

Date : May 23, 2018

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18E09-FWM2-1-CC

Customer identification : Frankincense - Somalia

Type : Essential oil

Source : *Boswellia carterii* var. *Birdwell*

Customer : Faith Wellness Ministries

ANALYSIS

Method: PC-PA-014-17J19 - Analysis of the composition of an essential oil, or other volatile liquid, by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Sylvain Mercier, M. Sc., Chimiste

Analysis date : May 16, 2018

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.4725 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
2-Methyl-3-buten-2-ol	0.01	tr	Aliphatic alcohol
Toluene	0.06	44.69*	Simple phenolic
Unknown	0.01	0.01	Alkene
Unknown	0.01	0.01	Unknown
Hashishene	0.06	[44.69]*	Monoterpene
Tricyclene	0.06	0.07	Monoterpene
α -Thujene	1.62	1.65	Monoterpene
α -Pinene	44.81	[44.69]*	Monoterpene
α -Fenchene	1.02*	0.01	Monoterpene
Camphene	[1.02]*	0.97	Monoterpene
Unknown	[1.02]*	0.03	Monoterpene
Thuja-2,4(10)-diene	0.28	3.13*	Monoterpene
meta-Cymene	0.09	3.03*	Monoterpene
Sabinene	4.27	[3.13]*	Monoterpene
β -Pinene	[4.27]	1.40	Monoterpene
Pseudolimonene isomer	0.01	0.02	Monoterpene
Myrcene	2.94	[3.03]*	Monoterpene
2-Carene	0.01	tr	Monoterpene
α -Phellandrene	1.91*	1.82	Monoterpene
Pseudolimonene	[1.91]*	0.04	Monoterpene
Δ 3-Carene	0.86	0.80	Monoterpene
ortho-Methylanisole	0.01	0.06	Simple phenolic
α -Terpinene	0.08	0.07	Monoterpene
ortho-Cymene	0.03	3.42*	Simple phenolic
para-Cymene	3.47	[3.42]*	Monoterpene
Limonene	18.66*	17.93	Monoterpene
1,8-Cineole	[18.66]*	0.09	Monoterpenic ether
β -Phellandrene	[18.66]*	0.63	Monoterpene
Cymene analog	0.03	0.02	Monoterpene
(Z)- β -Ocimene	0.04	0.04	Monoterpene
Unknown	0.03		Unknown
(E)- β -Ocimene	0.04	0.05	Monoterpene
γ -Terpinene	0.14	0.14	Monoterpene
cis-Sabinene hydrate	0.02	0.03*	Monoterpenic alcohol
Unknown	0.01	0.01	Oxygenated monoterpene
Unknown	0.09		Oxygenated monoterpene
Isoterpinolene	0.01	0.01	Monoterpene
Terpinolene	0.14*	0.05	Monoterpene
γ -Campholenal	[0.14]*	0.01	Aliphatic alcohol
para-Cymenene	[0.14]*	0.08	Monoterpene
α -Pinene oxide	0.01	tr	Monoterpenic ether
6,7-Epoxymyrcene	0.03	0.04*	Monoterpenic ether
trans-Sabinene hydrate	0.02	0.02	Monoterpenic alcohol
Linalool	0.17*	0.10	Monoterpenic alcohol
Isoamyl 2-methylbutyrate	[0.17]*	0.03	Aliphatic ester
α -Thujone	0.03	[0.04]*	Monoterpenic ketone
Isoamyl isovalerate	0.05	0.05	Aliphatic ester
Verbenol analog?	0.06	0.04	Monoterpenic alcohol

