Date : November 16, 2021

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 21K03-PTH04
Customer identification : Palo Santo - Equador - PJ0108211R
Type : Essential oil
Source : *Bursera graveolens*
Customer : Plant Therapy

Analysis

Method: PC-MAT-014 ISO - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Seydou Ka, Ph. D.
Analysis date : November 04, 2021

Checked and approved by :

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

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Méthode certifiée ISO 17025:2017 Certified method

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4776 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

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

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Analysis summary – Consolidated contents

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

Identification	%	Class
Toluene	tr	Simple phenolic
α-Thujene	tr	Monoterpene
α-Pinene	0.07	Monoterpene
3-Methylcyclohexanone	tr	Aliphatic ketone
β-Pinene	0.01	Monoterpene
Sabinene	0.01	Monoterpene
Hexahydroacetophenone epimer I	0.03	Aliphatic ketone
Hexahydroacetophenone epimer II	0.04	Aliphatic ketone
Dehydro-1,8-cineole	0.03	Monoterpenic ether
Myrcene	0.40	Monoterpene
Pseudolimonene	0.02	Monoterpene
α-Phellandrene	0.18	Monoterpene
α-Terpinene	0.02	Monoterpene
Carvomenthene	0.02	Aliphatic alcohol
para-Cymene	0.73	Monoterpene
Limonene	67.55	Monoterpene
β-Phellandrene	0.26	Monoterpene
γ-Terpinene	0.02	Monoterpene
cis-Linalool oxide (fur.)	tr	Monoterpenic alcohol
Octanol	tr	Aliphatic alcohol
Terpinolene	0.03	Monoterpene
para-Cymenene	0.04	Monoterpene
Linalool	0.03	Monoterpenic alcohol
trans-para-Mentha-2,8-dien-1-ol	0.08	Monoterpenic alcohol
Limona ketone	0.02	Normonoterpenic ketone
cis-Limonene oxide	0.03	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.13	Monoterpenic alcohol
cis-β-Terpineol	0.01	Monoterpenic alcohol
Menthone	0.10	Monoterpenic ketone
Isomenthone	0.11	Monoterpenic ketone
trans-β-Terpineol	0.05	Monoterpenic alcohol
Menthofuran	14.51	Monoterpenic ether
neo-Menthol	0.08	Monoterpenic alcohol
trans-Isopulegone	0.05	Monoterpenic ketone
Unknown	0.01	Oxygenated monoterpene
Terpinen-4-ol	0.05	Monoterpenic alcohol
4-Methylacetophenone	0.01	Simple phenolic
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	8.06	Monoterpenic alcohol
cis-Dihydrocarvone	0.14	Monoterpenic ketone
trans-Dihydrocarvone	0.02	Monoterpenic ketone
trans-Isopiperitenol	0.06	Monoterpenic alcohol
trans-Piperitol	0.02	Monoterpenic alcohol
4,7-Dimethylbenzofuran?	0.01	Furan
cis-Isopiperitenol	0.02	Monoterpenic alcohol

