

GC/MS BATCH NUMBER: FB0101

ESSENTIAL OIL: FRANKINCENSE CARTERI CO2

BOTANICAL NAME: BOSWELLIA CARTERII

ORIGIN: GERMANY

KEY CONSTITUENTS PRESENT IN THIS BATCH OF FRANKINCENSE CARTERI CO2 OIL	%
α-PINENE	20.5
INCENSOLE	8.5
LIMONENE	4.8
p-CYMENE	3.0
α-AMYRIN	2.7
SABINENE	2.5
β-AMYRIN	2.5
INCENSYL ACETATE	2.3
MYRCENE	2.1
VERTICILLA-4(20),7,11-TRIENE	1.8
β-CARYOPHYLLENE	1.7
trans-VERBENOL	1.4
CEMBRENOL	1.4
(3E)-CEMBRENE A	1.3
CUBEBOL	1.2
OCTYL ACETATE	1.0
β-PINENE	1.0

Comments from Robert Tisserand: Excellent odor profile. Contains 20% of heavier molecules that are not found in the essential oil, and that possess significant therapeutic properties, such as cembrene A, alpha- and beta-amyrin and verticillatriene. Incensol and incensyl acetate are in much higher percentages than are found in Frankincense essential oils.

Date : December 23, 2016

SAMPLE IDENTIFICATION

Internal code : 16L15-PTH4-1-DM

Customer identification : Frankincense Carteri Co2 - FB0101610R

Type : Essential oil

Source : *Boswellia carterii*

Customer : Plant Therapy

ANALYSIS

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

Identifications double-checked by GC-MS

Analyst : Sylvain Mercier, M. Sc., chimiste

Analysis date : 2016-12-20

Checked and approved by :

Alexis St-Gelais, M. Sc., chimiste 2013-174

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IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
2-Methyl-3-buten-2-ol	0.53	570	0.01				Aliphatic alcohol
Acetic acid	0.60	594	0.04				Aliphatic acid
Toluene	1.30	749	0.01	19.93	955	0.90*	Simple phenolic
Tricyclene	3.18*	913	0.16	0.02	928	0.79	Monoterpene
Hashishene	3.18*	913	[0.16]	[19.93]	955	0.90*	Monoterpene
α -Thujene	3.28	920	0.77	2.37	958	0.91	Monoterpene
α -Pinene	3.43	929	20.49	[19.93]	955	0.90*	Monoterpene
Camphene	3.67	944	0.41	0.65	998	1.08	Monoterpene
Thuja-2,4(10)-diene	3.77	949	0.03	2.52	1056	1.50*	Monoterpene
Sabinene	4.11	970	2.51	[2.52]	1056	1.50*	Monoterpene
β -Pinene	4.17	974	1.02	0.95	1039	1.36	Monoterpene
Myrcene	4.46	991	2.08	2.30	1115	1.97*	Monoterpene
2-Carene	4.54	996	0.01	0.61	1089	1.76*	Monoterpene
α -Phellandrene	4.73*	1007	1.69	0.93	1109	1.92	Monoterpene
Δ 3-Carene	4.73*	1007	[1.69]	[0.61]	1089	1.76*	Monoterpene
o-Methylanisole	4.73*	1007	[1.69]				Simple phenolic
Octanal	4.79	1010	0.01	0.01	1231	3.37	Aliphatic aldehyde
α -Terpinene	4.92	1017	0.06	[2.30]	1115	1.97*	Monoterpene
para-Cymene	5.15	1030	3.03	1.68	1204	3.01	Monoterpene
Limonene	5.16	1031	4.76	5.82	1141	2.29	Monoterpene
β -Phellandrene	5.19	1032	0.30	0.62	1145	2.33*	Monoterpene
1,8-Cineole	5.20	1033	0.14	[0.62]	1145	2.33*	Monoterp. ether
cis- β -Ocimene	5.33	1040	0.18	0.19	1184	2.78*	Monoterpene
trans- β -Ocimene	5.51	1050	0.07	0.04	1199	2.97	Monoterpene
γ -Terpinene	5.69	1060	0.05	[0.19]	1184	2.78*	Monoterpene
cis-Sabinene hydrate	6.06	1079	0.05	0.05	1399	5.75	Monoterp. alcohol
Terpinolene	6.16	1085	0.03	0.02	1215	3.14	Monoterpene
Octanol	6.23	1089	0.20	0.27	1496	7.49	Aliphatic alcohol
para-Cymenene	6.40	1098	0.05	0.05	1352	5.05	Monoterpene
Linalool	6.72*	1109	0.15	0.12	1481	7.20*	Monoterp. alcohol
trans-Sabinene hydrate	6.72*	1109	[0.15]				Monoterp. alcohol
cis-Verbenol?	6.87	1115	0.11	0.25	1524	8.02*	Monoterp. alcohol
β -Thujone	6.98	1119	0.03	0.02	1367	5.28	Monoterp. ketone
trans-para-Mentha-2,8-dien-1-ol	7.09	1123	0.04	0.13	1569	9.38*	Monoterp. alcohol
α -Campholenal	7.23	1129	0.21				Monoterp. aldehyde
trans-Pinocarveol	7.64	1144	0.39	0.37	1554	8.94	Monoterp. alcohol
trans-para-Mentha-2-en-1-ol	7.72	1147	0.14	[0.13]	1569	9.38*	Monoterp. alcohol
trans-Verbenol	7.88	1153	1.43	2.01	1586	9.85*	Monoterp. alcohol
Sabinaketone	8.00	1157	0.01	0.46	1588	9.92*	Normonoterp. ketone
Pinocamphone	8.10	1161	0.03	0.05	1429	6.22*	Monoterp. ketone