<i>trans</i> -para-Mentha-2,8-dien-1-ol	0.12	0.10	Monoterpenic alcohol
<i>cis</i> -para-Menth-2-en-1-ol	0.24*	0.04	Monoterpenic alcohol
α -Campholenal	[0.24]*	0.23*	Monoterpenic aldehyde
Unknown	tr		Unknown
<i>cis</i> -Limonene oxide	0.04	0.04	Monoterpenic ether
<i>trans</i> -Pinocarveol	0.66	0.61	Monoterpenic alcohol
(<i>Z</i>)-Myroxide	0.03	[0.03]*	Monoterpenic ether
<i>cis</i> -Verbenol	0.27	0.22	Monoterpenic alcohol
<i>trans</i> -Verbenol	1.00	1.01	Monoterpenic alcohol
meta-Mentha-4,6-dien-8-ol	0.13	0.10	Monoterpenic alcohol
Pinocamphone	0.07	0.06	Monoterpenic ketone
Pinocarvone	0.05	0.05	Monoterpenic ketone
Borneol	0.03	0.40*	Monoterpenic alcohol
α -Phellandren-8-ol	0.32	0.34	Monoterpenic alcohol
Terpinen-4-ol	0.24	0.23	Monoterpenic alcohol
para-Cymen-8-ol	0.10	0.09	Monoterpenic alcohol
α -Terpineol	0.19	[0.40]*	Monoterpenic alcohol
Myrtenal	0.13	0.15	Monoterpenic aldehyde
Myrtenol	0.22	0.18	Monoterpenic alcohol
Methylchavicol	0.04	0.17*	Phenylpropanoid
α -Phellandrene epoxide	0.20	0.15	Monoterpenic ether
Verbenone	0.32	0.51*	Monoterpenic ketone
<i>trans</i> -Piperitol	0.02	[1.21]*	Monoterpenic alcohol
Octyl acetate	0.02	[0.23]*	Aliphatic ester
<i>trans</i> -Carveol	0.26	0.30*	Monoterpenic alcohol
<i>cis</i> -Carveol	0.08	0.08	Monoterpenic alcohol
Cuminal	0.05	0.07	Monoterpenic aldehyde
Carvone	0.20	0.21	Monoterpenic ketone
Carvotanacetone	0.02	0.07	Monoterpenic ketone
Piperitone	0.04	0.04	Monoterpenic ketone
3,5-Dimethoxytoluene	0.05	[0.30]*	Simple phenolic
Unknown	0.03		Oxygenated monoterpene
Bornyl acetate	0.35	0.37	Monoterpenic ester
Thymol	0.02	0.02	Monoterpenic alcohol
Carvacrol	0.05	0.05	Monoterpenic alcohol
Unknown	0.02	0.01	Unknown
Bicycloelemene	0.02	[0.23]*	Sesquiterpene
Unknown	0.02		Unknown
α -Cubebene	0.19*	0.11	Sesquiterpene
α -Terpinyl acetate	[0.19]*	0.07*	Monoterpenic ester
Cyclosativene I	0.02	0.02	Sesquiterpene
Cyclosativene II	0.02	[0.23]*	Sesquiterpene
α -Ylangene	0.03	[0.23]*	Sesquiterpene
α -Copaene	0.54	0.55	Sesquiterpene
β -Bourbonene	0.05	0.05	Sesquiterpene
<i>cis</i> - β -Elemene	0.04	0.04	Sesquiterpene
β -Cubebene	0.06	0.12	Sesquiterpene
β -Elemene	1.39	[3.69]*	Sesquiterpene
α -Gurjunene	0.02	0.01	Sesquiterpene
β -Caryophyllene	2.35	3.69	Sesquiterpene
β -Copaene	0.03	0.04	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.11	[3.69]*	Sesquiterpene

