Date : 2024-01-12

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24A05-PTH02
Customer Identification : Peppermint - India - P50115R
Type : Essential Oil
Source : *Mentha x piperita*
Customer : Plant Therapy

Checked an approved by:

Alexis St-Gelais, Ph. D., Chimiste 2013-174

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

MÉTHODE CERTIFIÉE ISO 17025:2017 CERTIFIED METHOD

Laboratoire PhytoChemia

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Gas Chromatographic Analysis

Method : PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID
ISO
Results : See analysis summary (next page)
Analyst : Sylvain Mercier, M. Sc., Chimiste 2014-005
Date : 2024-01-09

Physicochemical data

Refractive index : 1.4587 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2024-01-05

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Analysis Summary - Consolidated Contents

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

Identification	%
Isobutyral	tr
Isovaleral	0.01
2-Methylbutyral	tr
Isoamyl alcohol	tr
2-Methylbutanol	tr
(3*Z*)-Hexenol	0.01
Hexanol	0.02
trans-2,5-Diethyltetrahydrofuran	0.01
α-Thujene	0.02
α-Pinene	0.90
Camphene	0.03
3-Methylcyclohexanone	0.07
Benzaldehyde	0.01
Sabinene	0.41
cis-para-Menthane	0.01
β-Pinene	1.15
Octen-3-ol	0.03
cis-Carane	0.02
trans-para-Menthane	0.01
Octan-3-one	0.04
Myrcene	0.28
α-Phellandrene	0.01
Octan-3-ol	0.30
Pseudolimonene	0.02
Δ3-Carene	0.01
α-Terpinene	0.08
Carvomenthene	0.02
para-Cymene	0.10
Limonene	2.78
1,8-Cineole	5.47
(*Z*)-β-Ocimene	0.09
(*E*)-β-Ocimene	0.04
γ-Terpinene	0.13
cis-Sabinene hydrate	0.14
cis-Linalool oxide (fur.)	0.01
Octanol	0.03
Terpinolene	0.06
para-Cymenene	0.01
trans-Sabinene hydrate	0.03
Tetrahydrolinalool	0.02

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Nonan-3-ol	0.01
Linalool	0.11
2-Methylbutyl 2-methylbutyrate	0.02
Amyl isovalerate	0.01
cis-para-Menth-2-en-1-ol	0.05
Octan-3-yl acetate	0.01
trans-Sabinol	0.02
Isopulegol	0.16
Menthone	28.17
Menthofuran	2.73
Isomenthone	3.73
δ-Terpineol	0.07
neo-Menthol	4.31
Menthol	34.15
Terpinen-4-ol	0.62
Isomenthol	0.34
α-Terpineol	0.09
neoiso-Menthol	0.06
cis-Piperitol	0.02
Myrtenol	0.01
trans-Isopiperitenol	0.03
Unknown	0.01
trans-Carveol	0.01
cis-Carveol	0.01
Citronellol	0.04
Pulegone	1.32
Carvone	0.07
Piperitone	0.19
neo-Menthyl acetate	0.10
Decanol	0.04
2-Ethylmenthone?	0.03
Dihydroedulan I	0.02
Menthyl acetate	7.54
Dihydroedulan II	0.01
Thymol	0.03
Isomenthyl acetate	0.08
neoiso-Menthyl acetate?	0.01
Bicycloelemene	0.03
Piperitenone	0.01
α-Cubebene	0.01
Eugenol	0.02
α-Ylangene	0.01
α-Copaene	0.02
1,5-diepi-β-Bourbonene	0.02
β-Bourbonene	0.09

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β-Cubebene	0.02
β-Elemene	0.05
Unknown	0.03
Isocaryophyllene	0.02
Unknown	0.01
β-Caryophyllene	1.12
β-Ylangene	0.11
β-Copaene	0.06
Unknown	0.01
trans-α-Bergamotene	0.01
Isogermacrene D	0.02
α-Humulene	0.11
Muurola-4,11-diene	0.01
(*E*)-β-Farnesene	0.12
γ-Muurolene	0.04
Germacrene D	0.51
Viridiflorene	0.02
Bicyclogermacrene	0.08
α-Muurolene	0.03
γ-Cadinene	0.03
δ-Cadinene	0.07
α-Cadinene	0.01
Spathulenol	0.01
Caryophyllene oxide isomer	0.01
Caryophyllene oxide	0.03
Viridiflorol	0.07
τ-Muurolol	0.01
α-Cadinol	0.01
Phytol	0.01
Consolidated total	**99.43**