trans-Carveol	0.13	Monoterpenic alcohol
cis-para-Mentha-1(7),8-dien-2-ol	0.02	Monoterpenic alcohol
cis-Carveol	0.07	Monoterpenic alcohol
Pulegone	0.69	Monoterpenic ketone
Carvone	1.12	Monoterpenic ketone
Unknown	0.04	Unknown
Perillaldehyde	0.01	Monoterpenic aldehyde
Limonen-10-ol	0.01	Monoterpenic alcohol
Perilla alcohol	0.01	Monoterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.05	Unknown
Menthofurolactone isomer I	0.09	Monoterpenic lactone
Menthofurolactone isomer II	0.10	Monoterpenic lactone
Evodone	0.03	Monoterpenic ketone
α-Ylangene	0.03	Sesquiterpene
α-Copaene	0.06	Sesquiterpene
β-Cubebene	0.03	Sesquiterpene
β-Elemene	0.09	Sesquiterpene
α-Cedrene	0.02	Sesquiterpene
β-Ylangene	0.05	Sesquiterpene
β-Copaene	0.08	Sesquiterpene
Menthofurolactone isomer III	0.07	Monoterpenic lactone
β-Barbatene	0.06	Sesquiterpene
Unknown	0.12	Sesquiterpene
γ-Muurolene	0.18	Sesquiterpene
Germacrene D	1.75	Sesquiterpene
β-Selinene	0.04	Sesquiterpene
Unknown	0.02	Unknown
Menthalactone	0.17	Monoterpenic lactone
Bicyclogermacrene	0.05	Sesquiterpene
α-Selinene	0.05	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.01	Sesquiterpene
γ-Cadinene	0.36	Sesquiterpene
Unknown	0.01	Sesquiterpene
trans-Calamenene	0.03	Sesquiterpene
δ-Cadinene	0.23	Sesquiterpene
Menthofurolactone analog	0.01	Monoterpenic lactone
α-Cadinene	0.03	Sesquiterpene
1,5-Epoxysalvial-4(14)-ene	0.02	Sesquiterpenic ether
7α-Hydroxymintlactone	0.02	Monoterpenic alcohol
Spathulenol	0.03	Sesquiterpenic alcohol
Salvial-4(14)-en-1-one	0.01	Aliphatic alcohol
Unknown	0.01	Oxygenated sesquiterpene
Junenol	0.13	Sesquiterpenic alcohol
1-epi-Cubenol	tr	Sesquiterpenic alcohol
τ-Cadinol	0.01	Sesquiterpenic alcohol
τ-Muurolol	0.03	Sesquiterpenic alcohol
Unknown	0.02	Sesquiterpenic alcohol
α-Cadinol	0.04	Sesquiterpenic alcohol
Germacra-4(15),5,10(14)-trien-1α-ol	0.01	Sesquiterpenic alcohol
Consolidated total	**99.29%**	

