

Date : April 13, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21D06-PTH34


Customer identification : Palo Santo - Ecuador - PJ01072012R

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

Analysis date : April 12, 2021

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: 1.4780 ± 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	0.02	Aliphatic ketone
α -Thujene	0.01	Monoterpene
α -Pinene	0.07	Monoterpene
3-Methylcyclohexanone	0.01	Aliphatic ketone
β -Pinene	0.01	Monoterpene
Sabinene	tr	Monoterpene
Hexahydroacetophenone epimer I	0.03	Aliphatic ketone
Hexahydroacetophenone epimer II	0.03	Aliphatic ketone
Dehydro-1,8-cineole	0.02	Monoterpenic ether
Myrcene	0.42	Monoterpene
α -Phellandrene	0.23	Monoterpene
Pseudolimonene	0.02	Monoterpene
Δ^3 -Carene	0.01	Monoterpene
α -Terpinene	0.02	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
para-Cymene	0.83	Monoterpene
Limonene	64.88	Monoterpene
(<i>E</i>)- β -Ocimene	0.01	Monoterpene
γ -Terpinene	0.03	Monoterpene
<i>cis</i> -Linalool oxide (fur.)	tr	Monoterpenic alcohol
Octanol	tr	Aliphatic alcohol
<i>trans</i> -Linalool oxide (fur.)	0.11	Monoterpenic alcohol
Terpinolene	0.03	Monoterpene
para-Cymenene	0.04	Monoterpene
Linalool	0.04	Monoterpenic alcohol
<i>trans</i> -para-Mentha-2,8-dien-1-ol	0.07	Monoterpenic alcohol
Limona ketone	0.02	Normonoterpenic ketone
<i>cis</i> -Limonene oxide	0.03	Monoterpenic ether
<i>cis</i> -para-Mentha-2,8-dien-1-ol	0.07	Monoterpenic alcohol
<i>trans</i> -Limonene oxide	0.04	Monoterpenic ether
<i>cis</i> - β -Terpineol	0.04	Monoterpenic alcohol
Menthone	0.11	Monoterpenic ketone
Menthofuran	15.92	Monoterpenic ether
Isomenthone	0.10	Monoterpenic ketone
<i>trans</i> - β -Terpineol	0.01	Monoterpenic alcohol
Borneol	0.03	Monoterpenic alcohol
neo-Menthol	0.03	Monoterpenic alcohol
<i>trans</i> -Isopulegone	0.06	Monoterpenic ketone
Unknown	0.03	Oxygenated monoterpene
Terpinen-4-ol	0.03	Monoterpenic alcohol
<i>trans</i> -Isocarveol	0.02	Monoterpenic alcohol
α -Terpineol	8.14	Monoterpenic alcohol
<i>cis</i> -Dihydrocarvone	0.07	Monoterpenic ketone
Unknown	0.01	Unknown

