

Date : June 04, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20E22-PTH04

Customer identification : Sage officinalis - Austria - S10104202R

Type : Essential oil

Source : *Salvia officinalis*

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-007 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Fanny Charlier, B. Sc.

Analysis date : May 26, 2020

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: 1.4667 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 9909:1999 - OIL OF DALMATIAN SAGE

Compound	Min. %	Max. %	Observed %	Complies?
α-Humulene		12	4	Yes
Bornyl acetate		2.5	1.0	Yes
Camphor	4.5	24.5	15.4	Yes
β-Thujone	3.0	8.5	3.3	Yes
α-Thujone	18	43	27	Yes
1,8-Cineole	5.5	13.0	10.4	Yes
Limonene	0.5	3.0	2.9	Yes
Camphene	1.5	7.0	5.4	Yes
α-Pinene	1.0	6.5	6.3	Yes
Linalool + linalyl acetate		1.0	0.6	Yes
Refractive index	1.4580	1.4740	1.4667	Yes

CONCLUSION

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

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Isobutyral	tr	Aliphatic aldehyde
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
Heptane	tr	Alkane
Methyl isovalerate	0.01	Aliphatic ester
Hexanal	0.01	Aliphatic aldehyde
Ethyl butyrate	0.01	Aliphatic ester
(Z)-Salvene	0.10	Normonoterpene
Ethyl isovalerate	0.01	Aliphatic ester
(E)-Salvene	0.01	Normonoterpene
Hexanol	0.01	Aliphatic alcohol
Hashishene	0.01	Monoterpene
Tricyclene	0.05	Monoterpene
α -Thujene	0.19	Monoterpene
α -Pinene	6.26	Monoterpene
Camphene	5.40	Monoterpene
α -Fenchene	0.80	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
β -Pinene	1.37	Monoterpene
Sabinene	0.27	Monoterpene
Octen-3-ol	0.06	Aliphatic alcohol
6-Methyl-5-hepten-2-one	0.03	Aliphatic ketone
Myrcene	1.31	Monoterpene
6-Methyl-5-hepten-2-ol	0.01	Aliphatic alcohol
α -Phellandrene	0.07	Monoterpene
Pseudolimonene	0.05	Monoterpene
Δ^3 -Carene	0.86	Monoterpene
α -Terpinene	0.11	Monoterpene
para-Cymene	2.00	Monoterpene
1,8-Cineole	10.36	Monoterpenic ether
Limonene	2.94	Monoterpene
Benzyl alcohol	0.01	Simple phenolic
(Z)- β -Ocimene	0.11	Monoterpene
(E)- β -Ocimene	0.08	Monoterpene
γ -Terpinene	1.76	Monoterpene
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
para-Mentha-3,8-diene	0.01	Monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Fenchone	0.01	Monoterpenic ketone
Terpinolene	0.86	Monoterpene
para-Cymenene	0.03	Monoterpene
α -Thujone	26.88	Monoterpenic ketone
Linalool	0.57	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
β -Thujone	3.32	Monoterpenic ketone

