Date : 2025-02-11

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 25A27-PTH05
Customer Identification : Organic Peppermint - India - P40113R
Type : Essential Oil
Source : *Mentha x piperita*
Customer : Plant Therapy

Checked an approved by:

Sylvain Mercier, M. Sc., Chimiste 2014-005

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

This report is an update from the first version issued on February 11, 2025 to correct a mistake in the analysis summary.

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 : 2025-02-11

Physicochemical data

Refractive index : 1.4609 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2025-01-28

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
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	0.02	Aliphatic alcohol
2-Methylbutanol	0.01	Aliphatic alcohol
Ethyl 2-methylbutyrate	0.01	Aliphatic ester
(3*Z*)-Hexenol	0.01	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
trans-2,5-Diethyltetrahydrofuran	0.03	Furan
α-Thujene	0.06	Monoterpene
α-Pinene	0.89	Monoterpene
Camphene	0.02	Monoterpene
3-Methylcyclohexanone	0.06	Aliphatic ketone
Thuja-2,4(10)-diene	0.01	Monoterpene
Sabinene	0.59	Monoterpene
β-Pinene	1.32	Monoterpene
Octen-3-ol	0.07	Aliphatic alcohol
Octan-3-one	0.03	Aliphatic ketone
Myrcene	0.28	Monoterpene
Octan-3-ol	0.18	Aliphatic alcohol
α-Phellandrene	0.04	Monoterpene
Pseudolimonene	0.03	Monoterpene
Δ3-Carene	0.01	Monoterpene
α-Terpinene	0.26	Monoterpene
para-Cymene	0.23	Monoterpene
1,8-Cineole	5.77	Monoterpenic ether
Limonene	2.45	Monoterpene
2-Ethylhexanol	0.01	Aliphatic alcohol
(*Z*)-β-Ocimene	0.14	Monoterpene
(*E*)-β-Ocimene	0.07	Monoterpene
γ-Terpinene	0.43	Monoterpene
cis-Sabinene hydrate	0.35	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
para-Cymenene	0.02	Monoterpene
Terpinolene	0.17	Monoterpene
trans-Sabinene hydrate	0.04	Monoterpenic alcohol
Nonan-3-ol	0.02	Aliphatic alcohol
Linalool	0.22	Monoterpenic alcohol
2-Methylbutyl 2-methylbutyrate	0.06	Aliphatic ester
Amyl isovalerate	0.03	Aliphatic ester

cis-para-Menth-2-en-1-ol	0.06	Monoterpenic alcohol
Octan-3-yl acetate	0.01	Aliphatic ester
allo-Ocimene	0.08	Monoterpene
Isopulegol	0.18	Monoterpenic alcohol
trans-Sabinol	0.06	Monoterpenic alcohol
Menthone	28.59	Monoterpenic ketone
Menthofuran	4.65	Monoterpenic ether
Isomenthone	6.79	Monoterpenic ketone
δ-Terpineol	0.09	Monoterpenic alcohol
neo-Menthol	2.76	Monoterpenic alcohol
Terpinen-4-ol	0.84	Monoterpenic alcohol
Menthol	28.95	Monoterpenic alcohol
Isomenthol	0.40	Monoterpenic alcohol
para-Cymen-8-ol	0.03	Monoterpenic alcohol
neoiso-Menthol	0.09	Monoterpenic alcohol
α-Terpineol	0.42	Monoterpenic alcohol
Myrtenal	0.02	Monoterpenic aldehyde
Myrtenol	0.02	Monoterpenic alcohol
trans-Isopiperitenol	0.04	Monoterpenic alcohol
Unknown	0.01	Unknown
trans-Piperitol	0.02	Monoterpenic alcohol
Citronellol	2.08	Monoterpenic alcohol
Carvone	0.10	Monoterpenic ketone
Piperitone	0.47	Monoterpenic ketone
neo-Menthyl acetate	0.22	Monoterpenic ester
Decanol	0.02	Aliphatic alcohol
2-Ethylmenthone?	0.06	Aliphatic ketone
Dihydroedulan I	0.05	Terpenic ether
Menthyl acetate	3.48	Monoterpenic ester
Dihydroedulan II	0.01	Terpenic ether
Thymol	0.02	Monoterpenic alcohol
Isomenthyl acetate	0.15	Monoterpenic alcohol
Bicycloelemene	0.08	Sesquiterpene
Piperitenone	0.02	Monoterpenic ketone
α-Cubebene	0.02	Sesquiterpene
Evodone	0.02	Monoterpenic ketone
Eugenol	0.02	Phenylpropanoid
α-Ylangene	0.02	Sesquiterpene
α-Copaene	0.04	Sesquiterpene
β-Bourbonene	0.17	Sesquiterpene
β-Cubebene	0.02	Sesquiterpene
β-Elemene	0.12	Sesquiterpene
Unknown	0.04	Unknown
Isocaryophyllene	0.02	Sesquiterpene
β-Ylangene	0.34	Sesquiterpene