Pinocarvone	8.17*	1164	0.12	[0.12]	1481	7.20*	Monoterp. ketone
α -Phellandren-8-ol	8.17*	1164	[0.12]				Monoterp. alcohol
<i>cis</i> -Sabinol	8.48	1175	0.02				Monoterp. alcohol
Borneol	8.75	1185	0.05	0.04	1605	10.45	Monoterp. alcohol
Terpinen-4-ol	8.80	1187	0.19	[0.25]	1524	8.02*	Monoterp. alcohol
<i>para</i> -Cymen-8-ol	9.14	1199	0.03	0.02	1777	18.34	Monoterp. alcohol
Myrtenal	9.28	1202	0.11	2.22	1531	8.23*	Monoterp. aldehyde
α -Terpineol	9.52*	1207	0.47	0.28	1617	10.79	Monoterp. alcohol
Myrtenol	9.52*	1207	[0.47]	0.13	1705	14.58	Monoterp. alcohol
α -Phellandrene epoxide	9.78*	1213	0.62	0.13	1729	15.60	Monoterpene
Verbenone	9.78*	1213	[0.62]	[2.01]	1586	9.85*	Monoterp. ketone
Octyl acetate	9.89	1215	1.03	0.96	1424	6.12	Aliphatic ester
Methyl decyl ether	10.31	1225	0.44	0.43	1331	4.75	Aliphatic ether
<i>trans</i> -Carveol	10.59	1231	0.20	0.17	1744	16.45	Monoterp. alcohol
Neral	11.18	1244	0.05	0.04	1612	10.63	Monoterp. aldehyde
Carvone	11.36	1249	0.13	0.10	1627	11.11	Monoterp. ketone
<i>cis</i> -Carveol	11.53	1252	0.03	0.13	1804	19.88	Monoterp. alcohol
<i>trans</i> -2-Hydroxypinocamphone	11.60	1254	0.02				Monoterp. alcohol
Piperitone	11.77	1258	0.02	0.20	1618	10.84*	Monoterp. ketone
3,5-Dimethoxytoluene	12.61	1276	0.06				Simple phenolic
Bornyl acetate	12.84	1281	0.26	0.29	1490	7.38	Monoterp. ester
Bicycloelemene	14.93	1317	0.03	[0.05]	1429	6.22*	Sesquiterpene
α -Cubebene	15.73	1330	0.01	0.01	1403	5.80	Sesquiterpene
Methyl undecyl ether	15.86	1332	0.06	[0.05]	1429	6.22*	Aliphatic ether
Unknown (m/z = 111, 126 (90), 43 (86), 71 (50), 109 (32)...))	16.58	1343	0.13	0.18	2111	37.28*	
α -Copaene	17.58	1358	0.36	0.34	1445	6.51	Sesquiterpene
β -Bourbonene	18.00	1365	0.20	0.27	1462	6.84	Sesquiterpene
<i>trans-para</i> -Menth-6-en-2,8-diol	18.64	1374	0.07				Monoterp. alcohol
β -Elemene	18.85	1378	0.57	[2.22]	1531	8.23*	Sesquiterpene
α -Gurjunene	19.31	1385	0.06	0.11	1469	6.99	Sesquiterpene
Geranyl acetate	19.52	1388	0.06	0.03	1682	13.57	Monoterp. ester
β -Caryophyllene	20.51	1401	1.67	[2.22]	1531	8.23*	Sesquiterpene
β -Copaene	21.10	1409	0.10	[0.25]	1524	8.02*	Sesquiterpene
<i>trans</i> - α -Bergamotene	22.03	1420	0.09	[2.22]	1531	8.23*	Sesquiterpene
6,9-Guaiadiene	22.44	1425	0.09	0.12	1537	8.40	Sesquiterpene
γ -Patchoulene	22.88	1430	0.03	0.05	1544	8.64	Sesquiterpene
α -Humulene	23.29	1435	0.42	[0.46]	1588	9.92*	Sesquiterpene
allo-Aromadendrene	23.52	1438	0.12	0.11	1547	8.71	Sesquiterpene
Selina-4,11-diene	25.00	1456	0.04				Sesquiterpene
γ -Muurolene	25.37	1460	0.19	[0.20]	1618	10.84*	Sesquiterpene