Dehydrosabinaketone	0.02	Normoterpenic ketone
<i>cis</i> -para-Menth-2-en-1-ol	0.05	Monoterpenic alcohol
Camphor	15.40	Monoterpenic ketone
<i>trans</i> -para-Menth-2-en-1-ol	0.06	Monoterpenic alcohol
neoiso-Thujol	0.08	Monoterpenic alcohol
Camphene hydrate	0.02	Monoterpenic alcohol
Sabinaketone	0.04	Normoterpenic ketone
Isoborneol	0.05	Monoterpenic alcohol
Pinocarvone	0.02	Monoterpenic ketone
Thujol	0.12	Monoterpenic alcohol
Borneol	2.52	Monoterpenic alcohol
δ -Terpineol	0.01	Monoterpenic alcohol
Terpinen-4-ol	0.53	Monoterpenic alcohol
Thuj-3-en-10-al	0.02	Monoterpenic aldehyde
para-Cymen-8-ol	0.04	Monoterpenic alcohol
α -Terpineol	0.38	Monoterpenic alcohol
Myrtenol	0.06	Monoterpenic alcohol
Unknown	0.03	Oxygenated monoterpene
Unknown	0.01	Unknown
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
Cuminal	0.06	Monoterpenic aldehyde
Carvone	0.04	Monoterpenic ketone
Carvotanacetone	0.02	Monoterpenic ketone
Geraniol	0.02	Monoterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Bornyl acetate	1.01	Monoterpenic ester
Isobornyl acetate	0.02	Monoterpenic ester
<i>trans</i> -Sabinyl acetate	0.07	Monoterpenic ester
Thymol	0.05	Monoterpenic alcohol
<i>trans</i> -Carvyl acetate	0.02	Monoterpenic ester
α -Terpinyl acetate	0.03	Monoterpenic ester
α -Ylangene	0.01	Sesquiterpene
α -Copaene	0.04	Sesquiterpene
β -Bourbonene	0.01	Sesquiterpene
Geranyl acetate	0.02	Monoterpenic ester
(<i>Z</i>)-Jasmone	0.04	Jasmonate
Isocaryophyllene	0.04	Sesquiterpene
β -Caryophyllene	4.22	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.04	Sesquiterpene
Aromadendrene	0.05	Sesquiterpene
Unknown	0.02	Unknown
Unknown	0.02	Unknown
α -Humulene	3.87	Sesquiterpene
allo-Aromadendrene	0.06	Sesquiterpene
9-epi- β -Caryophyllene	0.06	Sesquiterpene
α -Amorphene	0.04	Sesquiterpene
Germacrene D	0.36	Sesquiterpene
β -Selinene	0.02	Sesquiterpene
α -Selinene	0.01	Sesquiterpene
Viridiflorene	0.09	Sesquiterpene
5-Methyl-2,4-diisopropylphenol	0.02	Terpene derivative

γ-Cadinene	0.02	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
Isocaryophyllene epoxide B	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.38	Sesquiterpenic ether
Globulol	1.59	Sesquiterpenic alcohol
Viridiflorol	0.36	Sesquiterpenic alcohol
Humulene epoxide I	0.02	Sesquiterpenic ether
Humulene epoxide II	0.10	Sesquiterpenic ether
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.01	Sesquiterpene
Phytone	0.01	Terpenic ketone
Isopimaradiene isomer I	0.01	Diterpene
Sclarene?	0.01	Diterpene
Manool	0.09	Diterpenic alcohol
Consolidated total	98.60%	

