

GC-MS Profiling Analysis Prepared for Jade Bloom, Inc

Date: February 15, 2018
Sample: Galbanum
Type: Essential Oil
Source: *Ferula galbaniflua*
Batch: 4312579

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
2-Methyl-3-buten-2-ol	tr	0.02	Aliphatic alcohol
Toluene	tr	tr	Simple phenolic
Hexanal	0.01	0.01	Aliphatic aldehyde
Hashishene	0.02	8.04*	Monoterpene
Tricyclene	0.01	0.01	Monoterpene
α -Thujene	0.37	0.37	Monoterpene
α -Pinene	8.02	[8.04]*	Monoterpene
Camphene	0.17*	0.13	Monoterpene
α -Fenchene	[0.17]*	0.02	Monoterpene
Unknown	tr	0.21*	Unknown
Sabinene	67.08*	0.92	Monoterpene
β -Pinene	[67.08]*	66.10	Monoterpene
Myrcene	2.65	2.67	Monoterpene
2-Carene	0.01	0.01	Monoterpene
α -Phellandrene	0.15	0.14	Monoterpene
Δ 3-Carene	3.13	3.13	Monoterpene
α -Terpinene	0.05	0.05	Monoterpene
ortho-Cymene	0.01	0.75*	Simple phenolic
para-Cymene	0.73	[0.75]*	Monoterpene
Limonene	3.35*	1.34	Monoterpene
1,8-Cineole	[3.35]*	2.01*	Monoterpenic ether
β -Phellandrene	[3.35]*	[2.01]*	Monoterpene
(Z)- β -Ocimene	0.72	0.72	Monoterpene
(E)- β -Ocimene	0.23	0.24	Monoterpene
γ -Terpinene	0.19	0.18	Monoterpene
cis-Sabinene hydrate	0.02	0.04	Monoterpenic alcohol
α -Pinene oxide analog	tr	0.01	Monoterpenic ether
Isoterpinolene	0.03	0.04	Monoterpene
Terpinolene	0.26	0.26	Monoterpene
6,7-Epoxyterpinolene	tr	0.13*	Monoterpenic ether
α -Pinene oxide	0.01	0.01	Monoterpenic ether
Perillene	0.01	0.02	Monoterpenic ether
Unknown	0.01	[0.13]*	Unknown
Linalool	0.05	0.08*	Monoterpenic alcohol
Isoamyl isovalerate	0.01	0.01	Aliphatic ester
endo-Fenchol	0.08	0.26*	Monoterpenic alcohol
Verbenol analog?	0.01	0.20	Monoterpenic alcohol
Unknown	0.01	0.01	Oxygenated monoterpene
cis-para-Menth-2-en-1-ol	0.02	0.02	Monoterpenic alcohol
allo-Ocimene	0.06*	0.03	Monoterpene
cis-Limonene oxide	[0.06]*	0.01	Monoterpenic ether
Nopinone	[0.06]*	0.12*	Normoterpenic ketone
trans-Pinocarveol	0.25	0.30*	Monoterpenic alcohol
(E)-Myroxide	0.02	0.11*	Monoterpenic ether
Epoxyterpinolene	0.06*	0.03*	Monoterpenic ether
Camphene hydrate	[0.06]*	0.25*	Monoterpenic alcohol
β -Pinene oxide	0.01	0.01	Monoterpenic ether
Pinocarvone	0.07	0.08	Monoterpenic ketone

Unknown	0.07*	0.21*	Oxygenated monoterpene
Borneol	[0.07]*	0.62*	Monoterpenic alcohol
α -Phellandren-8-ol	0.02	0.01	Monoterpenic alcohol
(3E,5E)-Undeca-1,3,5-triene	0.75*	0.57	Alkene
<i>trans</i> -2-Caren-4-ol	[0.75]*	tr	Monoterpenic alcohol
Terpinen-4-ol	[0.75]*	1.33*	Monoterpenic alcohol
Cryptone	0.05	[0.30]*	Normonoterpenic ketone
(3E,5Z)-Undeca-1,3,5-triene	0.20*	[0.13]*	Alkene
Isoamyl senecioate	[0.20]*	0.04	Aliphatic ester
para-Cymen-8-ol	0.02	0.03	Monoterpenic alcohol
Myrtenal	0.10	0.12	Monoterpenic aldehyde
α -Terpineol	0.42	[0.62]*	Monoterpenic alcohol
Myrtenol	0.14	0.17	Monoterpenic alcohol
<i>cis</i> -Piperitol	tr	0.18*	Monoterpenic alcohol
Verbenone	0.01	[0.18]*	Monoterpenic ketone
Unknown	0.01	0.02	Oxygenated monoterpene
endo-Fenchyl acetate	0.40	0.43	Aliphatic alcohol
Thymol methyl ether analog I	0.09	[0.26]*	Monoterpenic ether
Thymol methyl ether	0.27*	[0.25]*	Monoterpenic ether
Citronellol	[0.27]*	0.01	Monoterpenic alcohol
Cuminal	0.02	0.01*	Monoterpenic aldehyde
Carvacrol methyl ether	1.04	[1.33]*	Monoterpenic ether
Linalyl acetate	0.04	0.04	Monoterpenic ester
Unknown	0.01	0.01	Oxygenated monoterpene
Bornyl acetate	0.09	[0.12]*	Monoterpenic ester
<i>trans</i> -Pinocarvyl acetate	0.07	0.09*	Monoterpenic ester
Car-3-en-5-one	0.01	0.01	Monoterpenic ketone
Thymol	0.09	0.10	Monoterpenic alcohol
Carvacrol	0.06	0.21*	Monoterpenic alcohol
Unknown	tr		Oxygenated monoterpene
δ -Elemene	tr	tr	Sesquiterpene
α -Terpinyl acetate	0.59*	0.58	Monoterpenic ester
α -Cubebene	[0.59]*	[0.03]*	Sesquiterpene
Cyclosativene I	0.08	0.12	Sesquiterpene
α -Ylangene	0.05	0.03	Sesquiterpene
α -Copaene	0.10	[0.11]*	Sesquiterpene
β -Bourbonene	0.04	0.03	Sesquiterpene
β -Cubebene	0.03	0.02	Sesquiterpene
β -Elemene	0.08	[0.26]*	Sesquiterpene
α -Cedrene	0.06	0.04	Sesquiterpene
β -Funebrene	0.02	[0.08]*	Sesquiterpene
β -Caryophyllene	0.15*	[0.26]	Sesquiterpene
β -Cedrene	[0.15]*	0.06	Sesquiterpene
β -Copaene	0.03	[0.12]*	Sesquiterpene
Thymohydroquinone dimethyl ether	0.08	0.07	Monoterpenic ether
Aromadendrene	0.22	[1.33]*	Sesquiterpene
β -Barbatene	0.08*	[0.09]*	Sesquiterpene
6,9-Guaiadiene	[0.08]*	[0.21]*	Sesquiterpene
1,2,2 α ,3,3,4,6,7,8,8 α -Decahydro-2 α ,7,8-trimethylacenaphthylene	0.16	[1.33]*	Sesquiterpene
α -Humulene	0.08	0.07*	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.10	[0.07]*	Sesquiterpene