Germacrene D	25.51	1462	0.52	0.50	1630	11.28	Sesquiterpene
β-Selinene	26.12	1469	0.41	0.45	1635	11.47	Sesquiterpene
α-Selinene	26.76	1476	0.34	0.32	1642	11.78	Sesquiterpene
α-Muurolene	27.52	1485	0.25	0.17	1653	12.28	Sesquiterpene
Germacrene A	27.68	1487	0.19	0.12	1690	13.88	Sesquiterpene
γ-Cadinene	28.61	1499	0.46	0.40	1675	13.22	Sesquiterpene
Cubebol	29.32*	1509	1.53	1.20	1853	22.94	Sesquiterp. alcohol
δ-Cadinene	29.32*	1509	[1.53]	0.36	1680	13.45	Sesquiterpene
α-Cadinene	30.60	1526	0.03	0.03	1701	14.37	Sesquiterpene
Liguloxide	32.13	1547	0.11				Sesquiterp. ether
α-Elemol	32.76*	1556	0.13	0.13	1997	32.25	Sesquiterp. alcohol
Palustrol	32.76*	1556	[0.13]	0.02	1811	20.36	Sesquiterp. alcohol
Germacrene D-4-ol	33.52	1566	0.06	0.05	1948	29.37	Sesquiterp. alcohol
Caryophyllene oxide	33.79*	1570	1.07	0.85	1850	22.72	Sesquiterp. ether
Spathulenol	33.79*	1570	[1.07]	0.42	2019	33.53	Sesquiterp. alcohol
Viridiflorol	34.91*	1585	0.97	0.88	1979	31.17*	Sesquiterp. alcohol
Humulene epoxide II	34.91*	1585	[0.97]	0.17	1900	26.18	Sesquiterp. ether
Copaborneol	35.46	1593	0.18				Sesquiterp. alcohol
10-epi-γ-Eudesmol	36.13	1608	0.35	[0.88]	1979	31.17*	Sesquiterp. alcohol
Cubenol	36.79	1624	0.12	0.18	1950	29.48	Sesquiterp. alcohol
τ-Cadinol	37.60	1643	0.84	0.83	2070	35.91	Sesquiterp. alcohol
τ-Muurolol	37.70	1646	0.02	0.02	2091	36.59	Sesquiterp. alcohol
α-Muurolol	37.84	1649	0.12	0.10	2097	36.77	Sesquiterp. alcohol
β-Eudesmol	37.94*	1652	0.17	[0.18]	2111	37.28*	Sesquiterp. alcohol
α-Cadinol	37.94*	1652	[0.17]	0.10	2133	38.00*	Sesquiterp. alcohol
α-Eudesmol	38.13	1656	0.11	0.06	2126	37.77	Sesquiterp. alcohol
Shyobunol	38.94	1675	0.10	0.10	2202	39.94	Sesquiterp. alcohol
Oplopanone	41.10	1737	0.09	0.12	2347	43.41	Sesquiterp. alcohol
Benzyl benzoate	42.26*	1774	0.33	0.23	2484	46.22	Phenolic ester
Dimer of α-phellandrene II	42.26*	1774	[0.33]	0.08	1846	22.42	Diterpene
Dimer of α-phellandrene III	42.61	1785	0.07				Diterpene
Dimer of α-phellandrene IV	43.17	1804	0.04				Diterpene
Pentadecanol	45.70	1895	0.12				Aliphatic alcohol
(3E)-Cembrene A	46.64	1933	1.32	1.23	2146	38.46	Diterpene
meta-Camphorene	46.89	1943	0.12	[0.10]	2133	38.00*	Diterpene
para-Camphorene	47.78	1979	0.07	0.06	2175	39.26	Diterpene
Verticilla-4(20),7,11-triene epimer	47.86	1982	0.32				Diterpene
Verticilla-4(20),7,11-triene	47.98	1987	1.83				Diterpene
Cembrenol	51.22	2127	1.38	1.32	2656	49.37	Diterp. alcohol
Incensole	51.53	2141	8.52	6.54	2605	48.46	Diterp. alcohol
Unknown diterpene alcohol, coelutes in MS	51.57	2143	2.23				Diterp. alcohol
Incensyl acetate	51.77	2152	2.32				Diterp. ester

Incensole oxide	54.11	2263	0.16				Diterp. ether
24-Noroleana-3,12-diene	67.19	2983	0.13				Nortriterpene
24-Norursa-3,12-diene	67.90	3029	0.36				Nortriterpene
Lanosta-8,24-dien-3-one?	71.45	3262	0.58				Triterp. ketone
Lanosterol analog	71.70	3278	0.55				Triterp. alcohol
Lanosterol	71.81	3285	0.69	3.28	4123	70.18*	Triterp. alcohol
β-Amyrin	72.03	3297	2.45	[3.28]	4123	70.18*	Triterp. alcohol
β-Amyrin acetate?	72.42	3317	0.33				Triterp. ester
α-Amyrin	72.67	3331	2.65	2.78	4202	71.10	Triterp. alcohol
α-Amyrin acetate?	72.90	3343	2.20				Triterp. ester
Lupenyl acetate?	73.02	3350	0.78				Triterp. ester
Total identified			84.21%	71.72%			

*: 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 : 1.4865 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent were detected using this method.