β-Caryophyllene	2.18	Sesquiterpene
β-Copaene	0.10	Sesquiterpene
trans-α-Bergamotene	0.02	Sesquiterpene
Isogermacrene D	0.05	Sesquiterpene
ε-Muurolene?	0.12	Sesquiterpene
α-Humulene	0.10	Sesquiterpene
Muurola-4,11-diene	0.02	Sesquiterpene
(*E*)-β-Farnesene	0.19	Sesquiterpene
γ-Muurolene	0.04	Sesquiterpene
Germacrene D	0.48	Sesquiterpene
Bicyclogermacrene	0.20	Sesquiterpene
Viridiflorene	0.02	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
δ-Cadinene	0.05	Sesquiterpene
trans-Calamenene	0.01	Sesquiterpene
Caryophyllene oxide	0.04	Sesquiterpenic ether
Viridiflorol	0.04	Sesquiterpenic alcohol
Consolidated total	**99.39**	

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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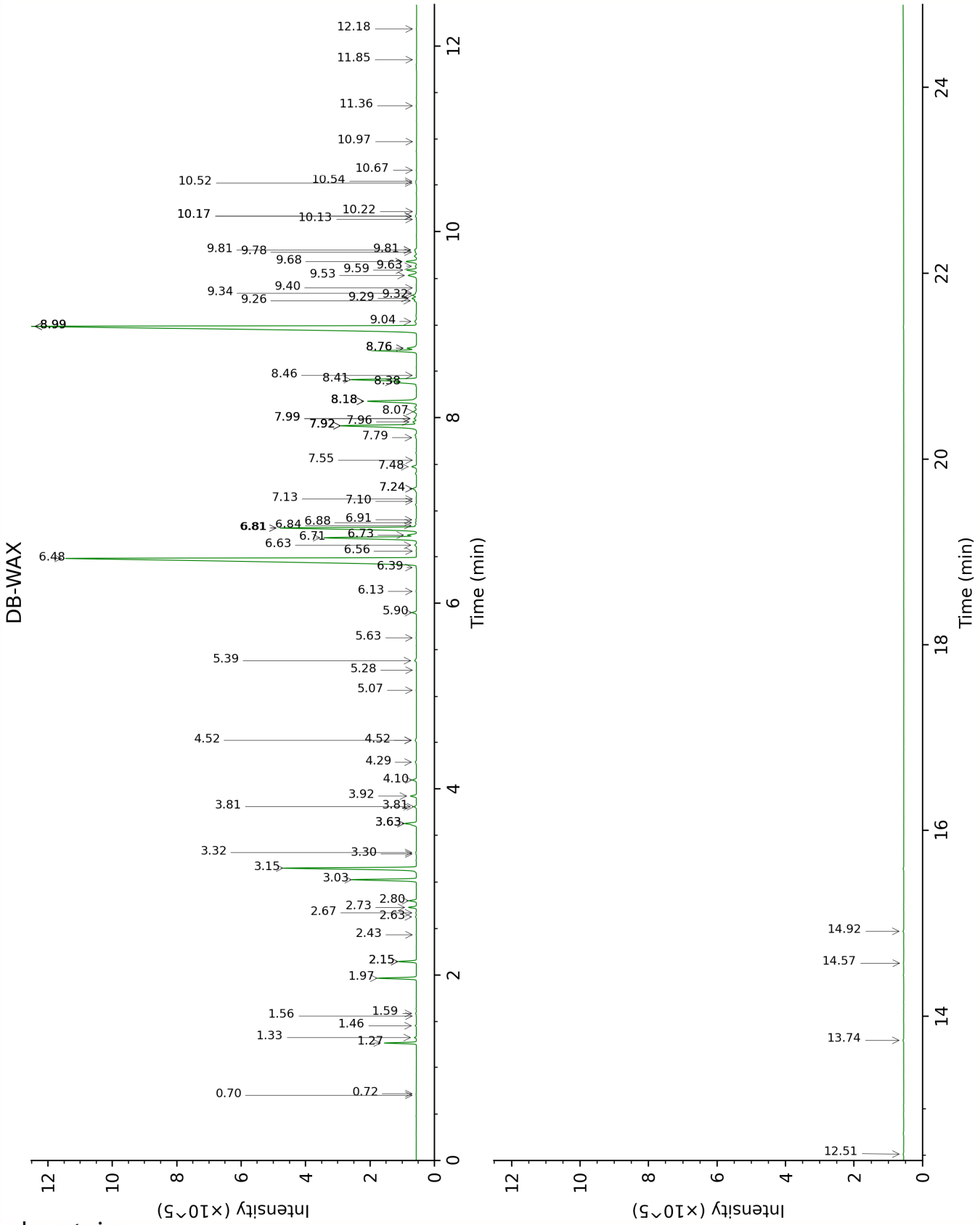
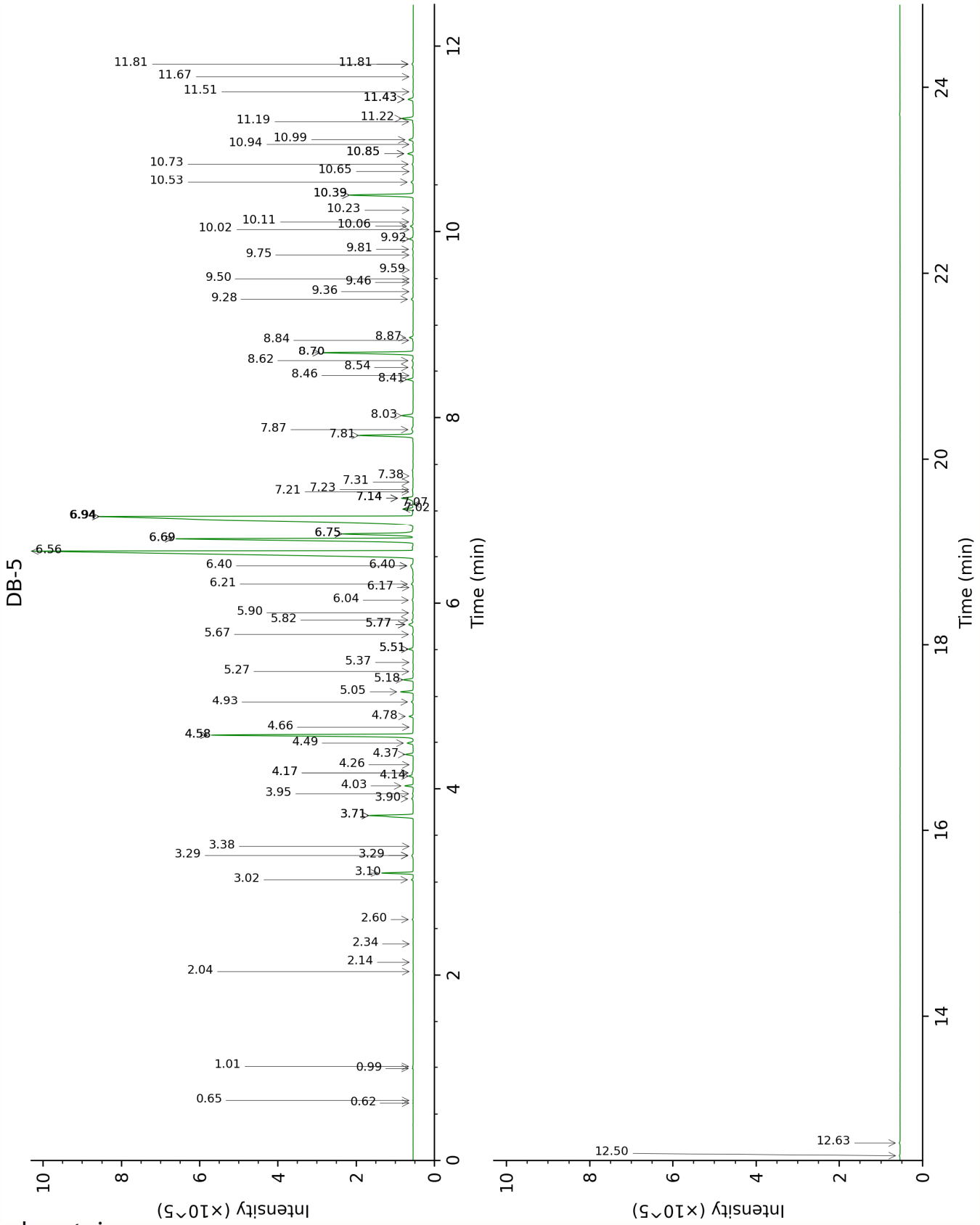

