

Date : October 22, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20J16-PTH02

Customer identification : Palo Santo - Ecuador - PJ0106912R

Type : Essential oil

Source : *Bursera graveolens*

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-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 : Fanny Charlier, B. Sc., chimiste à l'entraînement

Analysis date : October 21, 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: 1.4777 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

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

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

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

Identification	%	Class
Toluene	tr	Simple phenolic
3-Methylcyclopentanone	0.04	Aliphatic ketone
α -Thujene	tr	Monoterpene
α -Pinene	0.07	Monoterpene
3-Methylcyclohexanone	0.02	Aliphatic ketone
β -Pinene	0.01	Monoterpene
Sabinene	0.01	Monoterpene
Hexahydroacetophenone epimer I	0.04	Aliphatic ketone
Hexahydroacetophenone epimer II	0.04	Aliphatic ketone
Dehydro-1,8-cineole	0.04	Monoterpenic ether
Myrcene	0.42	Monoterpene
2-Carene	0.02	Monoterpene
α -Phellandrene	0.19	Monoterpene
Pseudolimonene	0.02	Monoterpene
Δ^3 -Carene	0.01	Monoterpene
α -Terpinene	0.01	Monoterpene
para-Cymene	0.72	Monoterpene
Limonene	65.74	Monoterpene
β -Phellandrene	0.20	Monoterpene
1,8-Cineole	0.04	Monoterpenic ether
(Z)- β -Ocimene	0.01	Monoterpene
(E)- β -Ocimene	0.01	Monoterpene
γ -Terpinene	0.02	Monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.02	Monoterpene
para-Cymenene	0.05	Monoterpene
Linalool	0.06	Monoterpenic alcohol
trans-para-Mentha-2,8-dien-1-ol	0.10	Monoterpenic alcohol
Limona ketone	0.02	Normonoterpenic ketone
cis-Limonene oxide	0.04	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.09	Monoterpenic alcohol
trans-Limonene oxide	0.06	Monoterpenic ether
cis- β -Terpineol	0.06	Monoterpenic alcohol
Menthone	0.08	Monoterpenic ketone
Menthofuran	14.01	Monoterpenic ether
Isomenthone	0.12	Monoterpenic ketone
Borneol	0.06	Monoterpenic alcohol
neo-Menthol	0.05	Monoterpenic alcohol
trans-Isopulegone	0.05	Monoterpenic ketone
Terpinen-4-ol	0.07	Monoterpenic alcohol
trans-para-Mentha-1(7),8-dien-2-ol	0.03	Monoterpenic alcohol
para-Cymen-8-ol	0.04	Monoterpenic alcohol
α -Terpineol	8.27	Monoterpenic alcohol
cis-Dihydrocarvone	0.10	Monoterpenic ketone
Unknown	0.04	Unknown

