

GC/MS BATCH NUMBER: FE0101

ESSENTIAL OIL: FRANKINCENSE FREREANA ORGANIC

BOTANICAL NAME: BOSWELIA FREREANA

ORIGIN: SOMALILAND

KEY CONSTITUENTS PRESENT IN THIS BATCH OF FRANKINCENSE FREREANA ORGANIC OIL	%
α -THUJENE	49.1
p-CYMENE	11.6
α -PINENE	10.2
SABINENE	6.2
LIMONENE	2.5
TERPINEN-4-ol	2.0
1,8-CINEOLE	1.3
β -PINENE	1.3
β -BOURBONENE	1.3

Comments from Robert Tisserand: Very good odor quality, with constituents characteristic of *Boswellia frereana*. The 2% of terpinen-4-ol gives this oil a fresh, Tea-Tree like odor.

Date : February 24, 2017

SAMPLE IDENTIFICATION

Internal code : 17B09-PTH14-1-DM

Customer identification : Frankincense Frereana Organic - Somaliland - FE010169R

Type : Essential oil

Source : *Boswellia frereana*

Customer : Plant Therapy

ANALYSIS

Method : PC-PA-001-15E06, "Analysis of the composition of a liquid essential oil by GC-FID" (in French).

Analyst : Sylvain Mercier, M. Sc., chimiste

Analysis date : 2017-02-23

Checked and approved by :

Sylvain Mercier, M. Sc., chimiste 2014-005

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IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
Toluene	1.35	756	0.05	60.36	976	1.39*	Simple phenolic
cis-Salvene	2.29	842	0.06	0.06	855	0.85	Normonoterpene
trans-Salvene	2.35	847	0.02	0.02	868	0.90	Normonoterpene
Unknown (m/z = 93, 91 (68), 121 (60), 77 (50), 79 (43), 105 (21), 41 (20)... 136 (17))	2.86	887	0.07	0.08	895	1.00	Monoterpene
Unknown (m/z = 93, 91 (77), 121 (62), 77 (55), 79 (44), 105 (23), 92 (21), 41 (21), 107 (20), 43 (17), 136 (17))	3.08	901	0.18	0.23	919	1.11	Monoterpene
Tricyclene	3.29*	913	0.53	0.02	931	1.16	Monoterpene
Hashishene	3.29*	913	[0.53]	[60.36]	976	1.39*	Monoterpene
α-Thujene	3.46	924	49.10	[60.36]	976	1.39*	Monoterpene
α-Pinene	3.54	928	10.21	[60.36]	976	1.39*	Monoterpene
Unknown (m/z = 91, 92 (49), 65 (12)... 134? (2))	3.73	939	2.60	2.59	1072	2.25	Monoterpene
α-Fenchene	3.78	942	0.01	0.01	995	1.55	Monoterpene
Camphene	3.79	943	0.23	0.22	999	1.59	Monoterpene
Thuja-2,4(10)-diene	3.88	948	0.16	6.25	1063	2.16*	Monoterpene
Sabinene	4.23	969	6.17	[6.25]	1063	2.16*	Monoterpene
β-Pinene	4.29	973	1.31	1.24	1043	1.97	Monoterpene
3-p-Menthene	4.44	981	0.03	0.03	1015	1.72	Monoterpene
Dehydro-1,8-cineole	4.53	987	0.02	0.02	1137	2.99	Monoterp. ether
Myrcene	4.55	988	0.53	0.52	1118	2.73	Monoterpene
2-Carene	4.69	996	0.15	0.12	1089	2.34	Monoterpene
α-Phellandrene	4.83*	1004	0.76	0.66	1112	2.65	Monoterpene
Δ3-Carene	4.83*	1004	[0.76]	0.04	1098	2.45	Monoterpene
α-Terpinene	5.01	1014	0.39	0.38	1125	2.83	Monoterpene
meta-Cymene	5.10	1019	0.65				Monoterpene
para-Cymene	5.23	1026	11.55	12.32	1214	4.05	Monoterpene
Limonene	5.26	1027	2.46	2.12	1144	3.08	Monoterpene
β-Phellandrene	5.29	1029	0.54	1.87	1150	3.16*	Monoterpene
1,8-Cineole	5.32	1031	1.33	[1.87]	1150	3.16*	Monoterp. ether
cis-β-Ocimene	5.42	1036	0.07	0.06	1191	3.70	Monoterpene
trans-β-Ocimene	5.60	1046	0.02	0.02	1205	3.92	Monoterpene
Unknown (m/z = 109, 43 (39), 91 (25), 95 (20)... 119 (15), 137 (19), 152 (1))	5.70	1051	0.17				Oxygenated monoterpene
γ-Terpinene	5.79	1056	0.52	0.50	1192	3.72	Monoterpene

