

Date : August 12, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19H05-PTH14-1-DM

Customer identification : Sage- Bosnia- S10103810R

Type : Essential oil

Source : *Salvia officinalis*

Customer : Plant Therapy

ANALYSIS

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

Analyst : Alexis St-Gelais, M. Sc., chimiste

Analysis date : August 07, 2019

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: 1.4656 ± 0.0003 (20 °C)

ISO 9909:1999 - OIL OF DALMATIAN SAGE

Compound	Min. %	Max. %	Observed %	Complies?
α-Humulene		12	4	Yes
Bornyl acetate		2.5	1.7	Yes
Camphor	4.5	24.5	21.9	Yes
β-Thujone	3.0	8.5	4.4	Yes
α-Thujone	18	43	27	Yes
1,8-Cineole	5.5	13.0	9.3	Yes
Limonene	0.5	3.0	2.0	Yes
Camphene	1.5	7.0	6.3	Yes
α-Pinene	1.0	6.5	3.6	Yes
Linalool + linalyl acetate		1.0	0.6	Yes
Refractive index	1.4580	1.4740	1.4656	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	%	Classe
Isovaleral	0.02	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
Heptane	0.01	Alkane
Ethyl butyrate	tr	Aliphatic ester
(2E)-Hexenal	0.01	Aliphatic aldehyde
(Z)-Salvene	0.51	Normonoterpene
(3Z)-Hexenol	0.02	Aliphatic alcohol
(E)-Salvene	0.08	Normonoterpene
Hexanol	0.01	Aliphatic alcohol
Hashishene	0.04	Monoterpene
Tricyclene	0.21	Monoterpene
α -Thujene	0.14	Monoterpene
α -Pinene	3.64	Monoterpene
Camphene	6.30	Monoterpene
α -Fenchene	0.05	Monoterpene
Unknown	0.01	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Sabinene	0.06	Monoterpene
β -Pinene	1.60	Monoterpene
Octen-3-ol	0.18	Aliphatic alcohol
Octan-3-one	0.03	Aliphatic ketone
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
Myrcene	0.75	Monoterpene
Octan-3-ol	0.03	Aliphatic alcohol
Pseudolimonene	0.01	Monoterpene
α -Phellandrene	0.04	Monoterpene
Δ^3 -Carene	0.01	Monoterpene
α -Terpinene	0.11	Monoterpene
para-Cymene	0.94	Monoterpene
Limonene	2.03	Monoterpene
1,8-Cineole	9.35	Monoterpenic ether
Benzyl alcohol	0.01	Simple phenolic
(Z)- β -Ocimene	0.08	Monoterpene
(E)- β -Ocimene	0.03	Monoterpene
γ -Terpinene	0.21	Monoterpene
cis-Sabinene hydrate	0.05	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
Fenchone	0.02	Aliphatic alcohol
para-Cymenene	0.08	Monoterpene
Terpinolene	0.19	Monoterpene
α -Thujone	27.43	Monoterpenic ketone
Linalool	0.60	Monoterpenic alcohol
β -Thujone	4.43	Monoterpenic ketone
Dehydrosabinaketone	0.03	Normonoterpenic ketone
cis-para-Menth-2-en-1-ol	0.08	Monoterpenic alcohol
Camphor	21.91	Monoterpenic ketone
trans-para-Menth-2-en-1-ol	0.07	Monoterpenic alcohol