6,9-Guaiadiene	0.01	0.02	Sesquiterpene
α -Humulene	0.46	0.47	Sesquiterpene
allo-Aromadendrene	0.16	0.19	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.10	[0.17]*	Sesquiterpene
γ -Muurolene	0.20	[0.51]*	Sesquiterpene
Germacrene D	0.17	[0.40]*	Sesquiterpene
β -Selinene	0.61	0.61	Sesquiterpene
<i>trans</i> -Muurolo-4(15),5-diene	0.06	0.49*	Sesquiterpene
δ -Selinene	0.03	[0.07]*	Sesquiterpene
α -Selinene	0.67*	[0.49]*	Sesquiterpene
epi-Cubebol	[0.67]*	0.12	Sesquiterpenic alcohol
α -Muurolene	0.17	0.16	Sesquiterpene
Cubebol	0.86*	0.31	Sesquiterpenic alcohol
γ -Cadinene	[0.86]*	1.21	Sesquiterpene
δ -Cadinene	0.58	[1.21]*	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.03	0.03	Sesquiterpene
α -Cadinene	0.05	0.05	Sesquiterpene
Isocaryophyllene epoxide B	0.07	0.05	Sesquiterpenic ether
Germacrene B	0.06	0.06	Sesquiterpene
Palustrol	0.01	0.01	Sesquiterpenic alcohol
Unknown	0.05		Oxygenated sesquiterpene
Germacrene D-4-ol	0.07	0.07	Sesquiterpenic alcohol
Caryophyllene oxide	0.66*	0.62	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.66]*	0.03	Sesquiterpenic ether
Viridiflorol	0.10	0.09	Sesquiterpenic alcohol
Copaborneol	0.05	0.04	Sesquiterpenic alcohol
Humulene epoxide II	0.09	0.20*	Sesquiterpenic ether
10-epi-Cubenol	0.18		Sesquiterpenic alcohol
1-epi-Cubenol	0.05	0.04	Sesquiterpenic alcohol
τ -Cadinol	0.43	0.40	Sesquiterpenic alcohol
β -Eudesmol	0.07*	0.03	Sesquiterpenic alcohol
α -Muurolol	[0.07]*	0.03	Sesquiterpenic alcohol
α -Eudesmol	0.04	0.04	Sesquiterpenic alcohol
(3Z)-Caryophylla-3,8(13)-dien-5 β -ol	0.10	0.06	Sesquiterpenic alcohol
Shyobunol	0.01	0.01	Sesquiterpenic alcohol
α -Phellandrene dimer I	0.01		Diterpene
α -Phellandrene dimer II	0.08	0.09	Diterpene
α -Phellandrene dimer III	0.01	0.01	Diterpene
α -Phellandrene dimer IV	0.01	[0.20]*	Diterpene
(3E)-Cembrene A	0.08	0.06	Diterpene
Cembrene C	0.02		Diterpene
Verticilla-4(20),7,11-triene	0.02		Diterpene
Cembrenol	0.03	0.03	Diterpenic alcohol
Incensole	0.26	0.10	Diterpenic alcohol
Serratol	[0.26]	0.16	Diterpenic alcohol
Total identified	98.16%	97.06%	