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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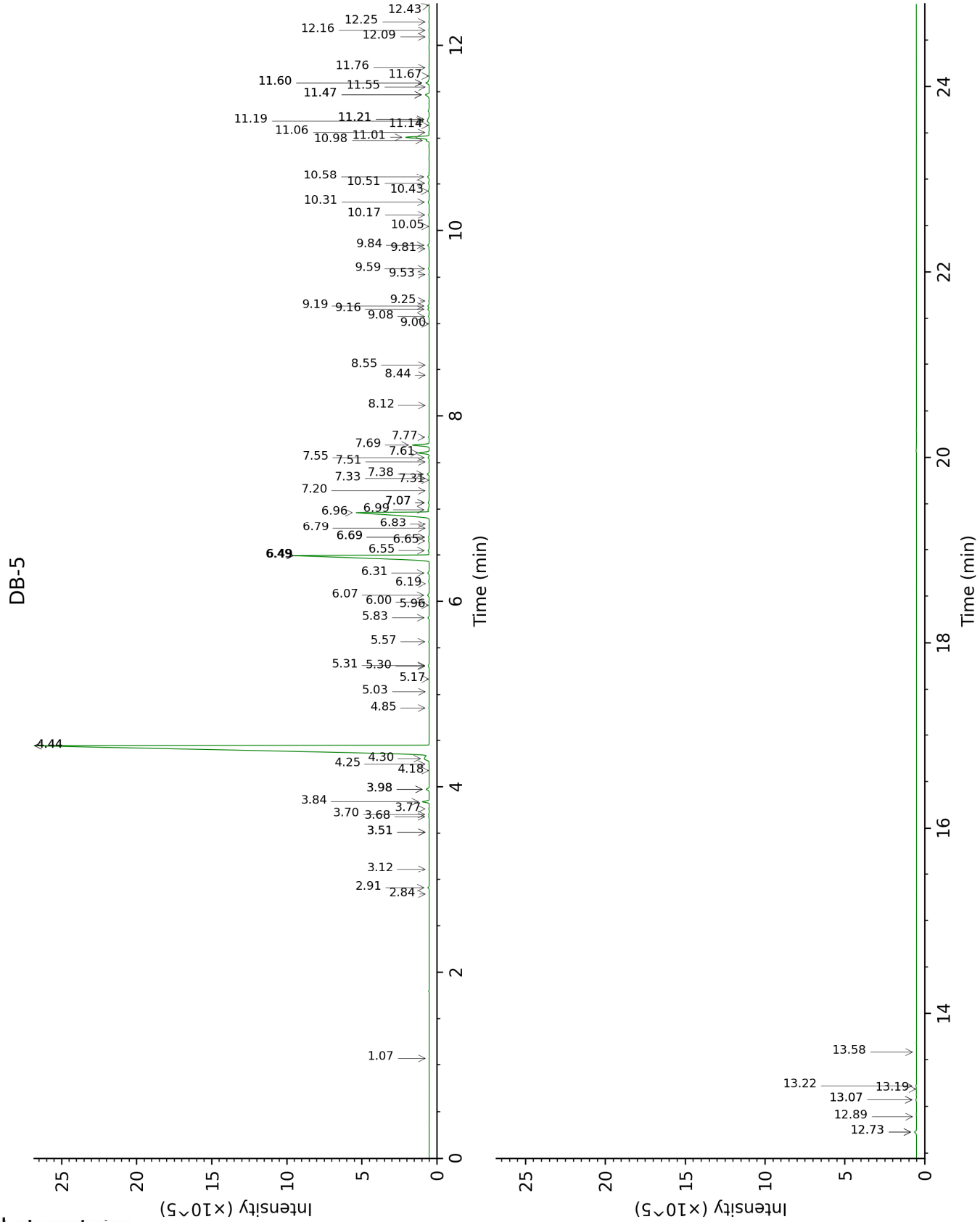
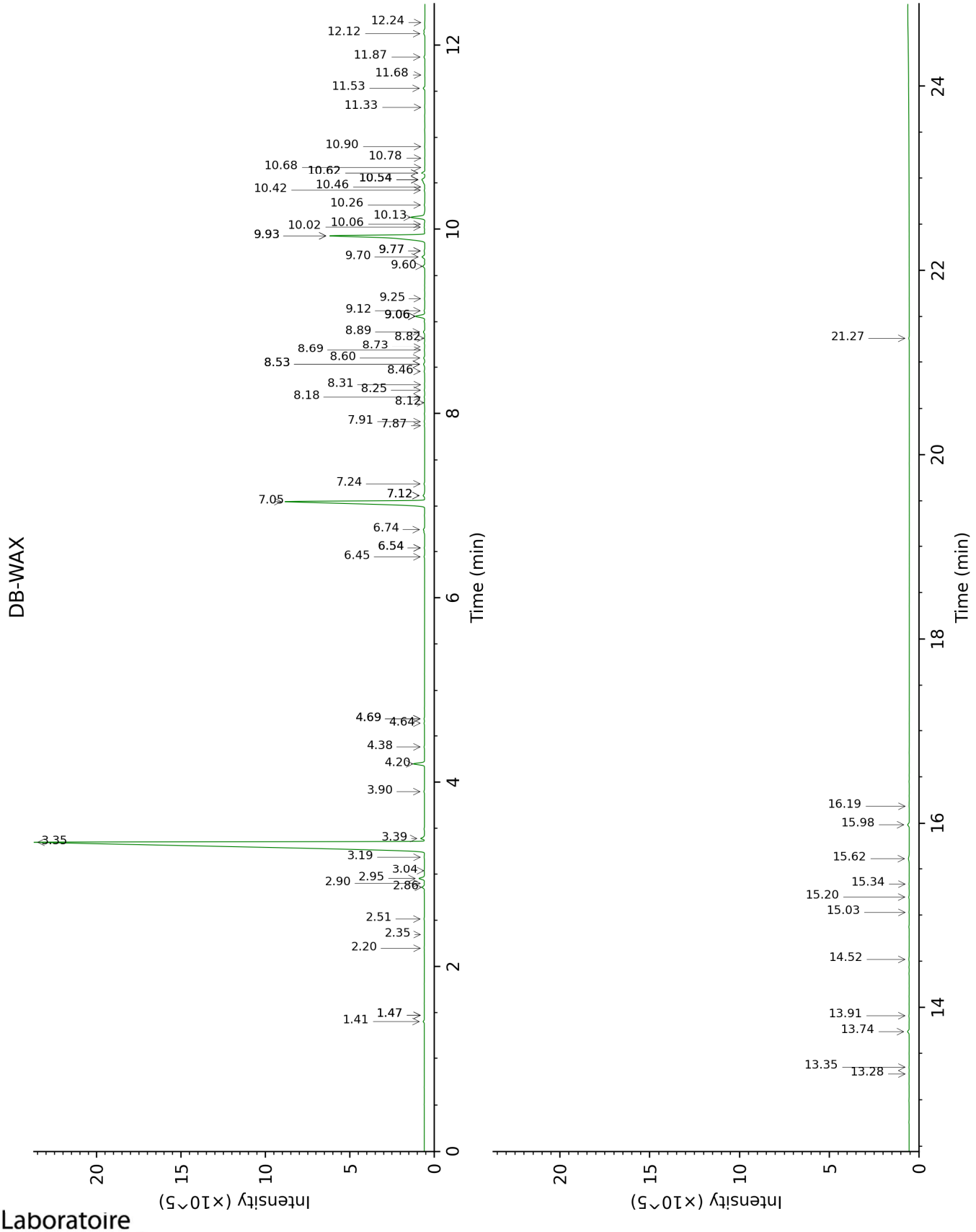