<i>trans</i> -Isopiperitenol	0.03	Monoterpenic alcohol
4,7-Dimethylbenzofuran?	0.02	Furan
<i>cis</i> -Isopiperitenol	0.02	Monoterpenic alcohol
<i>trans</i> -Carveol	0.15	Monoterpenic alcohol
<i>cis</i> -para-Mentha-1(7),8-dien-2-ol	0.08	Monoterpenic alcohol
<i>cis</i> -Carveol	0.08	Monoterpenic alcohol
Pulegone	0.59	Monoterpenic ketone
Carvone	1.12	Monoterpenic ketone
Unknown	0.05	Unknown
Unknown	0.01	Unknown
Perillaldehyde	0.01	Monoterpenic aldehyde
Limonen-10-ol	0.02	Monoterpenic alcohol
Perillyl alcohol	0.02	Monoterpenic alcohol
Unknown	0.02	Unknown
Unknown	0.05	Unknown
Menthofuro lactone isomer I	0.09	Monoterpenic lactone
Menthofuro lactone isomer II	0.11	Monoterpenic lactone
α -Ylangene	0.03	Sesquiterpene
α -Copaene	0.07	Sesquiterpene
β -Cubebene	0.03	Sesquiterpene
β -Elemene	0.09	Sesquiterpene
α -Cedrene	0.03	Sesquiterpene
β -Ylangene	0.05	Sesquiterpene
8-Hydroxycarvotanacetone	0.01	Monoterpenic alcohol
β -Copaene	0.08	Sesquiterpene
Menthofuro lactone isomer III	0.16	Monoterpenic lactone
β -Barbatene	0.02	Sesquiterpene
<i>cis</i> - β -Bergamotene?	0.12	Sesquiterpene
Unknown	0.03	Sesquiterpene
γ -Muurolene	0.17	Sesquiterpene
Germacrene D	1.78	Sesquiterpene
β -Selinene	0.04	Sesquiterpene
Unknown	0.03	Unknown
Menthallactone	0.21	Monoterpenic lactone
α -Selinene	0.12	Sesquiterpene
α -Muurolene	0.08	Sesquiterpene
Germacrene A	0.03	Sesquiterpene
γ -Cadinene	0.09	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	0.25	Sesquiterpene
Unknown	0.06	Sesquiterpene
<i>trans</i> -Calamenene	0.02	Sesquiterpene
δ -Cadinene	0.19	Sesquiterpene
Menthofuro lactone analog	0.05	Monoterpenic lactone
α -Cadinene	0.02	Sesquiterpene
1,5-Epoxy salvia-4(14)-ene	0.02	Sesquiterpenic ether
7 α -Hydroxymint lactone	0.02	Monoterpenic alcohol
Spathulenol	0.01	Sesquiterpenic alcohol
Globulol	0.03	Sesquiterpenic alcohol
Salvia-4(14)-en-1-one	0.01	Aliphatic alcohol
Unknown	0.02	Oxygenated sesquiterpene
Junenol	0.13	Sesquiterpenic alcohol
1-epi-Cubenol	0.03	Sesquiterpenic alcohol

τ -Cadinol	0.03	Sesquiterpenic alcohol
τ -Muurolol	0.04	Sesquiterpenic alcohol
β -Eudesmol	0.10	Sesquiterpenic alcohol
α -Cadinol	0.05	Sesquiterpenic alcohol
Germacra-4(15),5,10(14)-trien-1 α -ol	0.01	Sesquiterpenic alcohol
Consolidated total	97.94%	