<i>trans</i> -Dihydrocarvone	0.05	Monoterpenic ketone
<i>trans</i> -Carveol	0.11	Monoterpenic alcohol
<i>cis</i> -Isocarveol	0.02	Monoterpenic alcohol
<i>cis</i> -Carveol	0.06	Monoterpenic alcohol
Pulegone	0.74	Monoterpenic ketone
Carvone	1.03	Monoterpenic ketone
Unknown	0.06	Unknown
Unknown	0.01	Unknown
Perillaldehyde	0.01	Monoterpenic aldehyde
Limonen-10-ol	0.01	Monoterpenic alcohol
Perilla alcohol	0.03	Monoterpenic alcohol
Unknown	0.02	Unknown
Unknown	0.01	Unknown
Menthofuro lactone isomer I	0.05	Monoterpenic lactone
Menthofuro lactone isomer II	0.10	Monoterpenic lactone
Menthofuro lactone	0.04	Aliphatic alcohol
α -Ylangene	0.03	Sesquiterpene
α -Copaene	0.06	Sesquiterpene
<i>cis</i> - β -Elemene	0.01	Sesquiterpene
β -Cubebene	0.03	Sesquiterpene
β -Elemene	0.09	Sesquiterpene
α -Cedrene	0.03	Sesquiterpene
β -Ylangene	0.05	Sesquiterpene
8-Hydroxycarvotanacetone	0.02	Monoterpenic alcohol
<i>cis</i> -Thujopsene	0.01	Sesquiterpene
β -Copaene	0.07	Sesquiterpene
Menthofuro lactone isomer III	0.12	Monoterpenic lactone
β -Barbatene	0.03	Sesquiterpene
Unknown	0.13	Sesquiterpene
α -Humulene	0.02	Sesquiterpene
γ -Murolene	0.14	Sesquiterpene
Germacrene D	2.27	Sesquiterpene
β -Selinene	0.04	Sesquiterpene
Menthallactone	0.15	Monoterpenic lactone
α -Selinene	0.13	Sesquiterpene
Germacrene A	0.08	Sesquiterpene
β -Bisabolene	0.08	Sesquiterpene
γ -Cadinene	0.03	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	0.26	Sesquiterpene
Unknown	0.03	Sesquiterpene
<i>trans</i> -Calamenene	0.02	Sesquiterpene
δ -Cadinene	0.22	Sesquiterpene
Menthofuro lactone analog	0.05	Monoterpenic lactone
α -Cadinene	0.02	Sesquiterpene
Germacrene B	0.07	Sesquiterpene
1,5-Epoxy salvia-4(14)-ene	0.02	Sesquiterpenic ether
Spathulenol	0.02	Sesquiterpenic alcohol
Globulol	0.03	Sesquiterpenic alcohol
Salvia-4(14)-en-1-one	0.01	Aliphatic alcohol
Unknown	0.02	Oxygenated sesquiterpene
Junenol	0.15	Sesquiterpenic alcohol
1- <i>epi</i> -Cubenol	0.04	Sesquiterpenic alcohol

τ -Muurolol	0.04	Sesquiterpenic alcohol
τ -Cadinol	0.02	Sesquiterpenic alcohol
β -Eudesmol	0.03	Sesquiterpenic alcohol
Unknown	0.03	Sesquiterpenic alcohol
α -Cadinol	0.05	Sesquiterpenic alcohol
Germacra-4(15),5,10(14)-trien-1 α -ol	0.02	Sesquiterpenic alcohol
Consolidated total	98.82%	