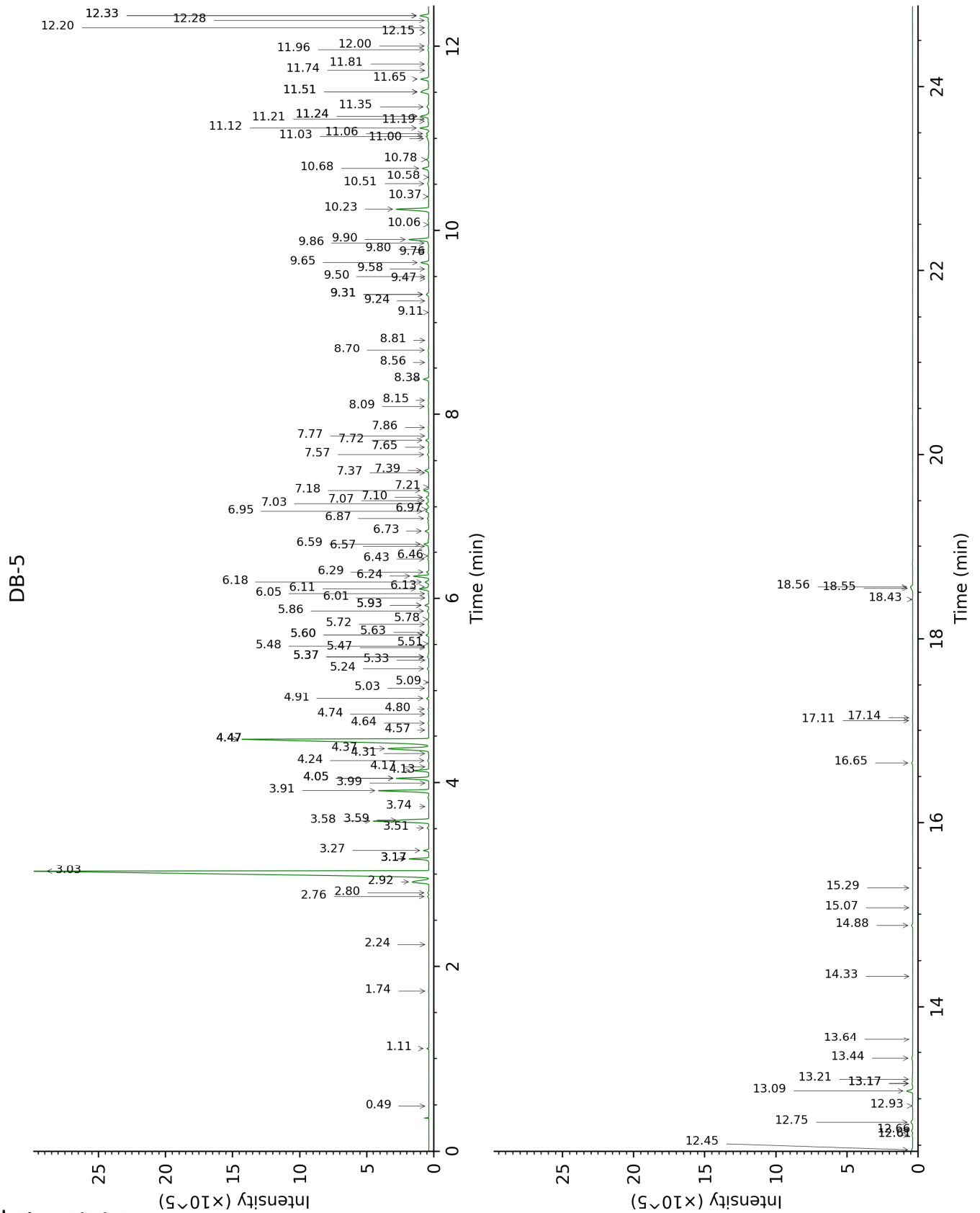
*: Two or more compounds are coeluting on this column