neoiso-Thujol	0.16	Monoterpenic alcohol
Camphene hydrate	0.05	Monoterpenic alcohol
neo-Thujol	0.04	Monoterpenic alcohol
Isoborneol	0.03	Monoterpenic alcohol
Pinocarvone	0.04	Monoterpenic ketone
Thujol	0.01	Monoterpenic alcohol
Borneol	2.57	Monoterpenic alcohol
δ-Terpineol	0.11	Monoterpenic alcohol
Isopinocampone	0.03	Monoterpenic ketone
Terpinen-4-ol	0.38	Monoterpenic alcohol
Thuj-3-en-10-al	0.02	Monoterpenic aldehyde
para-Cymen-8-ol	0.10	Monoterpenic alcohol
α-Terpineol	0.14	Monoterpenic alcohol
Myrtenol	0.07	Monoterpenic alcohol
Unknown	0.05	Oxygenated monoterpene
Unknown	0.02	Unknown
<i>trans</i> -Carveol	0.03	Monoterpenic alcohol
Cuminal	0.03	Monoterpenic aldehyde
Carvone	0.03	Monoterpenic ketone
Carvotanacetone	0.01	Monoterpenic ketone
Geraniol	0.02	Monoterpenic alcohol
Unknown	0.02	Unknown
Bornyl acetate	1.71	Monoterpenic ester
Isobornyl acetate	0.03	Monoterpenic ester
Cuminol	0.01	Monoterpenic alcohol
Unknown	0.11	Unknown
<i>trans</i> -Sabinyl acetate	0.13	Monoterpenic ester
Thymol	0.04	Monoterpenic alcohol
Myrtenyl acetate	0.02	Monoterpenic ester
exo-2-Hydroxycineole acetate	0.02	Monoterpenic ester
Unknown	0.01	Unknown
α-Terpinyl acetate	0.03	Monoterpenic ester
α-Copaene	0.03	Sesquiterpene
(<i>Z</i>)-Jasmone	0.02	Jasmonate
Isocaryophyllene	0.04	Sesquiterpene
β-Caryophyllene	2.80	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.02	Sesquiterpene
Unknown	0.10	Unknown
Aromadendrene	0.08	Sesquiterpene
α-Humulene	3.98	Sesquiterpene
9-epi-β-Caryophyllene	0.07	Sesquiterpene
allo-Aromadendrene	0.09	Sesquiterpene
Germacrene D	0.04	Sesquiterpene
β-Selinene	0.03	Sesquiterpene
Viridiflorene	0.08	Sesquiterpene
α-Selinene	0.36	Sesquiterpene
5-Methyl-2,4-diisopropylphenol	0.02	Terpene derivative
γ-Cadinene	0.04	Sesquiterpene
δ-Cadinene	0.05	Sesquiterpene
<i>trans</i> -Calamenene	0.01	Sesquiterpene
α-Elemol	0.09	Sesquiterpenic alcohol
Caryophyllene oxide	0.23	Sesquiterpenic ether

Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Viridiflorol	1.44	Sesquiterpenic alcohol
Humulene epoxide I	0.06	Sesquiterpenic ether
Ledol	0.02	Sesquiterpenic alcohol
Humulene epoxide II	0.36	Sesquiterpenic ether
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.11	Oxygenated sesquiterpene
β -Eudesmol	0.24	Sesquiterpenic alcohol
α -Eudesmol	0.14	Sesquiterpenic alcohol
Manool	0.15	Diterpenic alcohol
<i>trans</i> -Sabinene hydrate	0.05	Monoterpenic alcohol
Globulol	0.01	Sesquiterpenic alcohol
Consolidated total	98.42%	