DB-5
Time (min)
Intensity (×10^5)
12.43
12.25
12.16
12.09
11.76
11.67
11.60
11.55
11.47
11.21
11.19
11.14
11.06
11.01
10.98
10.58
10.51
10.43
10.31
10.17
10.05
9.84
9.81
9.59
9.53
9.25
9.19
9.16
9.08
9.00
8.55
8.44
8.12
7.77
7.69
7.61
7.55
7.51
7.38
7.33
7.31
7.20
7.07
6.99
6.96
6.83
6.79
6.69
6.65
6.55
6.49
6.31
6.19
6.07
6.00
5.96
5.83
5.57
5.31
5.30
5.17
5.03
4.85
4.44
4.30
4.25
4.18
3.98
3.84
3.77
3.70
3.68
3.51
3.12
2.91
2.84
1.07
13.58
13.22
13.19
13.07
12.89
12.73


DB-WAX
Time (min)
Intensity (×10^5)
12.24
12.12
11.87
11.68
11.53
11.33
10.90
10.78
10.68
10.62
10.54
10.46
10.42
10.26
10.13
10.06
10.02
9.93
9.77
9.70
9.60
9.25
9.12
9.06
8.89
8.82
8.73
8.69
8.60
8.53
8.46
8.31
8.25
8.18
8.12
7.91
7.87
7.24
7.12
7.05
6.74
6.54
6.45
4.69
4.64
4.38
4.20
3.90
3.39
3.35
3.19
3.04
2.95
2.90
2.86
2.51
2.35
2.20
1.47
1.41
21.27
16.19
15.98
15.62
15.34
15.20
15.03
14.52
13.91
13.74
13.35
13.28