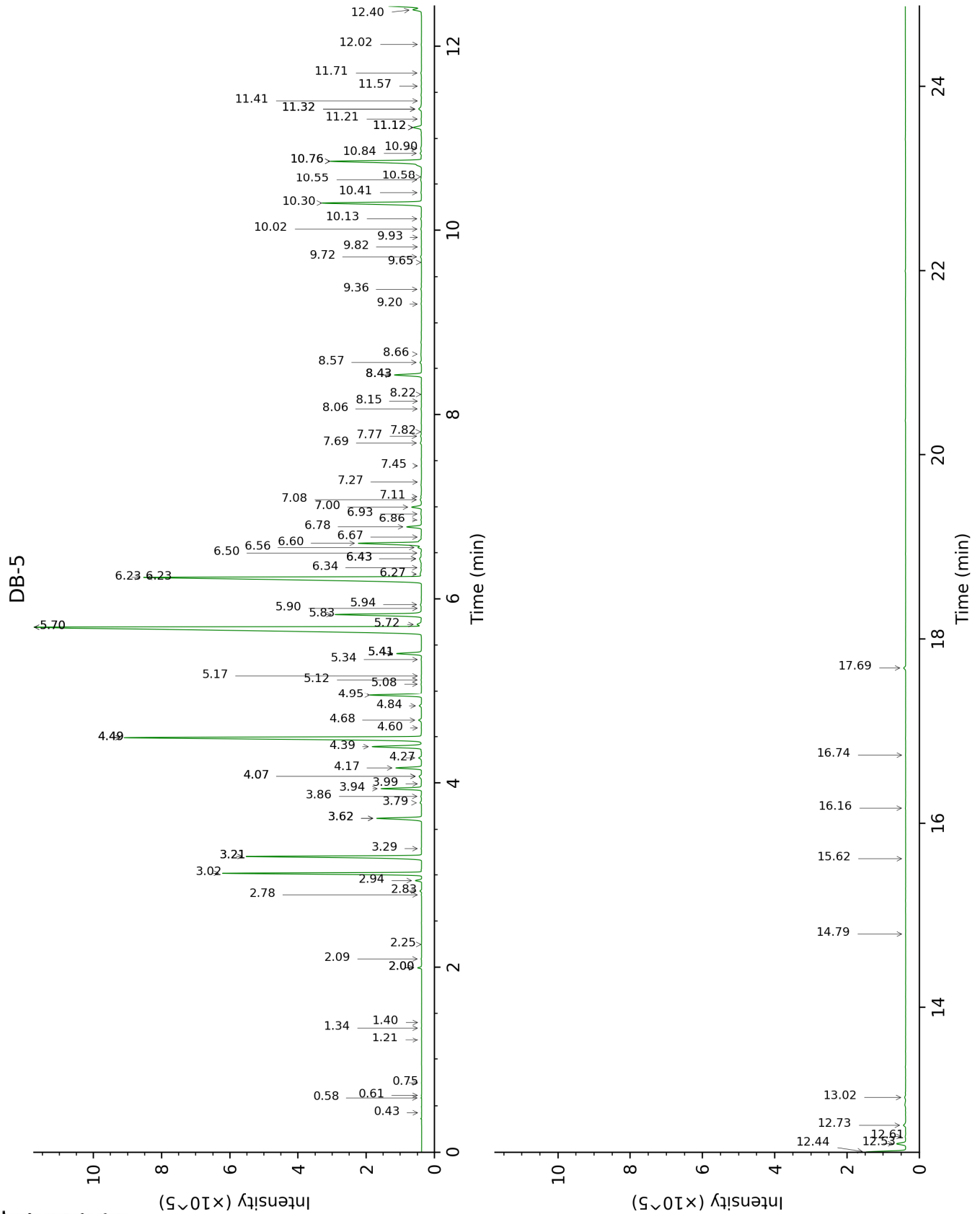
tr: The compound has been detected below 0.005% of total signal.