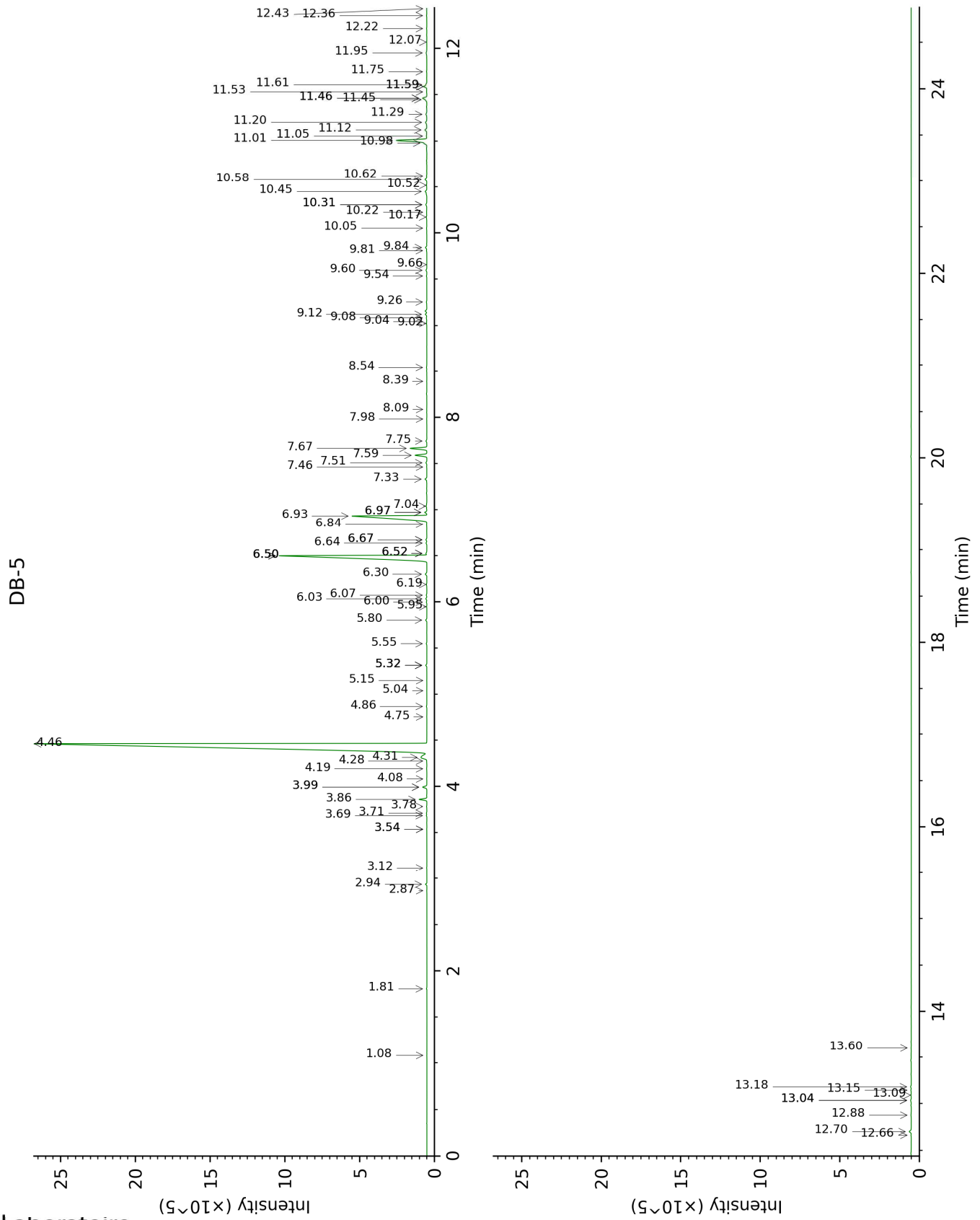
tr: The compound has been detected below 0.005% of total signal.