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

Bracketed value ([xx]): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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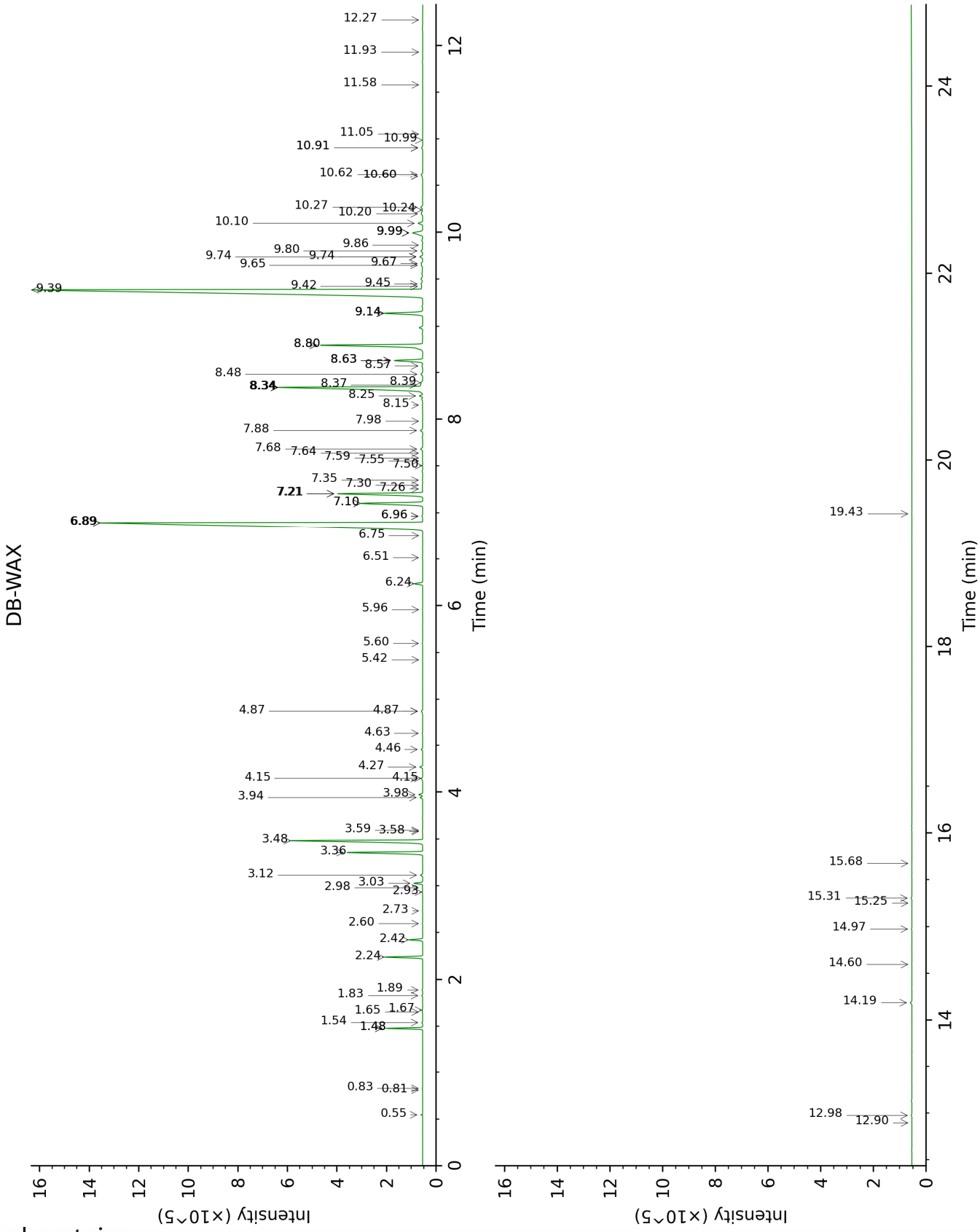
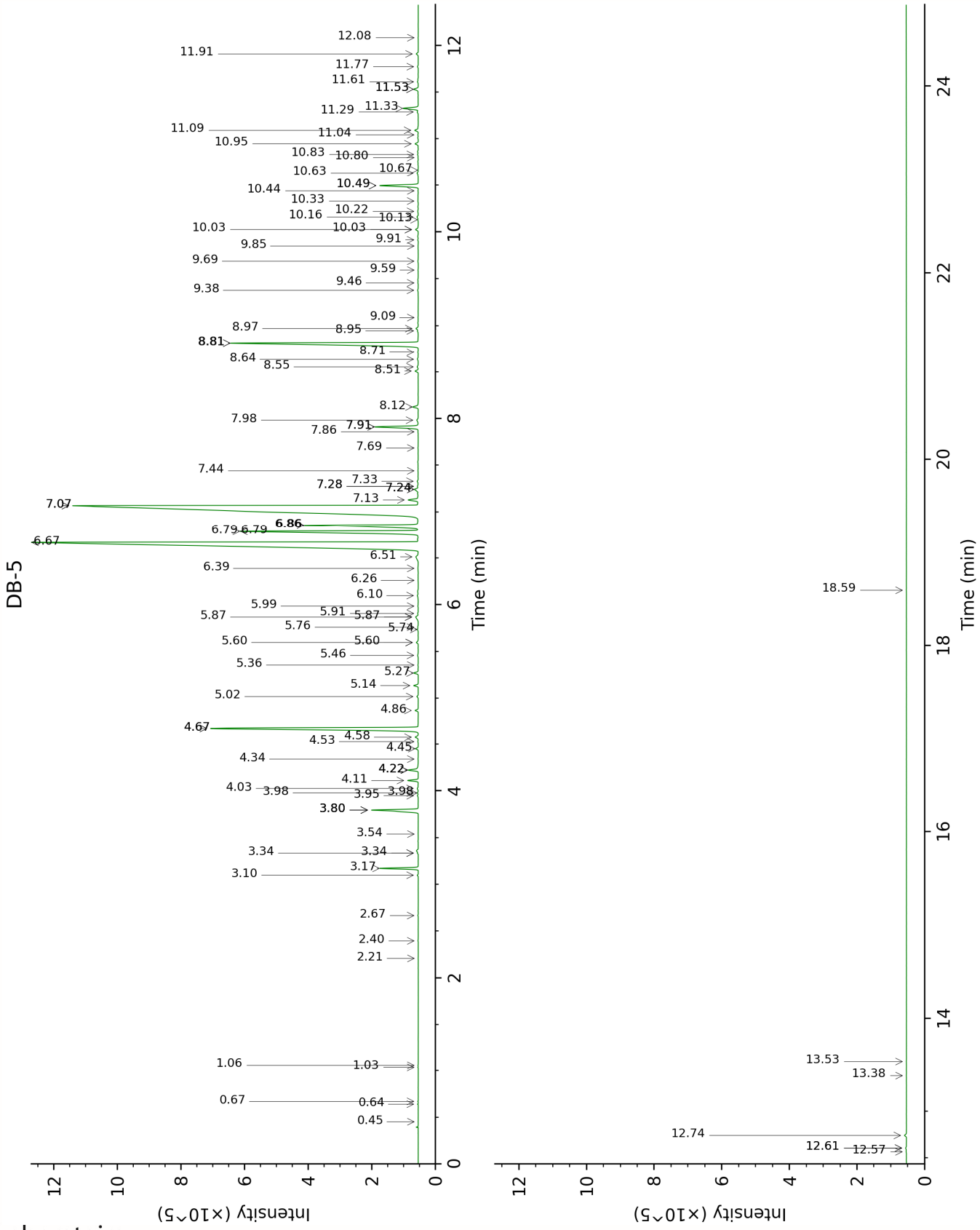

