

GC-MS Profiling Analysis Prepared for Jade Bloom, Inc

Date: March 9, 2018
Sample: Cardamom
Type: Essential Oil
Source: *Elettaria Cardamomum*
Batch: 121639

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Isobutylal	tr		Aliphatic aldehyde
Ethyl acetate	tr		Aliphatic ester
Isovaleral	0.02	0.02*	Aliphatic aldehyde
2-Methylbutylal	0.01	[0.02]*	Aliphatic aldehyde
Isoamyl alcohol	0.01	0.03*	Aliphatic alcohol
2-Methylbutanol	0.01	[0.03]*	Aliphatic alcohol
Hexanal	0.01	0.01	Aliphatic aldehyde
Hexanol	tr	0.01	Aliphatic alcohol
Isoamyl acetate	0.01	0.01	Aliphatic ester
2-Methylbutyl acetate	0.01	0.01	Aliphatic ester
α -Thujene	0.23	0.23	Monoterpene
α -Pinene	1.69	1.70	Monoterpene
Camphene	0.07*	0.06	Monoterpene
α -Fenchene	[0.07]*	0.01	Monoterpene
Sabinene	5.22*	4.78	Monoterpene
β -Pinene	[5.22]*	0.48	Monoterpene
6-Methyl-5-hepten-2-one	0.03	0.03	Aliphatic ketone
Myrcene	2.29	2.32	Monoterpene
α -Phellandrene	0.02	0.02	Monoterpene
Octanal	0.11	0.11	Aliphatic aldehyde
Δ 3-Carene	0.01	0.01	Monoterpene
α -Terpinene	0.11	0.10	Monoterpene
para-Cymene	0.16	0.17	Monoterpene
β -Phellandrene	31.53*	29.07*	Monoterpene
1,8-Cineole	[31.53]*	[29.07]*	Monoterpenic ether
Limonene	[31.53]*	2.46	Monoterpene
(Z)- β -Ocimene	0.07	0.02	Monoterpene
(E)- β -Ocimene	0.07	0.06	Monoterpene
γ -Terpinene	0.40	0.39	Monoterpene
cis-Sabinene hydrate	0.42	1.23	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	0.01	Monoterpenic alcohol
Octanol	0.06	0.06	Aliphatic alcohol
Terpinolene	0.10	0.11	Monoterpene
6,7-Epoxyterpinene	0.04	0.04	Monoterpenic ether
trans-Sabinene hydrate	0.25	0.25*	Monoterpenic alcohol
Linalool	2.98	3.01	Monoterpenic alcohol
(E)-4,8-Dimethylnona-1,3,7-triene	0.09	0.10	Terpene derivative
cis-para-Menth-2-en-1-ol	0.03	4.96*	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.01	0.01	Monoterpenic alcohol
δ -Terpineol	0.08	0.29*	Monoterpenic alcohol
Terpinen-4-ol	0.68	0.68	Monoterpenic alcohol
para-Cymen-8-ol	0.01	0.97*	Monoterpenic alcohol
α -Terpineol	1.25	39.98*	Monoterpenic alcohol
γ -Terpineol	0.10	0.08	Monoterpenic alcohol
cis-Piperitol	0.03	0.01	Monoterpenic alcohol
trans-Piperitol	0.04	[0.18]*	Monoterpenic alcohol
Octyl acetate	0.11	0.11	Aliphatic ester
Unknown	0.81	[0.97]*	Monoterpenic ester

Unknown	tr	[0.25]*	Unknown
Neral	0.21	[0.29]*	Monoterpenic aldehyde
Linalyl acetate	5.91*	[4.96]*	Monoterpenic ester
Geraniol	[5.91]*	0.01	Monoterpenic alcohol
Geranial	0.30	0.32	Monoterpenic aldehyde
β-Terpinyl acetate	0.02		Monoterpenic ester
Bornyl acetate	0.03	0.02	Monoterpenic ester
Isobornyl acetate	0.01	0.01	Monoterpenic ester
2-Undecanone	0.01	0.02	Aliphatic ketone
Terpinen-4-yl acetate	0.02	0.02	Monoterpenic ester
δ-Terpinyl acetate	0.14	0.15	Monoterpenic ester
Methyl geranate	0.08	[39.98]*	Monoterpenic ester
δ-Elemene	0.02	0.02	Sesquiterpene
α-Terpinyl acetate	38.89*	[39.98]*	Monoterpenic ester
γ-Terpinyl acetate	[38.89]*	[39.98]*	Monoterpenic ester
Neryl acetate	0.07	0.03	Monoterpenic ester
α-Copaene	0.01	0.01	Sesquiterpene
Geranyl acetate	0.80	0.83	Monoterpenic ester
β-Elemene	0.14*	0.07*	Sesquiterpene
Dodeceny acetate isomer?	[0.14]*		Aliphatic ester
β-Caryophyllene	0.05	[0.07]*	Sesquiterpene
α-Terpinyl propionate	0.07		Monoterpenic ester
Geranyl propionate	0.09*	0.02	Monoterpenic ester
Germacrene D	[0.09]*	[39.98]*	Sesquiterpene
β-Selinene	0.36	0.39	Sesquiterpene
α-Selinene	0.12	0.12	Sesquiterpene
γ-Cadinene	0.13	0.18	Sesquiterpene
δ-Cadinene	0.05	[0.18]*	Sesquiterpene
Germacrene B	0.10	0.08	Sesquiterpene
(E)-Nerolidol	0.82	0.79	Sesquiterpenic alcohol
8-Acetoxyarvotanacetone	0.17*		Monoterpenic ester
Dendrolasin	[0.17]*	0.02	Sesquiterpenic ether
Unknown	0.05	0.16	Oxygenated sesquiterpene
(2E,6E)-Farnesol	0.09	0.08	Sesquiterpenic alcohol
(2E,6E)-Farnesal	0.05	0.04	Sesquiterpenic aldehyde
(2E,6E)-Farnesyl acetate	0.05	0.03	Sesquiterpenic ester
Coronarín E	0.06	0.06	Diterpene
Total identified	97.23%	97.31%	

PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4625 ± 0.0003 (20 °C)

COMPLIANCE WITH ISO 4733:2004 (CARDAMOM)

Compound	Central America		India and Sri Lanka		Obs. %	Complies?
	Min %	Max %	Min %	Max %		
α-Pinene	1	2	1	2	1.7	Yes
Sabinene	3	5	2	4	4.8	America
Myrcene	tr	2.5	tr	2.5	2.3	Yes
Limonene	2	3	3	7	2.5	America
1,8-Cineole	27	35	23	33	29.1	Yes
Linalool	3	6	3.5	7	3.0	Yes
Linalyl acetate	4	6	4	9	5.0	Yes
Terpinen-4-ol	0.8	1.5	1	3	0.7	No
α-Terpineol	tr	2.5	3	7	1.2	America
α-Terpinyl acetate	35	45	32	42	38.9	Yes
(E)-Nerolidol	0.5	1	1	2	0.8	America
Refractive index	1.460	1.467	1.460	1.468	1.4625	Yes