α -Amorphene	0.11	[0.18]*	Sesquiterpene
Germacrene D	0.13	[0.62]*	Sesquiterpene
β -Selinene	0.24	0.31	Sesquiterpene
δ -Selinene	0.07	0.09	Sesquiterpene
α -Selinene	0.36	0.15	Sesquiterpene
Bicyclogermacrene	[0.36]	[0.21]	Sesquiterpene
α -Muurolene	0.10	[0.21]*	Sesquiterpene
β -Dihydroagarofuran	0.06	0.37*	Sesquiterpenic ether
β -Bisabolene	0.36*	0.10	Sesquiterpene
Cubebol	[0.36]*	tr	Sesquiterpenic alcohol
γ -Cadinene	[0.36]*	[0.37]*	Sesquiterpene
7-epi- α -Selinene	0.04	0.25*	Sesquiterpene
<i>trans</i> -Calamenene	0.29*	0.02	Sesquiterpene
δ -Cadinene	[0.29]*	[0.25]*	Sesquiterpene
Selina-4(15),7(11)-diene	0.04	0.05	Sesquiterpene
Selina-3,7(11)-diene	0.02	[0.01]*	Sesquiterpene
α -Cadinene	0.02	0.02	Sesquiterpene
Germacrene B	0.17	0.17	Sesquiterpene
Elemicin	0.04	0.02	Phenylpropanoid
Spathulenol	0.45*	0.16	Sesquiterpenic alcohol
10-epi-Junenol	[0.45]*	0.28	Sesquiterpenic alcohol
Citronellyl isovalerate?	0.03		Monoterpenic ester
Guaiol	0.54	0.66*	Sesquiterpenic alcohol
10-epi-Cubenol	0.14*		Sesquiterpenic alcohol
10-epi- γ -Eudesmol	[0.14]*	[0.66]*	Sesquiterpenic alcohol
γ -Eudesmol	0.04	0.06	Sesquiterpenic alcohol
Hinesol	0.02	0.07	Sesquiterpenic alcohol
τ -Cadinol	0.18	0.17	Sesquiterpenic alcohol
α -Muurolol	0.03	0.03	Sesquiterpenic alcohol
β -Eudesmol	0.15	[0.21]*	Sesquiterpenic alcohol
α -Eudesmol	0.13	0.18	Sesquiterpenic alcohol
Bulnesol	0.41	0.42	Sesquiterpenic alcohol
Unknown	0.06		Unknown
Unknown	0.04		Oxygenated sesquiterpene
Guaiyl acetate	0.20		Sesquiterpenic ester
γ -Eudesmyl acetate?	0.07		Sesquiterpenic ester
Unknown	0.04		Sesquiterpenic ester
Total identified	98.21%	97.83%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4785 \pm 0.0003 (20 °C)

COMPLIANCE WITH ISO 14716:1999 (FERULA GALBANIFLUA - GALBANUM)

Compound	Min. %	Max. %	Observed %	Complies?
α -Pinene	5	21	8.0	Yes
β -Pinene	40	70	66.1	Yes
Sabinene	0.3	3	0.9	Yes
Δ^3 -Carene	2	16	3.1	Yes
Myrcene	2.5	3.5	2.7	Yes
(3E,5E)-Undeca-1,3,5-triene*	0.4	2	0.6	Yes
Ratio of (3E,5E)-Undeca-1,3,5-triene on (3E,5Z)-Undeca-1,3,5-triene*	2.0	5.5	4.4	Yes
Refractive index	1.478	1.485	1.4785	Yes

*Note that the ISO standard nomenclature does not correspond to the expected eluting order based on their sample chromatogram, and RI values provided by Robert P. Adams and Luigi Mondello. The table has been corrected accordingly from the standard to reflect proper identifications.

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with the ISO standard for galbanum oil.