DB-WAX
Time (min)
Intensity (×10^5)
12.18
11.85
11.36
10.97
10.67
10.54
10.52
10.22
10.17
10.13
9.81
9.78
9.81
9.68
9.63
9.59
9.53
9.40
9.34
9.32
9.29
9.26
9.04
8.99
8.76
8.46
8.41
8.38
8.18
8.07
7.99
7.96
7.92
7.79
7.55
7.48
7.24
7.13
7.10
6.91
6.88
6.84
6.81
6.73
6.71
6.63
6.56
6.48
6.39
6.13
5.90
5.63
5.39
5.28
5.07
4.52
4.52
4.29
4.10
3.92
3.81
3.81
3.63
3.32
3.30
3.15
3.03
2.80
2.73
2.67
2.63
2.43
2.15
1.97
1.59
1.56
1.46
1.33
1.27
0.72
0.70
14.92
14.57
13.74
12.51


DB-5
Time (min)
Intensity (×10^5)
11.81
11.67
11.51
11.43
11.22
11.19
10.99
10.94
10.85
10.73
10.65
10.53
10.39
10.23
10.11
10.06
10.02
9.92
9.81
9.75
9.59
9.50
9.46
9.36
9.28
8.87
8.84
8.70
8.62
8.54
8.46
8.41
8.03
7.87
7.81
7.38
7.31
7.23
7.21
7.14
7.07
7.02
6.94
6.75
6.69
6.56
6.40
6.40
6.21
6.17
6.04
5.90
5.82
5.77
5.67
5.51
5.37
5.27
5.18
5.05
4.93
4.78
4.66
4.58
4.49
4.37
4.26
4.17
4.14
4.03
3.95
3.90
3.71
3.38
3.29
3.29
3.10
3.02
2.60
2.34
2.14
2.04
1.01
0.99
0.65
0.62
12.63
12.50