DB-WAX
Intensity (×10^5)
Time (min)
12.27
11.93
11.58
11.05
10.99
10.91
10.62
10.60
10.27
10.20
10.24
10.10
9.99
9.86
9.80
9.74
9.74
9.65
9.67
9.42
9.45
9.39
9.14
8.80
8.63
8.57
8.48
8.37
8.39
8.34
8.25
8.15
7.98
7.88
7.68
7.64
7.59
7.55
7.50
7.35
7.30
7.26
7.21
7.10
6.96
6.89
6.75
6.51
6.24
5.96
5.60
5.42
4.87
4.87
4.63
4.46
4.27
4.15
4.15
3.94
3.98
3.59
3.58
3.48
3.36
3.12
3.03
2.98
2.93
2.73
2.60
2.42
2.24
1.89
1.83
1.67
1.65
1.54
1.48
0.83
0.81
0.55
19.43
15.68
15.31
15.25
14.97
14.60
14.19
12.98
12.90


DB-5
Intensity (×10^5)
Time (min)
12.08
11.91
11.77
11.61
11.53
11.29
11.33
11.09
11.04
10.95
10.83
10.80
10.63
10.67
10.44
10.49
10.33
10.16
10.22
10.13
10.03
10.03
9.91
9.85
9.69
9.59
9.46
9.38
9.09
8.97
8.95
8.81
8.71
8.64
8.55
8.51
8.12
7.98
7.91
7.86
7.69
7.44
7.33
7.28
7.24
7.13
7.07
6.86
6.79
6.79
6.67
6.51
6.39
6.26
6.10
5.99
5.91
5.87
5.87
5.76
5.74
5.60
5.60
5.46
5.36
5.27
5.14
5.02
4.86
4.67
4.58
4.53
4.45
4.34
4.22
4.11
4.03
3.98
3.95
3.98
3.80
3.54
3.34
3.34
3.17
3.10
2.67
2.40
2.21
1.06
1.03
0.67
0.64
0.45
18.59
13.53
13.38
12.74
12.61
12.57

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Isobutyral	0.55	775.3	0.02	0.45	536.3	tr
Isovaleral	0.83	884.3	0.01	0.64	640.5	0.01
2-Methylbutyral	0.81	877.9	tr	0.67	650.5	tr
Isoamyl alcohol	3.59	1175.4	0.01	1.04	732.9	tr
2-Methylbutanol	3.58	1174.4	0.01	1.06	735.9	tr
(3*Z*)-Hexenol	5.96	1346.8	0.01	2.21	858.3	0.01
Hexanol	5.60	1321.0	0.02	2.40	873.7	0.02
trans-2,5-Diethyltetrahydrofuran	1.65	1010.9	0.01	2.67	895.9	0.01
α-Thujene	1.54	1000.2	0.02	3.10	926.1	0.02
α-Pinene	1.48*	991.1	[0.92]	3.17	930.9	0.90
Camphene	1.83	1027.4	0.03	3.34*†	941.7	[0.02]
3-Methylcyclohexanone	4.87*	1267.3	[0.06]	3.34*†	941.7	[0.02]
Benzaldehyde	7.55	1462.8	0.01	3.54	955.0	0.01
Sabinene	2.42	1083.6	0.41	3.80*	971.9	[1.58]
cis-para-Menthane	1.48*	991.1	[0.92]	3.80*	971.9	[1.58]
β-Pinene	2.24	1066.2	1.15	3.80*	971.9	[1.58]
Octen-3-ol	6.96*	1419.2	[0.03]	3.95	982.1	0.03
cis-Carane	1.89	1033.0	0.02	3.98*	984.0	[0.03]
trans-para-Menthane	1.67	1012.7	0.01	3.98*	984.0	[0.03]
Octan-3-one	4.15*	1216.2	[0.06]	4.03	987.2	0.04
Myrcene	3.03	1132.4	0.27	4.11	992.8	0.28
α-Phellandrene	2.93	1125.3	0.01	4.22*	1000.1	[0.34]
Octan-3-ol	6.24	1366.5	0.30	4.22*	1000.1	[0.34]
Pseudolimonene	2.98	1128.7	0.02	4.22*	1000.1	[0.34]
Δ3-Carene	2.73	1110.1	0.01	4.34	1007.7	0.01
α-Terpinene	3.12	1139.0	0.08	4.45	1014.7	0.08
Carvomenthene	2.60	1099.8	0.01	4.53	1019.4	0.02
para-Cymene	4.27	1224.9	0.10	4.58	1022.3	0.10
Limonene	3.36	1157.4	2.78	4.67*	1028.2	[8.24]
1,8-Cineole	3.48	1167.0	5.47	4.67*	1028.2	[8.24]
(*Z*)-β-Ocimene	3.94	1201.7	0.09	4.86	1040.2	0.09
(*E*)-β-Ocimene	4.15*	1216.2	[0.06]	5.02	1050.0	0.04
γ-Terpinene	3.98	1204.0	0.14	5.14	1057.3	0.13
cis-Sabinene hydrate	7.10*	1429.4	[2.87]	5.27	1065.7	0.14
cis-Linalool oxide (fur.)	6.75	1403.4	0.01	5.36	1071.0	0.01
Octanol	8.39	1525.8	0.08	5.46	1077.5	0.03
Terpinolene	4.46	1238.2	0.06	5.60*	1086.1	[0.06]
para-Cymenene	6.51	1386.4	0.01	5.60*	1086.1	[0.06]
trans-Sabinene hydrate	8.15	1507.3	0.01	5.74	1094.9	0.03
Tetrahydrolinalool	6.89*	1413.9	[28.19]	5.76	1096.4	0.02