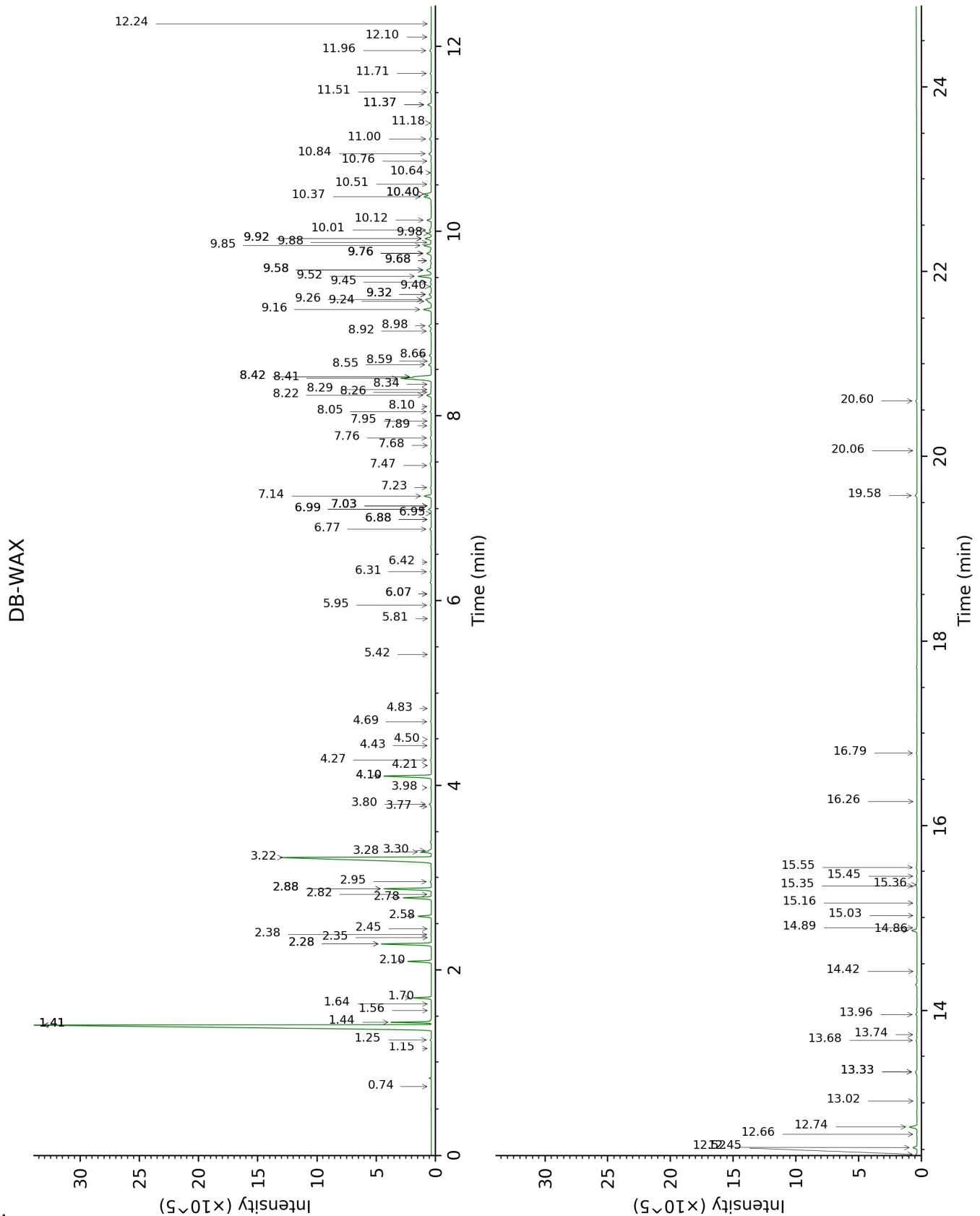
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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