Terpinolene	6.27	1082	0.13	0.12	1226	4.22	Monoterpene
para-Cymenene	6.45	1092	0.10	0.08	1368	6.45	Monoterpene
Linalool	6.82	1106	0.08	0.15	1496	9.45	Monoterp. alcohol
α -Thujone	6.98	1112	0.11	0.39	1358	6.29	Monoterp. ketone
β -Thujone	7.08	1115	0.69	0.56	1366	6.42	Monoterp. ketone
Dehydrosabinaketon	7.25	1121	0.08	0.06	1532	10.80	Normonoterp. ketone
<i>trans</i> -para-Mentha-2,8-dien-1-ol	7.27	1122	0.10	0.13	1569	12.23	Monoterp. alcohol
α -Campholenal	7.32	1124	0.07				Monoterp. aldehyde
<i>trans</i> -Sabinol	7.64	1136	0.28				Monoterp. alcohol
<i>trans</i> -Pinocarveol	7.75	1140	0.06	0.07	1579	12.62	Monoterp. alcohol
<i>trans</i> -Verbenol	7.83	1143	0.09	0.10	1598	13.40	Monoterp. alcohol
α -Phellandren-8-ol analog	7.97	1148	0.05				Monoterp. alcohol
Pinocarvone	8.30	1160	0.05	0.06	1476	8.91	Monoterp. ketone
Umbellulone	8.60*	1171	0.31	0.19	1556	11.72	Monoterp. ketone
α -Phellandren-8-ol	8.60*	1171	[0.31]				Monoterp. alcohol
<i>cis</i> -Sabinol	8.71	1175	0.10				Monoterp. alcohol
Terpinen-4-ol	8.85	1180	2.01	2.11	1527	10.62	Monoterp. alcohol
para-Cymen-8-ol	9.26	1194	0.23	0.20	1766	23.37	Monoterp. alcohol
Myrtenal	9.36	1196	0.03	0.03	1534	10.88	Monoterp. aldehyde
α -Terpineol	9.44	1198	0.31	0.36	1622	14.65	Monoterp. alcohol
<i>cis</i> -Piperitol	9.94	1209	0.14				Monoterp. alcohol
Verbenone	10.09*	1212	0.34	0.14	1601	13.52	Monoterp. ketone
Octyl acetate	10.09*	1212	[0.34]	0.26	1420	7.54	Aliphatic ester
<i>trans</i> -Carveol	10.83	1229	0.03	0.03	1753	22.49	Monoterp. alcohol
Cuminal	11.38	1241	0.06	0.06	1668	17.13	Monoterp. aldehyde
<i>trans</i> -Piperitone oxide	11.89	1252	0.05	0.05	1651	16.23	Monoterp. alcohol
Bornyl acetate	13.12	1279	0.13	0.13	1500	9.61	Monoterp. ester
Thymol	14.26	1301	0.06	0.07	2106	40.71	Monoterp. alcohol
Citronellyl acetate	17.50	1350	0.03	0.03	1611	14.09	Monoterp. ester
α -Copaene	17.94	1357	0.05	0.04	1427	7.70	Sesquiterpene
β -Bourbonene	18.40	1364	1.25	1.30	1449	8.24	Sesquiterpene
1,5-diepi- β -Bourbonene	18.51	1365	0.10				Sesquiterpene
β -Elemene	19.14	1375	0.09	0.07	1518	10.29	Sesquiterpene
β -Caryophyllene	20.88	1399	0.16	0.20	1513	10.10	Sesquiterpene
Aromadendrene	21.75	1410	0.14	0.14	1540	11.11	Sesquiterpene
γ -Cadinene	28.85	1496	0.04	0.03	1662	16.85	Sesquiterpene
δ -Cadinene	29.53	1505	0.02	0.05	1664	16.95	Sesquiterpene
τ -Cadinol	37.44	1633	0.04	0.03	2067	39.55	Sesquiterp. alcohol
Dimer of α -phellandrene I	40.57	1715	0.02				Diterpene
Dimer of α -phellandrene II	42.43	1773	0.52	0.52	1839	28.57	Diterpene
Dimer of α -phellandrene III	42.74	1783	0.06				Diterpene

Dimer of α -phellandrene IV	43.37	1805	0.07		Diterpene
Total identified			95.15%	94.60%	

*: Two or more compounds are coeluting on this column

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

Note: no correction factor was applied

OTHER DATA

Physical aspect : Light yellow liquid

Refractive index : 1.4628 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent were detected using this method. The sample contains all expected chemical markers for *B. frereana*.