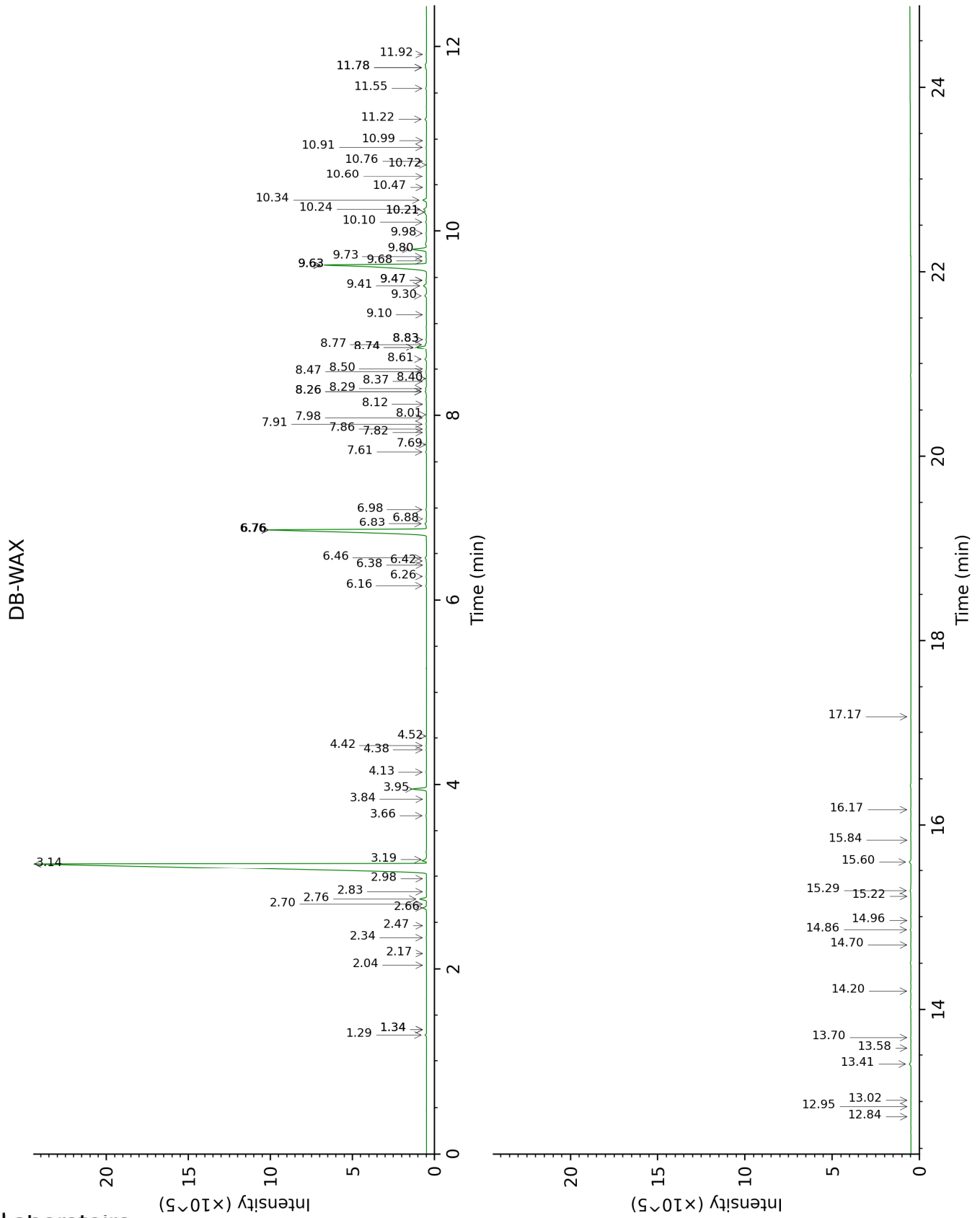
Note: no correction factor was applied

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.