FULL ANALYSIS DATA

Isovaleral	Column DB-WAX			Column DB-5		
	0.72	885.0	tr	0.62	639.2	tr
2-Methylbutyral	0.70	878.1	tr	0.65	649.2	tr
Isoamyl alcohol	3.30	1177.9	0.01	0.99	730.9	0.02
2-Methylbutanol	3.32	1179.1	0.03	1.01	734.0	0.01
Ethyl 2-methylbutyrate	1.56	1021.9	tr	2.04	848.7	0.01
(3*Z*)-Hexenol	5.63	1351.5	0.02	2.14	857.1	0.01
Hexanol	5.28	1326.6	0.01	2.34	873.5	0.01
trans-2,5-Diethyltetrahydrofuran	1.46	1011.2	0.03	2.60	895.5	0.03
α-Thujene	1.33	998.0	0.05	3.02	925.6	0.06
α-Pinene	1.27	987.9	0.90	3.10	930.4	0.89
Camphene	1.59	1024.8	0.02	3.29*	942.9	[0.08]
3-Methylcyclohexanone	4.52*	1270.0	[0.08]	3.29*	942.9	[0.08]
Thuja-2,4(10)-diene	2.15*	1081.7	[0.60]	3.38	949.4	0.01
Sabinene	2.15*	1081.7	[0.60]	3.72*	971.4	[1.91]
β-Pinene	1.97	1063.4	1.32	3.72*	971.4	[1.91]
Octen-3-ol	6.63	1423.6	0.08	3.90	983.4	0.07
Octan-3-one	3.81*	1217.2	[0.09]	3.95	986.9	0.03
Myrcene	2.73	1132.0	0.28	4.03	992.6	0.28
Octan-3-ol	5.90	1371.0	0.17	4.14	999.6	0.18
α-Phellandrene	2.63	1123.9	0.04	4.17*	1001.8	[0.05]
Pseudolimonene	2.67	1127.4	0.03	4.17*	1001.8	[0.05]
Δ3-Carene	2.43	1108.6	0.01	4.26	1007.5	0.01
α-Terpinene	2.80	1137.8	0.27	4.37	1014.4	0.26
para-Cymene	3.92	1225.7	0.23	4.49	1022.1	0.23
1,8-Cineole	3.15	1165.7	5.77	4.58*	1027.4	[8.16]
Limonene	3.03	1155.8	2.45	4.58*	1027.4	[8.16]
2-Ethylhexanol	7.10	1459.1	0.01	4.66	1032.8	0.01
(*Z*)-β-Ocimene	3.63*	1203.9	[0.58]	4.78	1040.0	0.14
(*E*)-β-Ocimene	3.81*	1217.2	[0.09]	4.94	1049.8	0.07
γ-Terpinene	3.63*	1203.9	[0.58]	5.05	1057.1	0.43
cis-Sabinene hydrate	6.73	1431.6	0.33	5.18	1065.2	0.35
cis-Linalool oxide (fur.)	6.39	1405.8	0.02	5.27	1070.8	0.02
Octanol	7.99*	1526.0	[0.14]	5.37	1076.9	0.02
para-Cymenene	6.13	1387.3	0.02	5.51*	1085.9	[0.18]
Terpinolene	4.10	1238.4	0.17	5.51*	1085.9	[0.18]
trans-Sabinene hydrate	7.79	1510.2	0.04	5.67	1095.8	0.04
Nonan-3-ol	7.13	1460.9	0.02	5.77*	1102.5	[0.25]
Linalool	7.92*	1520.0	[3.91]	5.77*	1102.5	[0.25]
2-Methylbutyl 2-methylbutyrate	4.29	1252.6	0.06	5.82	1105.5	0.06