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Nonan-3-ol	7.50	1459.2	0.01	5.87*	1103.2	[0.15]
Linalool	8.25	1514.9	0.11	5.87*	1103.2	[0.15]
2-Methylbutyl 2-methylbutyrate	4.63	1250.5	0.01	5.91	1105.6	0.02
Amyl isovalerate	4.87*	1267.3	[0.06]	5.99	1110.6	0.01
cis-para-Menth-2-en-1-ol	8.34*†	1521.9	[7.71]	6.10	1117.8	0.05
Octan-3-yl acetate	5.42	1308.5	0.01	6.26	1128.1	0.01
trans-Sabinol	9.99*	1651.8	[0.63]	6.39	1136.3	0.02
Isopulegol	8.34*†	1521.9	[7.71]	6.51	1144.2	0.16
Menthone	6.89*	1413.9	[28.19]	6.67	1154.1	28.17
Menthofuran	7.10*	1429.4	[2.87]	6.79*	1161.7	[6.46]
Isomenthone	7.20*	1437.0	[3.73]	6.79*	1161.7	[6.46]
δ-Terpineol	9.67	1625.5	0.07	6.86*	1166.0	[4.38]
neo-Menthol	8.80*	1557.3	[4.54]	6.86*	1166.0	[4.38]
Menthol	9.39	1602.9	34.15	7.07*	1179.6	[34.77]
Terpinen-4-ol	8.80*	1557.3	[4.54]	7.07*	1179.6	[34.77]
Isomenthol	9.14*	1583.4	[1.68]	7.13	1183.5	0.34
α-Terpineol	9.99*	1651.8	[0.63]	7.24*	1190.7	[0.15]
neoiso-Menthol	9.65	1624.0	0.06	7.24*	1190.7	[0.15]
cis-Piperitol	9.74*	1631.3	[0.13]	7.28*	1192.8	[0.02]
Myrtenol	11.05	1739.2	0.01	7.28*	1192.8	[0.02]
trans-Isopiperitenol	10.60*	1700.8	[0.04]	7.33	1196.3	0.03
Unknown MEPI V [m/z 43, 99 (84), 81 (46), 986 (43), 126 (36), 71 (28)... 170 (12)]				7.44	1203.4	0.01
trans-Carveol	11.58	1783.7	0.01	7.69	1219.6	0.01
cis-Carveol	11.93	1813.9	0.01	7.86	1231.2	0.01
Citronellol	10.91*	1726.9	[0.05]	7.91*	1234.7	[1.36]
Pulegone	9.14*	1583.4	[1.68]	7.91*	1234.7	[1.36]
Carvone	10.20†	1668.2	0.04	7.98	1239.5	0.07
Piperitone	10.10	1660.0	0.19	8.12	1249.0	0.19
neo-Menthyl acetate	7.88	1486.9	0.10	8.51	1274.6	0.10
Decanol	10.91*	1726.9	[0.05]	8.55	1277.7	0.04
2-Ethylmenthone?				8.64	1283.1	0.03
Dihydroedulan I	7.30	1443.9	0.02	8.72	1288.4	0.02
Menthyl acetate	8.34*†	1521.9	[7.71]	8.82*	1295.1	[7.55]
Dihydroedulan II	7.64	1469.0	0.01	8.82*	1295.1	[7.55]
Thymol	15.31	2127.6	0.03	8.95	1303.8	0.03
Isomenthyl acetate	8.48	1532.7	0.09	8.97	1305.5	0.08
neoiso-Menthyl acetate?				9.09	1313.8	0.01
Bicycloelemene	7.26	1440.8	0.03	9.38	1334.2	0.03
Piperitenone	12.27	1844.2	0.01	9.46	1339.8	0.01