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Toluene	1.08	758	tr	1.34*	1001	0.01
3-Methylcyclopentanone	1.81	841	0.02	3.19	1169	0.05
α -Thujene	2.87	927	0.01	1.34*	1001	[0.01]
α -Pinene	2.94	932	0.07	1.29	992	0.07
3-Methylcyclohexanone	3.12	944	0.01	4.52	1271	0.01
β -Pinene	3.54*	972	0.01	2.04	1072	0.01
Sabinene	3.54*	972	[0.01]	2.17	1084	tr
Hexahydroacetophenone epimer I	3.68	982	0.03	4.38	1260	0.02
Hexahydroacetophenone epimer II	3.71	984	0.03	4.42	1263	0.02
Dehydro-1,8-cineole	3.78	989	0.02	2.98	1152	0.01
Myrcene	3.86	994	0.42	2.76	1135	0.42
α -Phellandrene	3.99*	1003	0.27	2.66	1127	0.23
Pseudolimonene	3.99*	1003	[0.27]	2.70	1130	0.02
Δ 3-Carene	4.08	1009	0.01	2.47	1112	0.01
α -Terpinene	4.19	1016	0.02	2.84	1141	0.02
Carvomenthene	4.28	1021	0.01	2.34	1102	0.02
para-Cymene	4.31	1023	0.83	3.95	1228	0.85
Limonene	4.46	1033	64.88	3.14	1165	65.05
(E)- β -Ocimene	4.75	1051	0.01	3.84	1220	tr
γ -Terpinene	4.86	1058	0.03	3.66	1207	0.04
cis-Linalool oxide (fur.)	5.04	1070	tr	6.38	1403	0.01
Octanol	5.15	1076	tr	8.01	1527	0.02
trans-Linalool oxide (fur.)	5.32*	1087	0.07	6.76*	1432	16.04
Terpinolene	5.32*	1087	[0.07]	4.13	1242	0.03
para-Cymenene	5.32*	1087	[0.07]	6.16	1387	0.04
Linalool	5.55	1102	0.04	7.91	1519	0.03
trans-para-Mentha-2,8- dien-1-ol	5.80	1118	0.07	8.77	1586	0.07
Limona ketone	5.95	1127	0.02	7.69	1501	0.02
cis-Limonene oxide	6.00	1130	0.03	6.26	1394	0.03
cis-para-Mentha-2,8- dien-1-ol	6.03	1133	0.07	9.30	1629	0.12
trans-Limonene oxide	6.07	1135	0.04	6.42	1407	0.03
cis- β -Terpineol	6.19	1143	0.04	8.83*	1591	0.04
Menthone	6.30	1150	0.11	6.46	1409	0.10
Menthofuran	6.50*	1163	16.03	6.76*	1432	[16.04]
Isomenthone	6.50*	1163	[16.03]	6.83	1437	0.10
trans- β -Terpineol	6.50*	1163	[16.03]	9.47*	1642	0.05
Borneol	6.52*	1164	0.06	9.63*	1656	10.43
neo-Menthol	6.52*	1164	[0.06]	8.37	1555	0.03
trans-Isopulegone	6.64	1172	0.06	8.74*	1584	0.69
Unknown [m/z 69, 84 (62), 41 (30), 123 (26), 97 (24), 109 (23)...]	6.67*	1174	0.06	9.47*	1642	[0.05]
Terpinen-4-ol	6.67*	1174	[0.06]	8.40	1557	0.03
trans-Isocarveol	6.84	1185	0.02	10.76	1750	0.02

α -Terpineol	6.94	1191	8.14	9.63*	1656	[10.43]
<i>cis</i> -Dihydrocarvone	6.98*	1193	0.12	8.29	1549	0.07
Unknown [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39), 84 (37)...]	6.98*	1193	[0.12]	7.82	1512	0.01
<i>trans</i> -Dihydrocarvone	7.04	1198	0.05	8.47	1563	0.06
<i>trans</i> -Carveol	7.33	1217	0.11	11.22	1789	0.11
<i>cis</i> -Isocarveol	7.46	1226	0.02	11.78*	1838	0.08
<i>cis</i> -Carveol	7.51	1229	0.06	11.55	1818	0.06
Pulegone	7.59	1234	0.74	8.74*	1584	[0.69]
Carvone	7.67	1239	1.03	9.80	1670	0.99
Unknown [m/z 112, 43 (70), 70 (63), 59 (53), 97 (46), 84 (25)...]	7.75	1245	0.06	10.10	1694	0.06
Unknown [m/z 112, 70 (63), 43 (59), 59 (51), 97 (45), 84 (22)...]	7.98	1261	0.01	10.72	1747	0.01
Perillaldehyde	8.09	1268	0.01	10.47	1726	0.01
Limonen-10-ol	8.39	1288	0.01	12.95	1945	0.01
Perilla alcohol	8.54	1298	0.03	13.02	1951	0.01
Unknown [m/z 124, 123 (43), 121 (35), 166 (30), 93 (30), 136 (17)...]	9.02	1332	0.02			
Unknown [m/z 150, 71 (67), 107 (54), 43 (44), 109 (42)...]	9.04	1333	0.01			
Menthofuroolactone isomer I	9.08	1336	0.05			
Menthofuroolactone isomer II	9.12	1339	0.10			
Menthofuroolactone	9.26	1348	0.04	11.78*	1838	[0.08]
α -Ylangene	9.54	1368	0.03	6.88	1441	0.04
α -Copaene	9.60	1372	0.06	6.98	1449	0.06
<i>cis</i> - β -Elemene	9.66	1377	0.01	8.12	1535	0.01
β -Cubebene	9.81	1388	0.03	7.61	1496	0.05
β -Elemene	9.84	1390	0.09	8.26*	1546	0.09
α -Cedrene	10.05	1405	0.03	7.86	1514	0.03
β -Ylangene	10.17	1414	0.05	7.98	1524	0.03
8-						
Hydroxycarvotanacetone	10.22	1417	0.02	16.17	2263	0.03
<i>cis</i> -Thujopsene	10.31*	1424	0.09	8.50	1565	0.01
β -Copaene	10.31*	1424	[0.09]	8.26*	1546	[0.09]
Menthofuroolactone isomer III	10.45	1434	0.12			
β -Barbatene	10.52	1439	0.03	8.83*	1591	[0.04]
Unknown [m/z 91, 161 (92), 105 (85), 119 (63), 133 (53), 79 (49), 204 (46)]	10.58	1444	0.13	8.61	1574	0.11
α -Humulene	10.62	1447	0.02	9.10	1612	0.02
γ -Murolene	10.98	1474	0.14	9.41	1638	0.27
Germacrene D	11.01	1476	2.27	9.63*	1656	[10.43]
β -Selinene	11.05	1479	0.04	9.68	1660	0.04