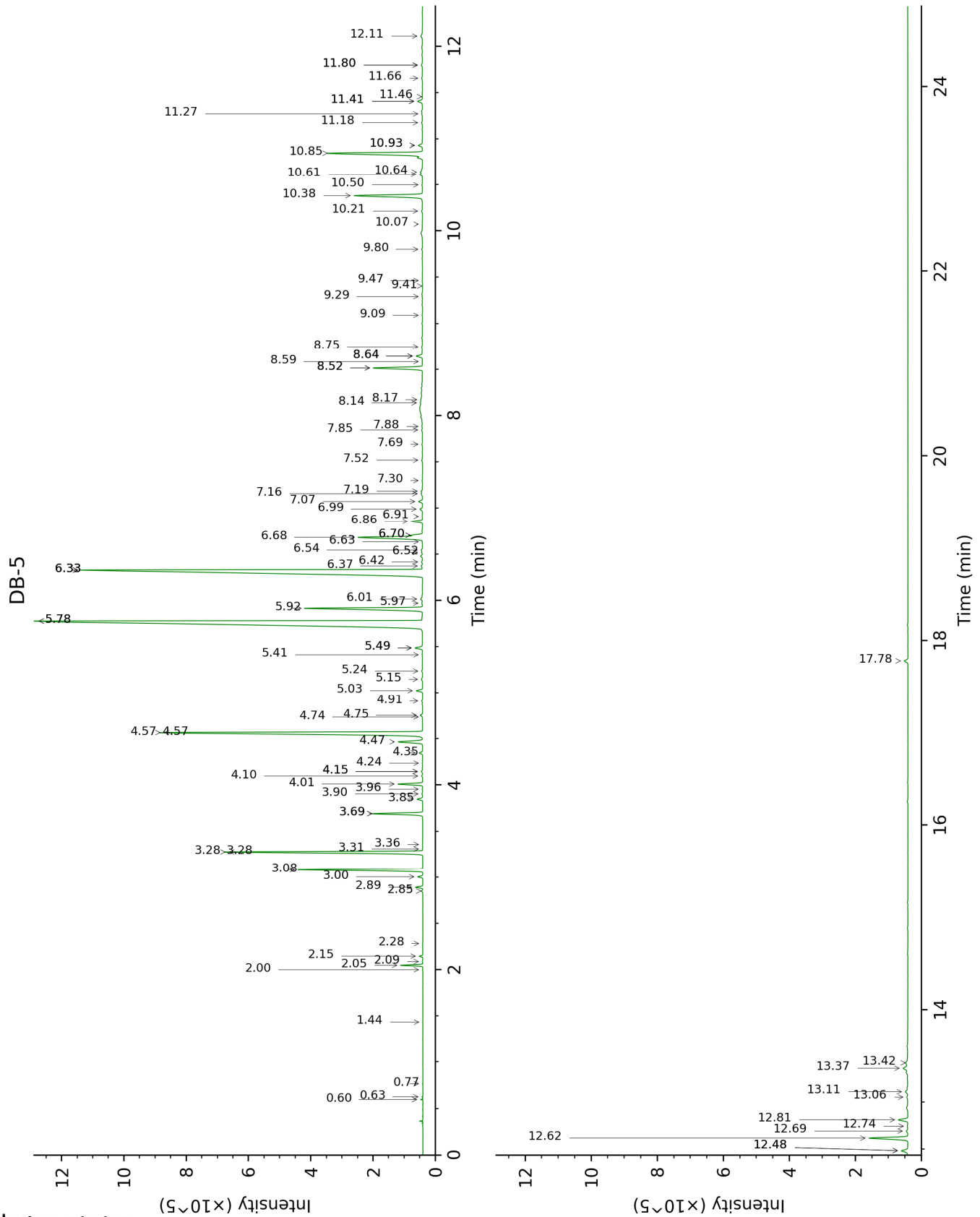
tr: The compound has been detected below 0.005% of total signal.