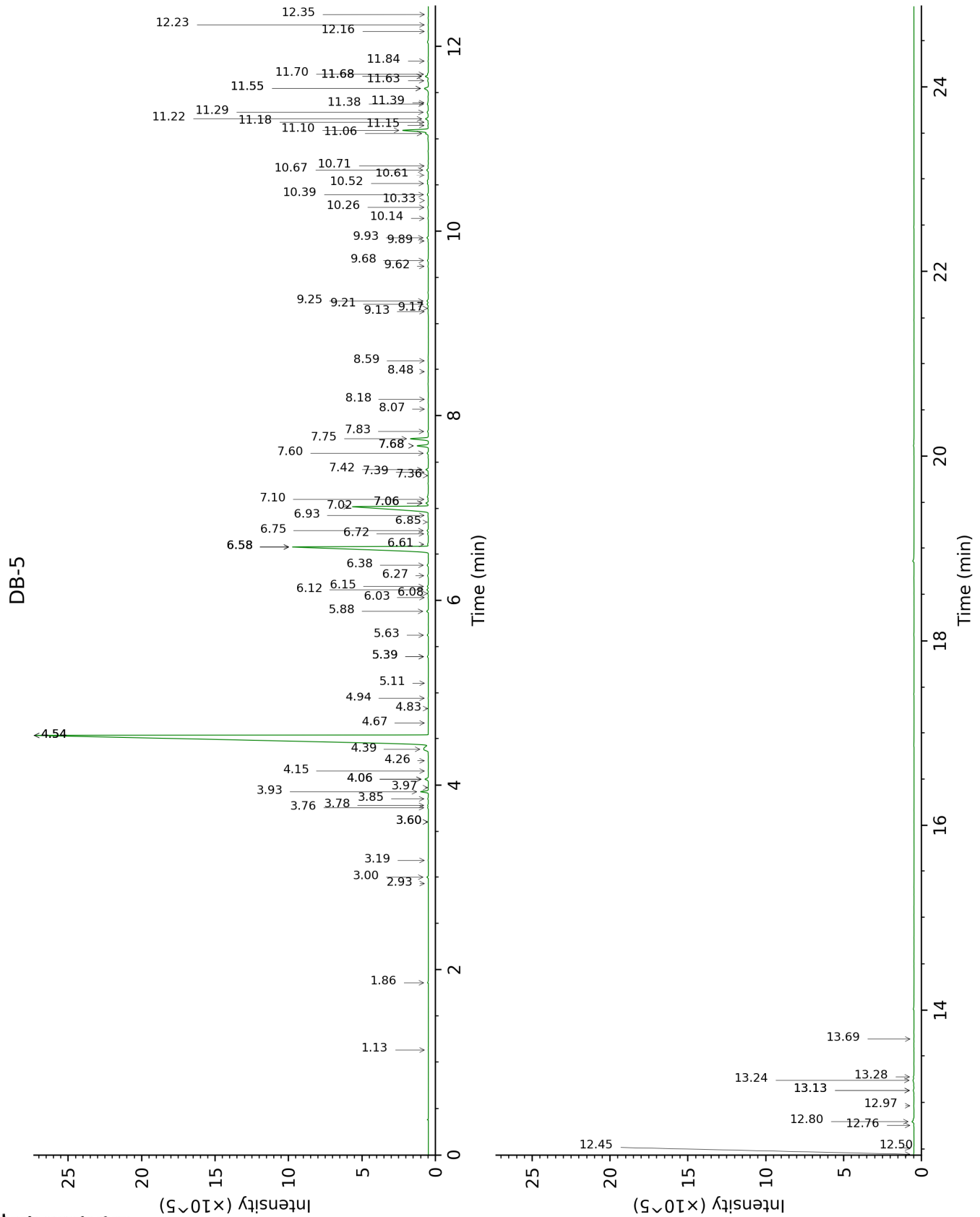
tr: The compound has been detected below 0.005% of total signal.