Menthylactone	11.12	1484	0.15	15.60	2204	0.12
α -Selinene	11.20	1490	0.13	9.73	1663	0.06
Germacrene A	11.29	1497	0.08	10.21*	1703	0.19
β -Bisabolene	11.45	1509	0.08	9.98	1684	0.05
γ -Cadinene	11.46*	1510	0.29	10.21*	1703	[0.19]
(3E,6E)- α -Farnesene	11.46*	1510	[0.29]	10.34	1714	0.26
Unknown [m/z 161, 81 (93), 105 (66), 93 (60), 119 (60), 204 (54)...]	11.53	1516	0.03			
<i>trans</i> -Calamenene	11.59*	1520	0.23	10.99	1769	0.02
δ -Cadinene	11.59*	1520	[0.23]	10.24	1705	0.22
Menthofuroolactone analog	11.61	1522	0.05			
α -Cadinene	11.75	1533	0.02	10.60	1736	0.02
Germacrene B	11.95	1549	0.07	10.91	1763	0.04
1,5-Epoxysalvial-4(14)-ene	12.07	1558	0.02	11.92	1851	0.02
Spathulenol	12.22	1570	0.02	14.20	2064	0.03
Globulol	12.36	1581	0.03	13.70	2015	0.02
Salvial-4(14)-en-1-one	12.43	1587	0.01	12.84	1935	0.01
Unknown [m/z 43, 93 (88), 91 (76), 79 (73), 69 (64), 41 (63), 95 (53).. 220 (3)]	12.66	1605	0.02	17.17	2370	0.02
Junenol	12.70	1608	0.15	13.41	1987	0.12
1-epi-Cubenol	12.88	1623	0.04	13.58	2003	0.01
τ -Muurolol	13.04*	1636	0.06	14.86	2129	0.04
τ -Cadinol	13.04*	1636	[0.06]	14.70	2112	0.02
β -Eudesmol	13.09	1640	0.03	15.22	2165	0.02
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109 (40)... 204 (35), 222 (2)]	13.15	1645	0.03	14.96	2139	0.02
α -Cadinol	13.18	1648	0.05	15.28	2172	0.07
Germacra-4(15),5,10(14)-trien-1 α -ol	13.60	1682	0.02	15.84	2228	0.01
Total identified		98.45%			98.24%	
Total reported		98.77%			98.47%	

*: Two or more compounds are coeluting on this column

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

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