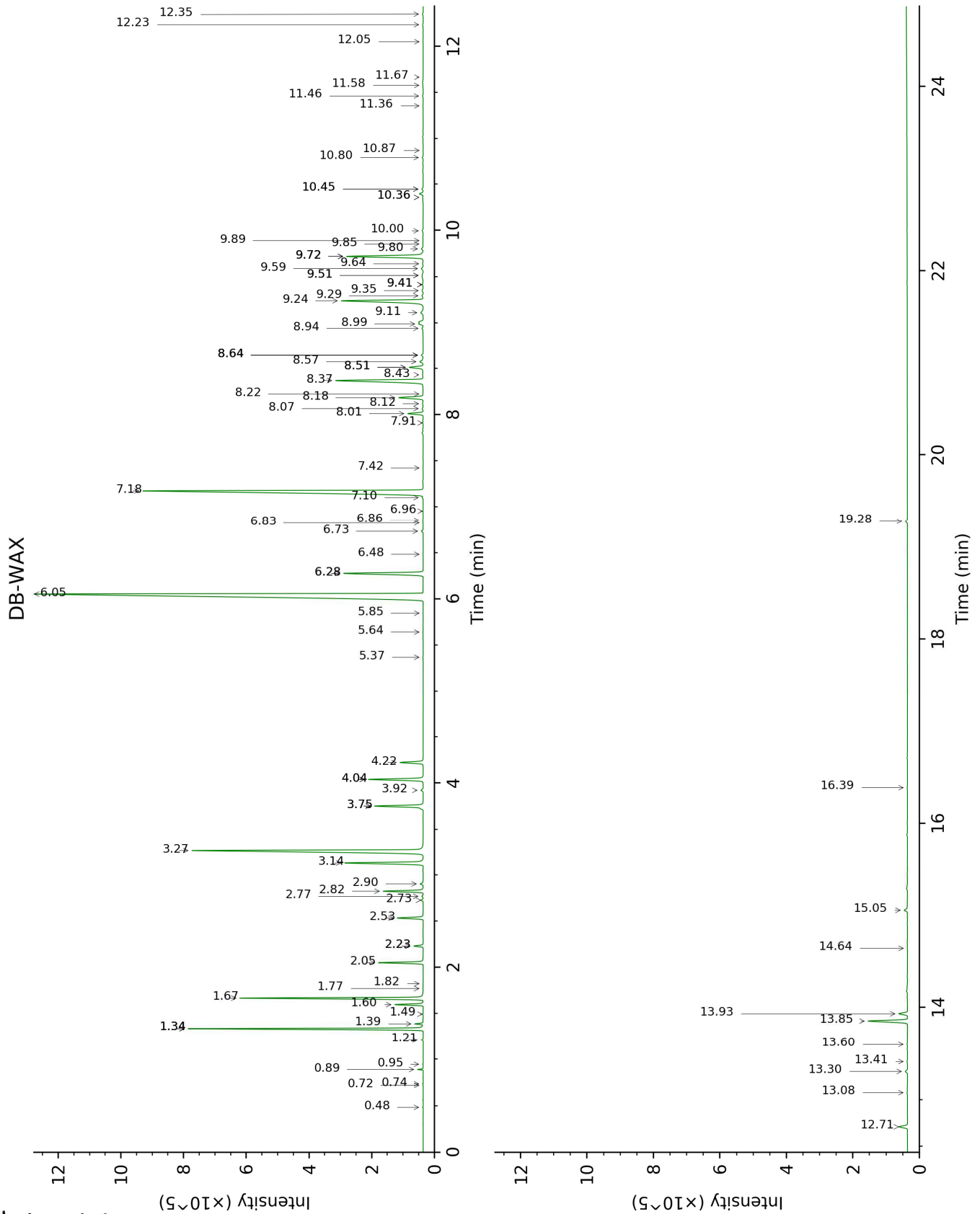
Note: no correction factor was applied

About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm is set to prioritize data from the most standard DB-5 column, and smallest values so as to avoid overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report to access the full untreated data and perform their own calculations if needed.

Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

This page was intentionally left blank. The following pages present the complete data of the analysis.