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Toluene	1.07	757	tr	1.47*	998	tr
α-Thujene	2.84	925	tr	1.47*	998	[tr]
α-Pinene	2.91	930	0.07	1.41	990	0.07
3-Methylcyclohexanone	3.12	944	tr	4.69*	1267	0.04
β-Pinene	3.51*	971	0.01	2.20	1069	0.01
Sabinene	3.51*	971	[0.01]	2.35	1084	0.01
Hexahydroacetophenone epimer I	3.68	982	0.03	4.64	1264	0.04
Hexahydroacetophenone epimer II	3.70	984	0.04	4.69*	1267	[0.04]
Dehydro-1,8-cineole	3.76	988	0.03	3.19	1152	0.03
Myrcene	3.84	993	0.40	2.95	1134	0.41
Pseudolimonene	3.98*	1002	0.22	2.90	1129	0.02
α-Phellandrene	3.98*	1002	[0.22]	2.86	1126	0.18
α-Terpinene	4.18	1015	0.02	3.04	1140	0.02
Carvomenthene	4.25	1019	0.02	2.51	1099	0.02
para-Cymene	4.30	1023	0.73	4.20	1231	0.83
Limonene	4.44*	1032	67.89	3.35	1165	67.55
β-Phellandrene	4.44*	1032	[67.89]	3.39	1169	0.26
γ-Terpinene	4.85	1057	0.02	3.90	1208	0.04
cis-Linalool oxide (fur.)	5.03	1069	tr	6.54*	1396	0.03
Octanol	5.17	1077	tr	8.31	1527	0.02
Terpinolene	5.30	1086	0.03	4.38	1244	0.04
para-Cymenene	5.31	1087	0.04	6.44	1389	0.04
Linalool	5.57	1103	0.03	8.18	1517	0.04
trans-para-Mentha-2,8-dien-1-ol	5.83	1119	0.08	9.06*	1584	0.78
Limona ketone	5.96	1128	0.02	7.91	1497	0.04
cis-Limonene oxide	6.00	1130	0.03	6.54*	1396	[0.03]
cis-para-Mentha-2,8-dien-1-ol	6.07	1135	0.13	9.60	1627	0.16
cis-β-Terpineol	6.19	1143	0.01	9.12	1589	0.05
Menthone	6.31	1150	0.10	6.74	1410	0.11
Isomenthone	6.49*	1162	14.61	7.12*	1438	0.14
trans-β-Terpineol	6.49*	1162	[14.61]	9.77*	1641	0.06
Menthofuran	6.49*	1162	[14.61]	7.05	1433	14.51
neo-Menthol	6.55	1166	0.08	8.73	1559	0.01
trans-Isopulegone	6.65	1172	0.05	9.06*	1584	[0.78]
Unknown [m/z 69, 84 (62), 41 (30), 123 (26), 97 (24), 109 (23)...]	6.69*	1175	0.06	9.77*	1641	[0.06]
Terpinen-4-ol	6.69*	1175	[0.06]	8.69	1556	0.05
4-Methylacetophenone	6.79	1181	0.01	10.62*	1709	0.24
para-Cymen-8-ol	6.83	1184	0.01	11.68	1799	0.01
α-Terpineol	6.96	1192	8.06	9.93*	1654	9.80
cis-Dihydrocarvone	6.99	1194	0.14	8.60	1549	0.09
trans-Dihydrocarvone	7.07*	1199	0.08	8.82	1566	0.02
trans-Isopiperitenol	7.07*	1199	[0.08]	10.54*	1703	0.42

