic and natural ingredients.

As a COSMOS approved ingredient, Citriodiol® can be used in end-use products which are to be certified as COSMOS natural or COSMOS organic.

The guiding principles of COSMOS are to:

- Promote the use of products from organic agriculture, and respect biodiversity
- Use natural resources responsibly, and respect the environment;
- Use processing and manufacturing that are clean and respectful of human health and the environment
- Integrate and develop the concept of “Green Chemistry”

The ECOCERT approval is only given to raw materials that meet the strict requirements regarding the origin of the material (e.g. not using GMOs, no endangered species). The material must also meet strict criteria relating to processing of the material (e.g. use of starting materials with strict toxicity and biodegradability limits).

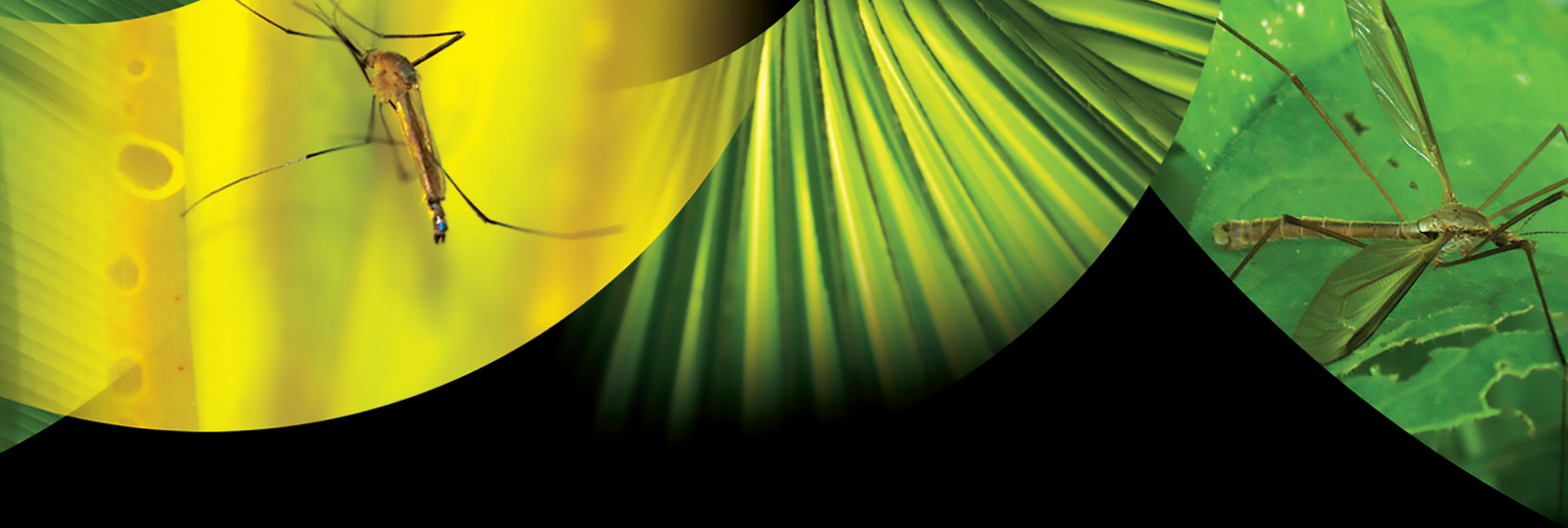
ECOCERT approval gives customers confidence that Citriodiol® is sourced and manufactured in a way that is in total alignment with the above principles.



**COSMOS
APPROVED**

Label Precautions

	<h1>CITRIODIOL®</h1> <p>(Eucalyptus citriodora oil, hydrated, cyclized)</p>	
	<p>WARNING</p> <p>PLEASE REFER TO SAFETY DATA SHEETS BEFORE USING PRODUCT</p> <p>Causes serious eye irritation. Wash hands thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. CONTINUE RINSING. If eye irritation persists: Get medical advice/attention. Contains citronellal, citronellol, eucalyptol, linalool and limonene. May produce an allergic reaction.</p>	
	<p>CAS No.1245629-80-4 (Contains ≥64% Cis and Trans PMD, CAS No. 42822-86-6)</p> <p>NETT WT: 180kg GROSS WT: 200kg Batch No. xxxxxx Manf. Date: xx/20xx Exp. Date: xx/20xx</p>	<p>Moorfield Road, Yeadon, Leeds LS19 7BN Telephone 0113 238 7900 Fax 0113 202 9900 www.citrefine.com</p>



Contact Details

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Please visit our website for much more information about our active substance Citriodiol® and up-to-date regulatory information

www.citrefine.com

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Disclaimer

The information contained in this Technical Datasheet is correct to the best of our knowledge and belief at the date of publication however no guarantee is made to its accuracy. This document is designed only as an information guideline and to provide guidance for the safe use, storage and handling of this material. This information relates only to the specific material designated and may not be valid when the material is used in combination with any other materials.