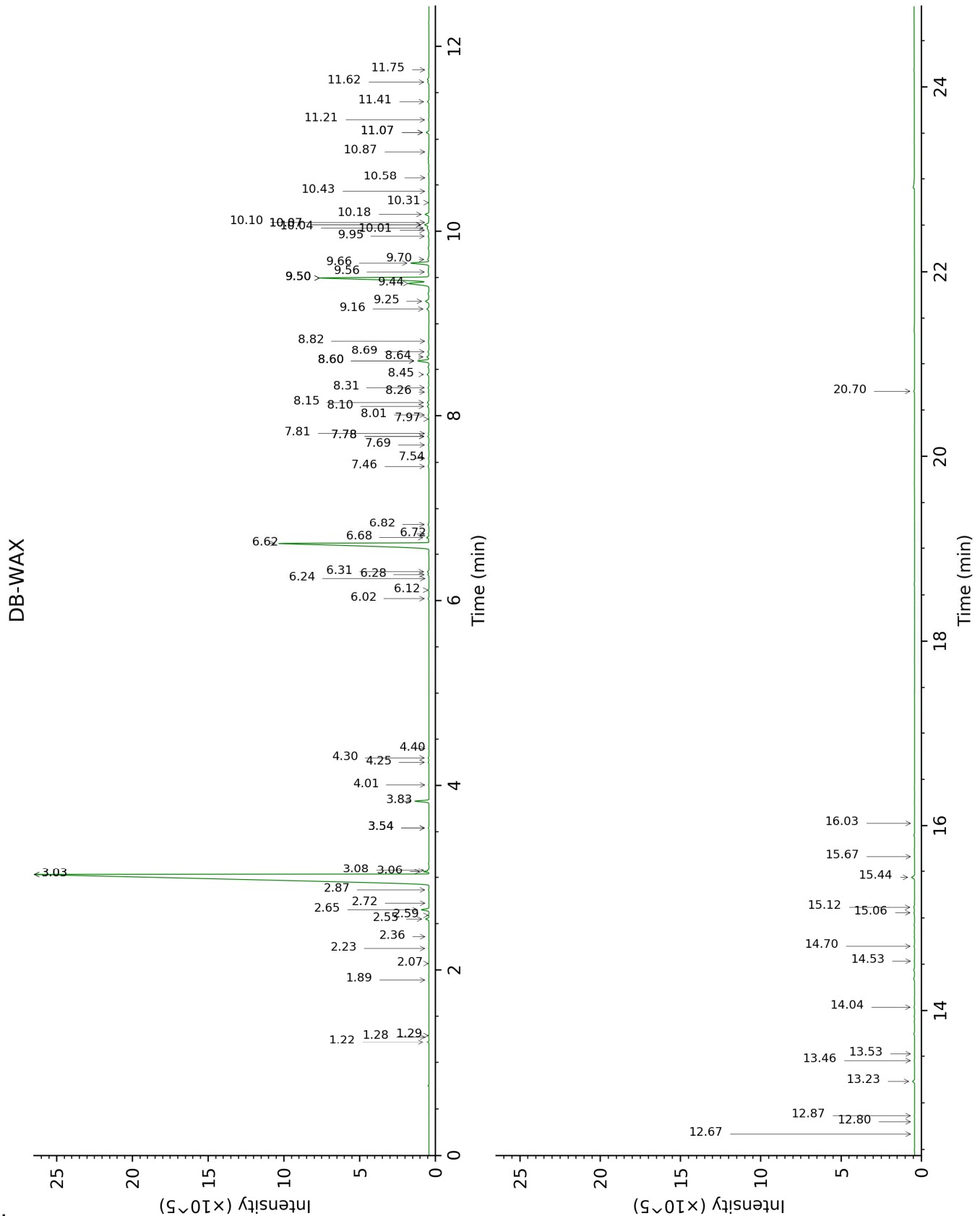
Note: no correction factor was applied

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	%
Toluene	1.13	759	tr	1.30	1003	tr
3-Methylcyclopentanone	1.86	840	0.04	3.03*	1166	65.78
α -Thujene	2.93	925	tr	1.28	1001	tr
α -Pinene	3.00	930	0.07	1.22	992	0.07
3-Methylcyclohexanone	3.19	942	0.02	4.40	1272	0.01
β -Pinene	3.60*	970	0.02	1.89	1066	0.01
Sabinene	3.60*	970	[0.02]	2.07	1084	0.01
Hexahydroacetophenone epimer I	3.76	981	0.04	4.25	1261	0.04
Hexahydroacetophenone epimer II	3.78	982	0.04	4.30	1264	0.04
Dehydro-1,8-cineole	3.85	987	0.04	2.87	1152	0.03
Myrcene	3.93	992	0.42	2.65	1135	0.42
2-Carene	3.97	995	0.02	2.23	1101	0.02
α -Phellandrene	4.06*	1001	0.22	2.55	1127	0.19
Pseudolimonene	4.06*	1001	[0.22]	2.59	1130	0.02
Δ 3-Carene	4.15	1007	0.01	2.36	1112	0.01
α -Terpinene	4.26	1014	0.01	2.72	1141	0.01
para-Cymene	4.39	1022	0.72	3.83	1229	0.71
Limonene	4.54*	1031	66.32	3.03*	1166	[65.78]
β -Phellandrene	4.54*	1031	[66.32]	3.06	1169	0.20
1,8-Cineole	4.54*	1031	[66.32]	3.08	1170	0.04
(Z)- β -Ocimene	4.67	1040	0.01	3.54*	1207	0.03
(E)- β -Ocimene	4.83	1050	0.01			
γ -Terpinene	4.94	1057	0.02	3.54*	1207	[0.03]
cis-Linalool oxide (fur.)	5.11	1067	0.01	6.24	1403	0.01
Terpinolene	5.39*	1086	0.06	4.01	1242	0.02
para-Cymenene	5.39*	1086	[0.06]	6.02	1387	0.05
Linalool	5.63	1100	0.06	7.78*	1519	0.07
trans-para-Mentha-2,8-dien-1-ol	5.88	1117	0.10	8.64	1586	0.12
Limona ketone	6.03	1126	0.02	7.54	1501	0.03
cis-Limonene oxide	6.08	1129	0.04	6.12	1393	0.04
cis-para-Mentha-2,8-dien-1-ol	6.12	1132	0.09	9.16	1628	0.14
trans-Limonene oxide	6.15	1134	0.06	6.28	1406	0.06
cis- β -Terpineol	6.27	1142	0.06	8.69	1590	0.06
Menthone	6.38	1149	0.08	6.31	1408	0.08
Menthofuran	6.58*	1162	14.20	6.62	1431	14.01
Isomenthone	6.58*	1162	[14.20]	6.68	1436	0.12
Borneol	6.58*	1162	[14.20]	9.50*	1656	8.24
neo-Menthol	6.61	1164	0.05	8.26	1557	0.03
trans-Isopulegone	6.72	1171	0.05	8.60*	1583	0.69
Terpinen-4-ol	6.75	1173	0.07	8.31	1560	0.07
trans-para-Mentha-1(7),8-dien-2-ol	6.85	1179	0.03	11.07*	1789	0.15