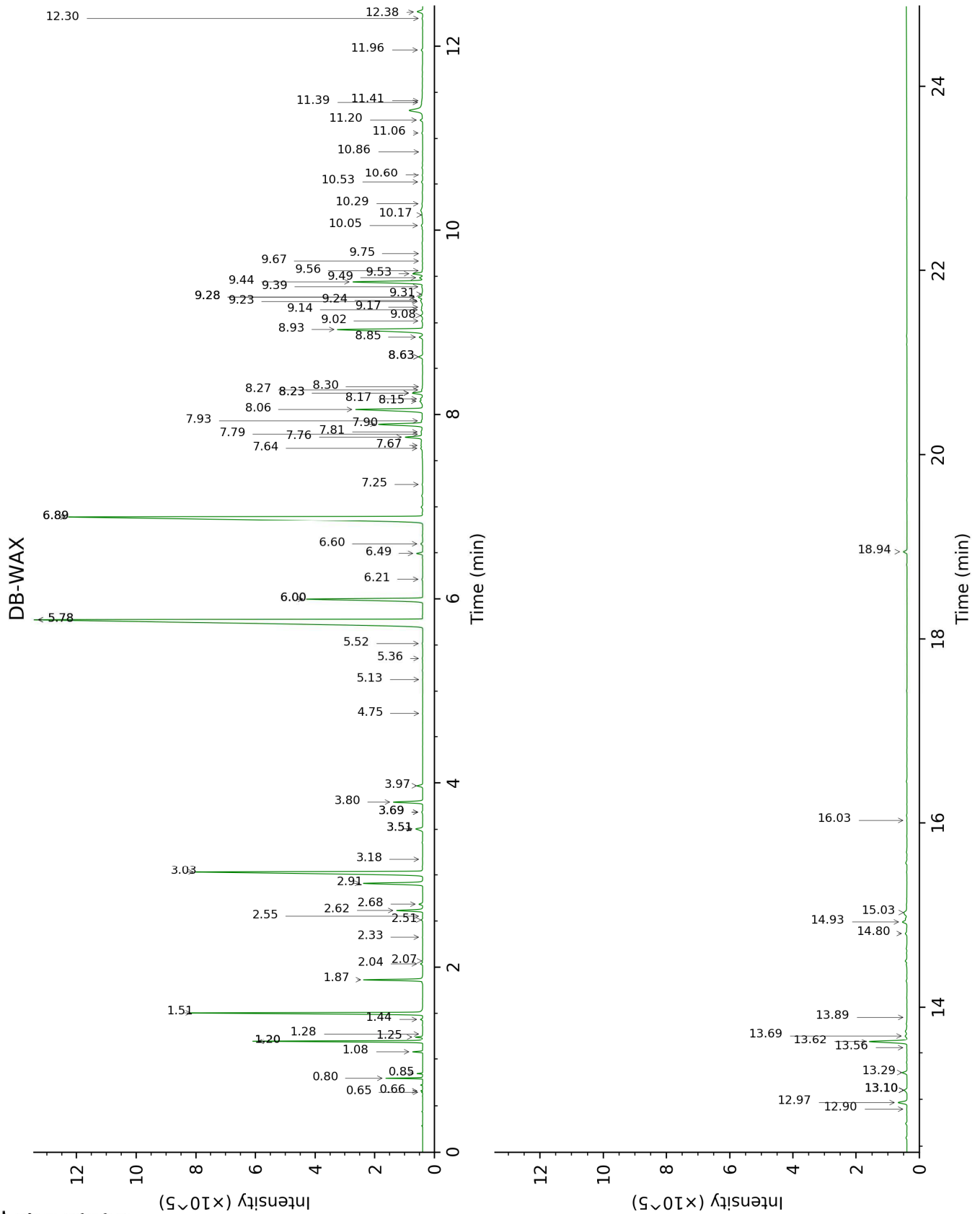
Note: no correction factor was applied

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	%
Isovaleral	0.60	639	0.02	0.66	887	0.02
2-Methylbutyral	0.63	650	0.01	0.65	880	0.01
Heptane	0.77	704	0.01			
Ethyl butyrate	1.44	800	tr	1.28	1004	tr
(2E)-Hexenal	2.00	848	0.01	3.18	1179	0.01
(Z)-Salvene	2.05	852	0.51	0.80	919	0.53
(3Z)-Hexenol	2.09	855	0.02	5.52	1353	0.02
(E)-Salvene	2.15	860	0.08	0.85	928	0.08
Hexanol	2.28	871	0.01	5.13	1324	0.01
Hashishene	2.85	915	0.04	1.20*	992	3.74
Tricyclene	2.89	918	0.21	1.08	971	0.21
α -Thujene	3.00	925	0.14	1.25	1000	0.16
α -Pinene	3.08	930	3.64	1.20*	992	[3.74]
Camphene	3.28*	943	6.25	1.51	1028	6.30
α -Fenchene	3.28*	943	[6.25]	1.44	1020	0.05
Unknown [m/z 91, 92 (47), 65 (11)... 134 (1)]	3.31	945	0.01			
Thuja-2,4(10)-diene	3.36	948	0.01	2.07	1087	0.01
Sabinene	3.69*	970	1.59	2.04	1083	0.06
β -Pinene	3.69*	970	[1.59]	1.87	1065	1.60
Octen-3-ol	3.85	980	0.18	6.49	1424	0.18
Octan-3-one	3.90	984	0.03	3.69*	1219	0.04
6-Methyl-5-hepten-2-one	3.96	988	0.02	4.75	1300	0.01
Myrcene	4.01	991	0.75	2.62	1134	0.76
Octan-3-ol	4.10	997	0.03	5.78*	1371	27.47
Pseudolimonene	4.15*	1000	0.05	2.55	1129	0.01
α -Phellandrene	4.15*	1000	[0.05]	2.51	1125	0.04
Δ^3 -Carene	4.24	1006	0.01	2.33	1110	0.01
α -Terpinene	4.35	1013	0.11	2.68	1139	0.11
para-Cymene	4.47	1020	0.94	3.80	1228	0.94
Limonene	4.57*	1027	11.31	2.91	1158	2.03
1,8-Cineole	4.57*	1027	[11.31]	3.03	1168	9.35
Benzyl alcohol	4.74	1037	0.01	11.41	1819	0.01
(Z)- β -Ocimene	4.76	1039	0.08	3.51*	1206	0.29
(E)- β -Ocimene	4.91	1048	0.03	3.69*	1219	[0.04]
γ -Terpinene	5.03	1056	0.21	3.51*	1206	[0.29]
cis-Sabinene hydrate	5.15	1064	0.05	6.60	1432	0.07
cis-Linalool oxide (fur.)	5.24	1069	0.03	6.21	1403	0.03
Fenchone	5.41	1080	0.02	5.36	1341	0.02
para-Cymenene	5.49*	1085	0.27	6.00*	1388	4.43
Terpinolene	5.49*	1085	[0.27]	3.97	1241	0.19
α -Thujone	5.78*	1103	28.18	5.78*	1371	[27.47]
Linalool	5.78*	1103	[28.18]	7.76	1519	0.60