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isobutylal	0.43	540	tr	0.48	785	0.01
Isovaleral	0.58	640	0.01	0.74	888	0.01
2-Methylbutylal	0.61	651	0.01	0.72	882	0.01
Heptane	0.75	707	tr			
Methyl isovalerate	1.21	775	0.01	1.34*	993	6.21
Hexanal	1.34	794	0.01	1.82	1044	tr
Ethyl butyrate	1.40	802	0.01	1.49	1011	0.01
(Z)-Salvene	2.00*	853	0.11	0.89	921	0.10
Ethyl isovalerate	2.00*	853	[0.11]	1.77	1039	0.01
(E)-Salvene	2.09	861	0.01	0.95	930	0.01
Hexanol	2.25	874	0.01	5.37	1321	0.01
Hashishene	2.78	915	0.01	1.34*	993	[6.21]
Tricyclene	2.83	918	0.05	1.21	973	0.05
α-Thujene	2.94	925	0.19	1.39	1001	0.21
α-Pinene	3.02	930	6.26	1.34*	993	[6.21]
Camphene	3.21*	943	6.26	1.67	1029	5.40
α-Fenchene	3.21*	943	[6.26]	1.60	1022	0.80
Thuja-2,4(10)-diene	3.29	948	0.02	2.23*	1084	0.28
β-Pinene	3.62*	970	1.66	2.05	1066	1.37
Sabinene	3.62*	970	[1.66]	2.23*	1084	[0.28]
Octen-3-ol	3.79	981	0.06	6.73	1421	0.06
6-Methyl-5-hepten-2-one	3.86	986	0.03			
Myrcene	3.94	991	1.31	2.82	1134	1.30
6-Methyl-5-hepten-2-ol	3.99	995	0.01	6.83	1428	0.01
α-Phellandrene	4.07*	1000	0.14	2.73	1127	0.07
Pseudolimonene	4.07*	1000	[0.14]	2.77	1130	0.05
Δ3-Carene	4.16	1006	0.86	2.53	1112	0.84
α-Terpinene	4.27	1013	0.11	2.90	1141	0.11
para-Cymene	4.40	1020	2.00	4.04*	1229	2.01
1,8-Cineole	4.49*	1027	13.34	3.27	1170	10.36
Limonene	4.49*	1027	[13.34]	3.14	1159	2.94
Benzyl alcohol	4.60	1033	0.01	11.67	1816	0.01
(Z)-β-Ocimene	4.68	1038	0.11	3.75*†	1208	1.87
(E)-β-Ocimene	4.84	1048	0.08	3.92	1220	0.09
γ-Terpinene	4.95	1056	1.76	3.75*†	1208	[1.87]
cis-Sabinene hydrate	5.08	1064	0.02	6.86	1430	0.02
para-Mentha-3,8-diene	5.12	1066	0.01	4.04*	1229	[2.01]
cis-Linalool oxide (fur.)	5.17	1069	0.01	6.48	1402	0.01
Fenchone	5.34	1080	0.01	5.64	1341	0.01
Terpinolene	5.41*	1084	0.90	4.22	1242	0.86
para-Cymenene	5.41*	1084	[0.90]	6.28*	1387	3.23
α-Thujone	5.70*†	1103	27.67	6.05	1371	26.88
Linalool	5.70*†	1103	[27.67]	8.01	1517	0.57
Nonanal	5.72†	1104	[27.67]	5.85	1356	0.01

β-Thujone	5.83	1111	3.32	6.28*	1387	[3.23]
Dehydrosabinaketonone	5.90	1116	0.02	8.64*	1566	0.07
cis-para-Menth-2-en-1-ol	5.94	1118	0.05	8.07	1521	0.04
Camphor	6.23*	1137	15.52	7.18	1454	15.40
trans-para-Menth-2-en-1-ol	6.23*	1137	[15.52]	8.94	1590	0.06
neoiso-Thujol	6.27	1140	0.08	9.51*†	1636	0.12
Camphene hydrate	6.34	1144	0.02	8.43	1550	0.03
Sabinaketonone	6.44*	1151	0.12	8.64*	1566	[0.07]
Isoborneol	6.44*	1151	[0.12]	9.35	1622	0.05
Pinocarvone	6.50	1155	0.02	7.91	1509	0.02
Thujol	6.56	1158	0.12	9.80	1659	0.09
Borneol	6.60	1162	2.52	9.72*	1652	3.27
δ-Terpineol	6.67	1166	0.01	9.42*	1628	0.05
Terpinen-4-ol	6.78	1173	0.53	8.51*	1556	0.58
Thuj-3-en-10-al	6.86	1178	0.02	8.64*	1566	[0.07]
para-Cymen-8-ol	6.93	1183	0.04	11.46	1798	0.03
α-Terpineol	7.00	1188	0.38	9.72*	1652	[3.27]
Myrtenol	7.08	1193	0.06	10.80	1742	0.04
Unknown [m/z 43, 97 (84), 85 (65), 55 (56), 41 (50)...]	7.11	1195	0.03	12.23	1867	0.04
Unknown [m/z 95, 93 (32), 121 (24), 79 (22), 91 (21), 105 (16)... 154 (2)]	7.27	1205	0.01	10.87	1748	0.01
trans-Carveol	7.45	1217	0.01	11.36	1789	0.02
Cuminal	7.69	1234	0.06	10.45*	1712	0.06
Carvone	7.77	1239	0.04	10.00	1675	0.05
Carvotanacetone	7.82	1243	0.02	9.42*	1628	[0.05]
Geraniol	8.06	1260	0.02	11.58	1809	0.02
Unknown [m/z 107, 43 (83), 59 (54), 109 (50), 108 (43), 67(42)...]	8.15	1266	0.01			
Unknown [m/z 109, 43 (83), 95 (70), 110 (70), 99 (53), 119 (48)...]	8.22	1271	0.01			
Bornyl acetate	8.43*	1285	1.02	8.18	1530	1.01
Isobornyl acetate	8.43*	1285	[1.02]	8.22	1534	0.02
trans-Sabinyl acetate	8.57	1295	0.07	9.11	1603	0.15
Thymol	8.66	1301	0.05	15.05	2133	0.16
trans-Carvyl acetate	9.20	1335	0.02			
α-Terpinyl acetate	9.36	1346	0.03	9.64	1646	0.03
α-Ylangene	9.66	1367	0.01	6.96	1438	0.01
α-Copaene	9.72	1371	0.04	7.10	1448	0.04
β-Bourbonene	9.82	1379	0.01	7.42	1472	0.01
Geranyl acetate	9.93	1386	0.02	10.45*	1712	[0.06]
(Z)-Jasmone	10.02	1392	0.04	12.35	1877	0.04
Isocaryophyllene	10.13	1400	0.04	8.12	1526	0.04