Note: no correction factor was applied

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
2-Methyl-3-buten-2-ol	0.49	604	0.01	1.56	1015	tr
Toluene	1.11	752	0.06	1.41*	999	44.69
Unknown [m/z 109, 67 (32), 81 (14), 41 (12), 124 (10)]	1.74	826	0.01	0.74	876	0.01
Unknown [m/z 79, 78 (45), 91 (28), 77 (28), 41 (13), 80 (12), 107 (11)... 122 (1)]	2.24	870	0.01	1.15	956	0.01
Hashishene	2.76	912	0.06	1.41*	999	[44.69]
Tricyclene	2.80	914	0.06	1.25	972	0.07
α -Thujene	2.92	922	1.62	1.44	1002	1.65
α -Pinene	3.03	930	44.81	1.41*	999	[44.69]
α -Fenchene	3.18*	940	1.02	1.64	1022	0.01
Camphene	3.18*	940	[1.02]	1.70	1028	0.97
Unknown [m/z 91, 92 (47), 65 (11)... 134 (1)]	3.18*	940	[1.02]	2.38	1096	0.03
Thuja-2,4(10)-diene	3.26	946	0.28	2.28*	1086	3.13
meta-Cymene	3.51	962	0.09	2.88*	1135	3.03
Sabinene	3.58†	967	4.27	2.28*	1086	[3.13]
β -Pinene	3.59†	968	[4.27]	2.10	1067	1.40
Pseudolimonene isomer	3.74	978	0.01	2.45	1101	0.02
Myrcene	3.91	989	2.94	2.88*	1135	[3.03]
2-Carene	3.99	995	0.01	2.35	1092	tr
α -Phellandrene	4.05*	998	1.91	2.78	1127	1.82
Pseudolimonene	4.05*	998	[1.91]	2.82	1130	0.04
Δ 3-Carene	4.13	1004	0.86	2.58	1112	0.80
ortho-Methylanisole	4.17	1006	0.01	5.95	1360	0.06
α -Terpinene	4.24	1011	0.08	2.95	1141	0.07
ortho-Cymene	4.31	1016	0.03	4.10*	1227	3.42
para-Cymene	4.37	1019	3.47	4.10*	1227	[3.42]
Limonene	4.47*	1025	18.66	3.22	1161	17.93
1,8-Cineole	4.47*	1025	[18.66]	3.30	1167	0.09
β -Phellandrene	4.47*	1025	[18.66]	3.28	1166	0.63
Cymene analog	4.57	1032	0.03	4.50	1255	0.02
(Z)- β -Ocimene	4.64	1036	0.04	3.77	1203	0.04
Unknown (m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41	4.74	1042	0.03			

(17), 79 (14)...						
(E)-β-Ocimene	4.80	1046	0.04	3.98	1218	0.05
γ-Terpinene	4.91	1053	0.14	3.80	1205	0.14
cis-Sabinene hydrate	5.03	1061	0.02	6.88*	1427	0.03
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.09	1065	0.01	4.83	1278	0.01
Unknown [m/z 43, 94 (63), 109 (61), 59 (55), 79 (51)...152 (2)]	5.24	1074	0.09			
Isoterpinolene	5.33	1080	0.01	4.22	1235	0.01
Terpinolene	5.37*†	1082	0.14	4.27	1239	0.05
γ-Campholenal	5.37*†	1082	[0.14]	5.81	1349	0.01
para-Cymenene	5.37*†	1082	[0.14]	6.31	1385	0.08
α-Pinene oxide	5.47	1089	0.01	5.42	1321	tr
6,7-Epoxymyrcene	5.48	1090	0.03	6.07*	1368	0.04
trans-Sabinene hydrate	5.51	1091	0.02	7.95	1506	0.02
Linalool	5.60*	1097	0.17	8.05	1514	0.10
Isoamyl 2-methylbutyrate	5.60*	1097	[0.17]	4.43	1250	0.03
α-Thujone	5.63	1099	0.03	6.07*	1368	[0.04]
Isoamyl isovalerate	5.72	1105	0.05	4.69	1268	0.05
Verbenol analog?	5.78	1108	0.06	8.26	1530	0.04
trans-para-Mentha-2,8-dien-1-ol	5.86	1114	0.12	8.92	1582	0.10
cis-para-Mentha-2-en-1-ol	5.93*	1118	0.24	8.10	1518	0.04
α-Campholenal	5.93*	1118	[0.24]	6.99*†	1435	0.23
Unknown [m/z 111, 43 (22), 55 (14), 41 (12), 110 (11)...	6.01	1123	tr			
cis-Limonene oxide	6.05	1126	0.04	6.42	1393	0.04
trans-Pinocarveol	6.10	1129	0.66	9.16	1600	0.61
(Z)-Myroxide	6.13	1131	0.03	6.88*	1427	[0.03]
cis-Verbenol	6.18	1134	0.27	9.24	1608	0.22
trans-Verbenol	6.24	1138	1.00	9.52	1630	1.01
meta-Mentha-4,6-dien-8-ol	6.29	1141	0.13	9.40	1620	0.10
Pinocamphone	6.43	1150	0.07	7.23	1453	0.06
Pinocarvone	6.46	1152	0.05	7.90	1502	0.05
Borneol	6.57	1159	0.03	9.76*	1650	0.40
α-Phellandren-8-ol	6.59	1160	0.32	10.12	1679	0.34
Terpinen-4-ol	6.73	1170	0.24	8.55	1553	0.23