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α-Cubebene	6.96*	1419.2	[0.03]	9.59	1349.4	0.01
Eugenol	14.98	2094.5	0.02	9.69	1356.1	0.02
α-Ylangene	7.20*	1437.0	[3.73]	9.85	1367.5	0.01
α-Copaene	7.35	1447.7	0.02	9.92	1372.1	0.02
1,5-diepi-β-Bourbonene	7.59	1465.2	0.02	10.02*	1379.8	[0.11]
β-Bourbonene	7.68	1472.2	0.09	10.02*	1379.8	[0.11]
β-Cubebene	7.98	1494.2	0.01	10.13	1387.2	0.02
β-Elemene	8.57	1539.6	0.04	10.16	1389.3	0.05
Unknown MEPI VII [m/z 107, 121 (79), 119 (66), 91 (58), 136 (55), 105 (49)... 194 (1)]				10.22	1393.5	0.03
Isocaryophyllene	8.37*†	1523.9	[0.09]	10.33	1401.3	0.02
Unknown MEPI X [m/z 109, 95 (88), 69 (66), 135 (56), 82 (54), 41 (45)...]				10.44	1409.2	0.01
β-Caryophyllene	8.63*	1544.0	[1.19]	10.49*	1413.3	[1.24]
β-Ylangene	8.34*†	1521.9	[7.71]	10.49*	1413.3	[1.24]
β-Copaene	8.63*	1544.0	[1.19]	10.63	1423.7	0.06
Unknown MISC CX [m/z 177, 109 (32), 192 (26), 95 (25), 137 (23)]				10.67	1426.1	0.01
trans-α-Bergamotene	8.63*	1544.0	[1.19]	10.80	1436.1	0.01
Isogermacrene D	9.14*	1583.4	[1.68]	10.83	1438.6	0.02
α-Humulene	9.45	1607.9	0.10	10.95	1447.1	0.11
Muurola-4,11-diene	9.42	1605.8	0.05	11.04	1454.2	0.01
(*E*)-β-Farnesene	9.74*	1631.3	[0.13]	11.09	1457.8	0.12
γ-Muurolene	9.80	1636.4	0.08	11.29	1472.4	0.04
Germacrene D	9.99*	1651.8	[0.63]	11.33	1475.3	0.51
Viridiflorene	9.86	1641.3	0.02	11.53*	1490.5	[0.16]
Bicyclogermacrene	10.27	1673.8	0.08	11.53*	1490.5	[0.16]
α-Muurolene	10.24	1671.5	0.02	11.61	1496.4	0.03
γ-Cadinene	10.60*	1700.8	[0.04]	11.77	1508.6	0.03
δ-Cadinene	10.62	1702.7	0.07	11.91	1519.4	0.07
α-Cadinene	10.99	1733.8	0.01	12.08	1532.9	0.01
Spathulenol	14.60	2058.3	0.01	12.57	1570.8	0.01
Caryophyllene oxide isomer	12.90	1899.2	0.01	12.61*	1574.0	[0.03]
Caryophyllene oxide	12.98	1906.6	0.03	12.61*	1574.0	[0.03]
Viridiflorol	14.19	2019.1	0.06	12.74	1584.5	0.07
τ-Muurolol	15.25	2122.2	0.01	13.38	1636.4	0.01
α-Cadinol	15.68	2164.5	0.01	13.53	1648.8	0.01
Phytol	19.43	2571.4	0.01	18.59	2111.5	0.01

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Total reported	98.90%			99.50%		

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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

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