para-Cymen-8-ol	6.93	1184	0.04	11.21	1800	0.03
α -Terpineol	7.02	1190	8.27	9.50*	1656	[8.24]

<i>cis</i> -Dihydrocarvone	7.06*	1193	0.14	8.15	1548	0.10
Unknown [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39), 84 (37)...]	7.06*	1193	[0.14]	7.81	1522	0.04
<i>trans</i> -Isopiperitenol	7.10	1196	0.03	10.10	1705	0.03
4,7-Dimethylbenzofuran?	7.36	1212	0.02			
<i>cis</i> -Isopiperitenol	7.39	1215	0.02	10.01	1698	0.04
<i>trans</i> -Carveol	7.42	1217	0.15	11.07*	1789	[0.15]
<i>cis</i> -para-Mentha-1(7),8-dien-2-ol	7.60	1229	0.08	11.62	1837	0.08
<i>cis</i> -Carveol	7.68*	1234	0.68	11.41	1818	0.08
Pulegone	7.68*	1234	[0.68]	8.60*	1583	[0.69]
Carvone	7.75	1240	1.12	9.66	1669	1.13
Unknown [m/z 112, 43 (70), 70 (63), 59 (53), 97 (46), 84 (25)...]	7.83	1245	0.05	9.95	1693	0.06
Unknown [m/z 112, 70 (63), 43 (59), 59 (51), 97 (45), 84 (22)...]	8.07	1261	0.01	10.58	1746	0.01
Perillaldehyde	8.18	1268	0.01	10.31	1724	0.01
Limonen-10-ol	8.48	1289	0.02	12.80	1945	0.01
Perillyl alcohol	8.59	1297	0.02	12.87	1951	0.02
Unknown [m/z 124, 123 (43), 121 (35), 166 (30), 93 (30), 136 (17)...]	9.13	1331	0.02			
Unknown [m/z 150, 71 (67), 107 (54), 43 (44), 109 (42)...]	9.17	1334	0.05			
Menthofuroolactone isomer I	9.21	1337	0.09			
Menthofuroolactone isomer II	9.25	1339	0.11			
α -Ylangene	9.62	1366	0.03	6.72	1439	0.04
α -Copaene	9.68	1370	0.07	6.82	1446	0.06
β -Cubebene	9.90	1385	0.03	7.46	1494	0.07
β -Elemene	9.93	1388	0.09	8.10	1544	0.10
α -Cedrene	10.14	1403	0.03	7.69	1512	0.04
β -Ylangene	10.26	1412	0.05	7.78*	1519	[0.07]
8-Hydroxycarvotanacetone	10.33	1417	0.01	16.03	2264	0.01
β -Copaene	10.40	1422	0.08	8.01	1537	0.06
Menthofuroolactone isomer III	10.52	1431	0.16			
β -Barbatene	10.61	1438	0.02	8.82	1600	0.02
<i>cis</i> - β -Bergamotene?	10.67	1442	0.12			
Unknown [m/z 91, 161 (92), 105 (85), 119 (63), 133 (53), 79 (49), 204 (46)]	10.71	1445	0.03	8.45	1571	0.11
γ -Muurolene	11.06	1472	0.17	9.25	1635	0.28
Germacrene D	11.10	1474	1.78	9.44	1651	1.71
β -Selinene	11.15	1478	0.04	9.50*	1656	[8.24]