para-Cymen-8-ol	6.87	1179	0.10	11.51	1796	0.09
α-Terpineol	6.95	1184	0.19	9.76*	1650	[0.40]
Myrtenal	6.97	1185	0.13	8.66	1562	0.15
Myrtenol	7.03	1189	0.22	10.84	1739	0.18
Methylchavicol	7.07	1191	0.04	9.32*	1614	0.17
α-Phellandrene epoxide	7.10	1194	0.20	11.00	1753	0.15
Verbenone	7.18	1198	0.32	9.58*	1635	0.51
trans-Piperitol	7.21	1201	0.02	10.40*†	1702	[1.21]
Octyl acetate	7.37	1211	0.02	7.03*†	1438	[0.23]
trans-Carveol	7.39	1213	0.26	11.37*	1784	0.30
cis-Carveol	7.57	1224	0.08	11.71	1813	0.08
Cuminal	7.65	1230	0.05	10.51	1711	0.07
Carvone	7.72	1235	0.20	9.98	1667	0.21
Carvotanacetone	7.77	1238	0.02	9.45	1624	0.07
Piperitone	7.86	1244	0.04	9.88	1659	0.04
3,5-Dimethoxytoluene	8.09	1259	0.05	11.37*	1784	[0.30]
Unknown [m/z 109, 41 (22), 81 (14), 43 (11)... 152 (4)]	8.15	1264	0.03			
Bornyl acetate	8.38	1279	0.35	8.22	1528	0.37
Thymol	8.56	1291	0.02	15.02	2122	0.02
Carvacrol	8.70	1300	0.05	15.34	2154	0.05
Unknown [m/z 43, 111 (84), 109 (71), 126 (70)...]	8.81	1308	0.02	14.42	2063	0.01
Bicycloelemene	9.11	1330	0.02	6.99*†	1435	[0.23]
Unknown [m/z 133, 105 (45), 91 (38), 119 (36)... 150 (3)]	9.24	1339	0.02			
α-Cubebene	9.31*	1344	0.19	6.77	1419	0.11
α-Terpinyl acetate	9.31*	1344	[0.19]	9.68*	1643	0.07
Cyclosativene I	9.48	1355	0.02	6.95	1432	0.02
Cyclosativene II	9.50	1357	0.02	7.03*†	1438	[0.23]
α-Ylangene	9.58	1363	0.03	7.03*†	1438	[0.23]
α-Copaene	9.65	1368	0.54	7.14	1446	0.55
β-Bourbonene	9.76	1376	0.05	7.47	1470	0.05
cis-β-Elemene	9.80	1378	0.04	8.28	1533	0.04
β-Cubebene	9.86	1383	0.06	7.76	1492	0.12
β-Elemene	9.90	1386	1.39	8.42*†	1543	[3.69]
α-Gurjunene	10.06	1397	0.02	7.68	1486	0.01
β-Caryophyllene	10.23	1409	2.35	8.41†	1542	3.69
β-Copaene	10.37	1420	0.03	8.34	1537	0.04
trans-α-Bergamotene	10.51	1430	0.11	8.42*†	1543	[3.69]
6,9-Guaiadiene	10.58	1435	0.01	8.59	1556	0.02
α-Humulene	10.68	1443	0.46	9.26	1609	0.47
allo-Aromadendrene	10.78	1450	0.16	8.98	1587	0.19