trans-Piperitol	7.20	1207	0.02	10.54*	1703	[0.42]
4,7-Dimethylbenzofuran?	7.31	1215	0.01			
cis-Isopiperitenol	7.33	1216	0.02	10.46	1696	0.02
trans-Carveol	7.38	1219	0.13	11.53	1786	0.13
cis-para-Mentha-1(7),8-dien-2-ol	7.51	1228	0.02	12.12	1838	0.10
cis-Carveol	7.55	1231	0.07	11.87	1816	0.07
Pulegone	7.61	1235	0.69	9.06*	1584	[0.78]
Carvone	7.69	1240	1.12	10.13	1670	1.24
Unknown [m/z 112, 43 (70), 70 (63), 59 (53), 97 (46), 84 (25)...]	7.77	1246	0.04	10.42	1693	0.04
Perillaldehyde	8.12	1269	0.01	10.78	1723	0.01
Limonen-10-ol	8.44	1290	0.01	13.28	1941	0.01
Perilla alcohol	8.55	1298	0.01	13.35	1948	0.01
Unknown [m/z 124, 123 (43), 121 (35), 166 (30), 93 (30), 136 (17)...]	9.00	1329	0.01			
Unknown [m/z 150, 71 (67), 107 (54), 43 (44), 109 (42)...]	9.08	1335	0.05			
Menthofurolactone isomer I	9.16	1340	0.09			
Menthofurolactone isomer II	9.19	1343	0.10			
Evodone	9.25	1346	0.03			
α-Ylangene	9.53	1367	0.03	7.12*	1438	[0.14]
α-Copaene	9.59	1371	0.06	7.24	1447	0.05
β-Cubebene	9.81	1386	0.03	7.87	1493	0.03
β-Elemene	9.84	1389	0.09	8.53*	1544	0.11
α-Cedrene	10.05	1403	0.02	8.12	1512	0.04
β-Ylangene	10.17	1412	0.05	8.25	1523	0.04
β-Copaene	10.31	1422	0.08	8.53*	1544	[0.11]
Menthofurolactone isomer III	10.43	1431	0.07			
β-Barbatene	10.51	1438	0.06	9.25	1599	0.03
Unknown [m/z 91, 161 (92), 105 (85), 119 (63), 133 (53), 79 (49), 204 (46)]	10.58	1443	0.12	8.89	1571	0.12
γ-Muurolene	10.98	1472	0.18	9.70	1635	0.24
Germacrene D	11.01	1475	1.75	9.93*	1654	[9.80]
β-Selinene	11.06	1479	0.04	10.02	1661	0.06
Unknown [m/z 149, 161 (51), 93 (43), 91 (42), 164 (42), 105 (37)...204? (11)]	11.14	1485	0.02	8.46	1538	0.05
Menthalactone	11.19	1488	0.17	15.98	2203	0.13
Bicyclogermacrene	11.21*	1489	0.08	10.26	1680	0.05
α-Selinene	11.21*	1489	[0.08]	10.06	1664	0.05
(3*E*,6*E*)-α-Farnesene	11.47*	1509	0.36	10.68	1714	0.01
γ-Cadinene	11.47*	1509	[0.36]	10.54*	1703	[0.42]

Unknown [m/z 161, 81 (93), 105 (66), 93 (60), 119 (60), 204 (54)...]	11.55	1516	0.01			
trans-Calamenene	11.60*	1519	0.30	11.33	1769	0.03
δ-Cadinene	11.60*	1519	[0.30]	10.62*	1709	[0.24]
Menthofurolactone analog	11.67	1525	0.01			
α-Cadinene	11.76	1532	0.03	10.90	1733	0.02
1,5-Epoxysalvial-4(14)-ene	12.09	1558	0.02	12.24	1848	0.03
7α-Hydroxymintlactone	12.16	1564	0.02	21.27	2805	0.03
Spathulenol	12.25	1571	0.03	14.52	2058	0.03
Salvial-4(14)-en-1-one	12.43	1585	0.01			
Unknown [m/z 43, 93 (88), 91 (76), 79 (73), 69 (64), 41 (63), 95 (53).. 220 (3)]	12.73*	1608	0.14			
Junenol	12.73*	1608	[0.14]	13.74	1983	0.13
1-epi-Cubenol	12.89	1622	tr	13.91	2000	0.02
τ-Cadinol	13.07*	1637	0.05	15.03	2107	0.01
τ-Muurolol	13.07*	1637	[0.05]	15.20	2124	0.03
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109 (40)... 204 (35), 222 (2)]	13.19	1646	0.02	15.34	2138	0.02
α-Cadinol	13.22	1649	0.04	15.62	2166	0.10
Germacra-4(15),5,10(14)-trien-1α-ol	13.58	1679	0.01	16.19	2224	0.02
Total identified		**99.10%**			**99.02%**	
Total reported		**99.38%**			**99.25%**	

*: 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