β -Thujone	5.92	1112	4.43	6.00*	1388	[4.43]
Dehydrosabinaketone	5.97	1116	0.03	8.27	1559	0.04
cis-para-Menth-2-en-	6.02	1119	0.08	7.81	1524	0.04

1-ol						
Camphor	6.33*	1139	22.18	6.89*	1454	21.94
<i>trans</i> -para-Menth-2-en-1-ol	6.33*	1139	[22.18]	8.63*	1587	0.16
neoiso-Thujol	6.33*	1139	[22.18]	9.28*	1639	0.17
Camphene hydrate	6.37	1142	0.05	8.15	1550	0.09
neo-Thujol	6.42	1145	0.04	9.23	1636	0.05
Isoborneol	6.52	1152	0.03	9.02	1618	0.04
Pinocarvone	6.54	1153	0.04	7.64	1510	0.06
Thujol	6.63	1159	0.01	9.56	1663	0.02
Borneol	6.68	1162	2.57	9.44	1653	2.61
δ-Terpineol	6.70*	1164	0.30	9.14†	1628	0.12
Isopinocampone	6.70*	1164	[0.30]	7.25	1480	0.03
Terpinen-4-ol	6.86	1174	0.38	8.23*	1556	0.36
Thuj-3-en-10-al	6.91	1177	0.02	8.30	1562	0.01
para-Cymen-8-ol	6.99	1183	0.10	11.20	1800	0.08
α-Terpineol	7.07	1188	0.14	9.49	1656	0.11
Myrtenol	7.16	1194	0.07	10.52	1743	0.04
Unknown [m/z 43, 97 (84), 85 (65), 55 (56), 41 (50)...]	7.19	1195	0.05	11.96	1868	0.05
Unknown [m/z 95, 93 (32), 121 (24), 79 (22), 91 (21), 105 (16)... 154 (2)]	7.30	1203	0.02	10.60	1749	0.02
<i>trans</i> -Carveol	7.52	1218	0.03	11.06	1788	0.03
Cuminal	7.69	1230	0.03	10.29	1722	0.05
Carvone	7.85	1240	0.03	9.67	1671	0.01
Carvotanacetone	7.88	1243	0.01	9.17†	1631	[0.12]
Geraniol	8.14	1261	0.02	11.39	1817	0.03
Unknown [m/z 107, 43 (83), 59 (54), 109 (50), 108 (43), 67(42)...]	8.17	1263	0.02			
Bornyl acetate	8.52*	1287	1.78	7.90	1530	1.71
Isobornyl acetate	8.52*	1287	[1.78]	7.93	1533	0.03
Cuminol	8.58	1292	0.01	13.89	2047	0.01
Unknown [m/z 166, 96 (61), 83 (60), 41 (57), 69 (56), 69 (56), 81 (53), 97 (51), 95 (48), 151 (41), 123 (39), 109 (39)...]	8.64*	1296	0.24			
<i>trans</i> -Sabinyl acetate	8.64*	1296	[0.24]	8.85	1604	0.13
Thymol	8.75	1303	0.04	14.80	2136	0.07
Myrtenyl acetate	9.09	1322	0.02	9.28*	1639	[0.17]
exo-2-Hydroxycineole acetate	9.29	1336	0.02	9.75	1678	0.01
Unknown [m/z 70, 153 (94), 55 (51), 41 (50), 42 (36), 97 (29)...]	9.41	1344	0.01			
α-Terpinyl acetate	9.47	1348	0.03	9.31	1642	0.04