<i>trans</i> -Cadina-1(6),4-diene	11.00	1467	0.10	9.32*	1614	[0.17]
γ -Muurolene	11.02	1469	0.20	9.58*	1635	[0.51]
Germacrene D	11.06	1471	0.17	9.76*	1650	[0.40]
β -Selinene	11.12	1476	0.61	9.85	1656	0.61
<i>trans</i> -Muurola-4(15),5-diene	11.19	1481	0.06	9.92*	1662	0.49
δ -Selinene	11.21	1483	0.03	9.68*	1643	[0.07]
α -Selinene	11.24*	1485	0.67	9.92*	1662	[0.49]
epi-Cubebol	11.24*	1485	[0.67]	11.96	1835	0.12
α -Muurolene	11.35	1493	0.17	10.01	1670	0.16
Cubebol	11.51*	1505	0.86	12.52	1885	0.31
γ -Cadinene	11.51*	1505	[0.86]	10.37†	1699	1.21
δ -Cadinene	11.65	1516	0.58	10.40*†	1702	[1.21]
<i>trans</i> -Cadina-1,4-diene	11.74	1523	0.03	10.64	1722	0.03
α -Cadinene	11.81	1529	0.05	10.76	1732	0.05
Isocaryophyllene epoxide B	11.96	1541	0.07	12.10	1848	0.05
Germacrene B	12.00	1544	0.06	11.18	1767	0.06
Palustrol	12.15	1556	0.01	12.24	1861	0.01
Unknown [m/z 152, 109 (61), 43 (21), 137 (16), 151 (16)... 222 (6)]	12.20	1560	0.05			
Germacrene D-4-ol	12.28	1566	0.07	13.68	1992	0.07
Caryophyllene oxide	12.33*	1570	0.66	12.74	1905	0.62
Caryophyllene oxide isomer	12.33*	1570	[0.66]	12.66	1898	0.03
Viridiflorol	12.45	1580	0.10	13.96	2018	0.09
Copaborneol	12.61	1592	0.05	14.89	2109	0.04
Humulene epoxide II	12.66	1596	0.09	13.33*	1960	0.20
10-epi-Cubenol	12.75	1603	0.18			
1-epi-Cubenol	12.93	1618	0.05	13.74	1998	0.04
τ -Cadinol	13.09	1631	0.43	14.86	2106	0.40
β -Eudesmol	13.17*	1638	0.07	15.45	2165	0.03
α -Muurolol	13.17*	1638	[0.07]	15.16	2136	0.03
α -Eudesmol	13.21	1641	0.04	15.36	2156	0.04
(3Z)-Caryophylla-3,8(13)-dien-5 β -ol	13.44	1660	0.10	16.78	2303	0.06
Shyobunol	13.64	1677	0.01	16.26	2248	0.01
α -Phellandrene dimer I	14.33	1736	0.01			
α -Phellandrene dimer II	14.88	1784	0.08	12.45	1879	0.09
α -Phellandrene dimer III	15.07	1800	0.01	13.02	1931	0.01
α -Phellandrene dimer IV	15.29	1820	0.01	13.33*	1960	[0.20]

(3E)-Cembrene A	16.65	1946	0.08	15.55	2175	0.06
Cembrene C	17.11	1990	0.02			
Verticilla-4(20),7,11-triene	17.14	1993	0.02			
Cembrenol	18.43	2122	0.03	20.06	2677	0.03
Incensole	18.55†	2134	0.26	20.60	2743	0.10
Serratol	18.56†	2136	[0.26]	19.58	2618	0.16
Total identified		98.16%			97.06%	
Total reported		98.44%			97.13%	

*: Two or more compounds are coeluting on this column

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

†: Peaks apexes were resolved, but peaks overlapped and were summed for analysis

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

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index