β-Caryophyllene	10.30	1413	4.22	8.37	1545	4.20
Caryophylla-4(12),8(13)-diene	10.41	1421	0.04	8.57	1561	0.18
Aromadendrene	10.55	1431	0.05	8.51*	1556	[0.58]
Unknown [m/z 153, 43 (57), 107 (56), 108 (44)... 204 (11)...]	10.58	1434	0.02	13.41	1974	0.03
Unknown [m/z 153, 43 (55), 168 (33), 41 (28)... 207 (3)...]	10.76*	1447	4.08	13.60	1992	0.02
α-Humulene	10.76*	1447	[4.08]	9.24	1613	3.87
allo-Aromadendrene	10.84	1453	0.06	8.99	1593	0.16
9-epi-β-Caryophyllene	10.90	1457	0.06	9.30	1618	0.06
α-Amorphene	11.12*	1474	0.37	9.51*†	1636	[0.12]
Germacrene D	11.12*	1474	[0.37]	9.72*	1652	[3.27]
β-Selinene	11.21	1481	0.02	9.85	1663	0.02
α-Selinene	11.32*	1489	0.18	9.89	1666	0.01
Viridiflorene	11.32*	1489	[0.18]	9.59	1642	0.09
5-Methyl-2,4-diisopropylphenol	11.41	1496	0.02	16.39	2269	0.02
γ-Cadinene	11.57	1508	0.02	10.36*†	1705	0.17
δ-Cadinene	11.71	1519	0.04	10.36*†	1705	[0.17]
Isocaryophyllene epoxide B	12.02	1543	0.02	12.05	1850	0.01
Caryophyllene oxide	12.40	1573	0.38	12.71	1910	0.36
Globulol	12.44	1576	1.59	13.85	2016	1.58
Viridiflorol	12.53	1583	0.36	13.93	2024	0.36
Humulene epoxide I	12.60	1589	0.02	13.08	1943	0.02
Humulene epoxide II	12.73	1598	0.10	13.30	1965	0.10
Unknown [m/z 41, 91 (78), 67 (76), 119 (70), 55 (61)... 220 (7)]	13.02	1623	0.05			
Unknown [m/z 133, 148 (97), 43 (50), 93 (47), 91 (41), 147 (40)...204 (8)]	14.80	1773	0.01			
Phytone	15.62	1846	0.01	14.64	2092	0.01
Isopimaradiene isomer I	16.16	1896	0.01			
Sclarene?	16.74	1950	0.01			
Manool	17.69	2042	0.09	19.28	2590	0.09
Total identified		99.13%			98.61%	
Total reported		99.27%			98.71%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated 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