α-Copaene	9.80	1372	0.03	6.89*	1454	[21.94]
(Z)-Jasmone	10.07	1391	0.02			
Isocaryophyllene	10.22	1401	0.04	7.79	1522	0.02
β-Caryophyllene	10.38	1414	2.80	8.06	1543	2.66
Caryophylla-4(12),8(13)-diene	10.50	1422	0.02	8.23*	1556	[0.36]
Unknown [m/z 153, 43 (57), 107 (56), 108 (44)... 204 (11)...]	10.61	1431	0.10	13.10*	1972	0.13
Aromadendrene	10.64	1433	0.08	8.17	1552	0.08
α-Humulene	10.85	1448	3.98	8.93	1611	3.83
9-epi-β-Caryophyllene	10.93*	1455	0.16	9.08	1623	0.07
allo-Aromadendrene	10.93*	1455	[0.16]	8.63*	1587	[0.16]
Germacrene D	11.18	1473	0.04	9.39	1648	0.04
β-Selinene	11.27	1480	0.03			
Viridiflorene	11.41*	1490	0.22	9.24	1636	0.08
α-Selinene	11.41*	1490	[0.22]	9.53	1660	0.36
5-Methyl-2,4-diisopropylphenol	11.46	1494	0.02	16.03	2262	0.01
γ-Cadinene	11.66	1509	0.04	10.05	1702	0.06
δ-Cadinene	11.80*	1520	0.06	10.17	1712	0.05
trans-Calamenene	11.80*	1520	[0.06]	10.86	1771	0.01
α-Elemol	12.11	1545	0.09	13.69	2028	0.09
Caryophyllene oxide	12.48*	1574	0.27	12.38	1905	0.23
Caryophyllene oxide isomer	12.48*	1574	[0.27]	12.30	1898	0.03
Viridiflorol	12.62	1585	1.44	13.62	2021	1.41
Humulene epoxide I	12.69	1591	0.06	12.90	1953	0.02
Ledol	12.74	1595	0.02	13.10*	1972	[0.13]
Humulene epoxide II	12.81	1600	0.36	12.97	1960	0.36
Unknown [m/z 81, 41 (55), 79 (45), 67 (4), 93 (38)...]	13.06	1620	0.05	13.10*	1972	[0.13]
Unknown [m/z 41, 91 (78), 67 (76), 119 (70), 55 (61)... 220 (7)]	13.11	1625	0.11	13.29	1990	0.18
β-Eudesmol	13.37	1646	0.24	15.03	2159	0.23
α-Eudesmol	13.42	1650	0.14	14.92	2149	0.20
Manool	17.78	2044	0.15	18.94	2585	0.15
trans-Sabinene hydrate				7.67	1512	0.05
Globulol				13.56	2015	0.01
Total identified		97.95%			97.67%	
Total reported		98.32%			97.92%	

*: 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