Unknown [m/z 149, 161 (51), 93 (43), 91 (42), 164 (42), 105 (37)...204? (11)]	11.18	1481	0.03	7.97	1534	0.02
Menthallactone	11.22	1483	0.21	15.44	2202	0.20
α -Selinene	11.29	1489	0.12	9.56	1661	0.07
α -Muurolene	11.38	1495	0.08	9.70	1672	0.10
Germacrene A	11.39	1496	0.03	10.04	1700	0.16
γ -Cadinene	11.55*	1508	0.34	10.07*	1703	0.30
(3E,6E)- α -Farnesene	11.55*	1508	[0.34]	10.18	1713	0.25
Unknown [m/z 161, 81 (93), 105 (66), 93 (60), 119 (60), 204 (54)...]	11.63	1515	0.06			
<i>trans</i> -Calamenene	11.68*	1518	0.20	10.87	1771	0.02
δ -Cadinene	11.68*	1518	[0.20]	10.07*	1703	[0.30]
Menthofuroolactone analog	11.70	1520	0.05			
α -Cadinene	11.84	1532	0.02	10.43	1734	0.02
1,5-Epoxysalvial-4(14)-ene	12.16	1557	0.02	11.75	1849	0.02
7 α -Hydroxymintlactone	12.23	1562	0.02	20.70	2805	0.05
Spathulenol	12.35	1571	0.01	14.04	2062	0.04
Globulol	12.45	1579	0.03	13.53	2013	0.02
Salvial-4(14)-en-1-one	12.50	1583	0.01	12.67	1932	0.01
Unknown [m/z 43, 93 (88), 91 (76), 79 (73), 69 (64), 41 (63), 95 (53).. 220 (3)]	12.76	1603	0.02			
Junenol	12.80	1607	0.13	13.23	1985	0.13
1-epi-Cubenol	12.97	1621	0.03	13.46	2006	0.02
τ -Cadinol	13.13*	1634	0.06	14.53	2111	0.03
τ -Muurolol	13.13*	1634	[0.06]	14.70	2127	0.04
β -Eudesmol	13.24	1643	0.10	15.06	2164	0.05
α -Cadinol	13.28	1646	0.05	15.12	2170	0.07
Germacra-4(15),5,10(14)-trien-1 α -ol	13.69	1681	0.01	15.67	2227	0.01
Total identified		98.02%			97.19%	
Total reported		98.29%			97.42%	

*: 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