Amyl isovalerate	4.52*	1270.0	[0.08]	5.90	1110.4	0.03
cis-para-Menth-2-en-1-ol	7.96	1523.2	0.18	6.04	1119.2	0.06
Octan-3-yl acetate	5.07	1311.2	0.01	6.17	1127.8	0.01
allo-Ocimene	5.39	1334.0	0.09	6.21	1130.2	0.08
Isopulegol	7.92*	1520.0	[3.91]	6.40*	1142.8	[0.24]
trans-Sabinol	9.63	1655.5	0.06	6.40*	1142.8	[0.24]
Menthone	6.48	1413.0	28.60	6.56	1152.8	28.59
Menthofuran	6.71	1429.5	4.65	6.69*	1161.3	[11.44]
Isomenthone	6.81*†	1437.3	[6.85]	6.69*	1161.3	[11.44]
δ-Terpineol	9.26	1625.6	0.09	6.75*	1164.7	[2.96]
neo-Menthol	8.41	1558.4	2.76	6.75*	1164.7	[2.96]
Terpinen-4-ol	8.38	1556.1	0.84	6.94*	1177.1	[29.79]
Menthol	8.99*	1603.4	[28.91]	6.94*	1177.1	[29.79]
Isomenthol	8.76*†	1585.1	[0.43]	7.02	1182.2	0.40
para-Cymen-8-ol	11.36	1800.1	0.03	7.07	1185.6	0.03
neoiso-Menthol	9.29*†	1627.6	[0.20]	7.14*	1189.6	[0.54]
α-Terpineol	9.59	1652.2	0.42	7.14*	1189.6	[0.54]
Myrtenal	8.46	1561.9	0.02	7.14*	1189.6	[0.54]
Myrtenol	10.67	1741.3	0.02	7.21	1194.0	0.02
trans-Isopiperitenol	10.17*	1699.0	[0.07]	7.23	1195.7	0.04
Unknown MEPI V [m/z 43, 99 (84), 81 (46), 986 (43), 126 (36), 71 (28)... 170 (12)]				7.31	1200.8	0.01
trans-Piperitol	10.22	1703.1	0.01	7.38	1204.9	0.02
Citronellol	10.54	1730.6	0.04	7.81	1234.1	2.08
Carvone	9.81*	1669.6	[0.10]	7.87	1238.3	0.10
Piperitone	9.68	1659.5	0.47	8.02	1248.4	0.47
neo-Menthyl acetate	7.48	1486.6	0.21	8.41	1274.4	0.22
Decanol	10.52	1729.0	0.03	8.46	1277.2	0.02
2-Ethylmenthone?				8.54	1283.1	0.06
Dihydroedulan I	6.88	1442.1	0.05	8.62	1287.9	0.05
Menthyl acetate	7.92*	1520.0	[3.91]	8.70*	1293.6	[3.49]
Dihydroedulan II	7.24*	1469.1	[0.18]	8.70*	1293.6	[3.49]
Thymol	14.92	2132.6	0.03	8.84	1303.0	0.02
Isomenthyl acetate	8.07	1531.7	0.15	8.87	1305.1	0.15
Bicycloelemene	6.84†	1439.2	0.06	9.28	1333.9	0.08
Piperitenone	11.85	1844.1	0.01	9.36	1339.7	0.02
α-Cubebene	6.56	1418.9	0.02	9.46	1346.6	0.02
Evodone	12.18	1873.4	0.02	9.50	1349.4	0.02
Eugenol	14.57	2098.2	0.01	9.59	1356.0	0.02
α-Ylangene	6.81*†	1437.3	[6.85]	9.75	1367.4	0.02
α-Copaene	6.91	1444.4	0.03	9.81	1371.7	0.04
β-Bourbonene	7.24*	1469.1	[0.18]	9.92	1379.5	0.17

β-Cubebene	7.55	1491.8	0.01	10.02	1386.5	0.02
β-Elemene	8.18*	1540.4	[2.41]	10.06	1389.1	0.12
Unknown MEPI VII [m/z 107, 121 (79), 119 (66), 91 (58), 136 (55), 105 (49)... 194 (1)]				10.11	1392.3	0.04
Isocaryophyllene	7.99*	1526.0	[0.14]	10.23	1401.1	0.02
β-Ylangene	7.92*	1520.0	[3.91]	10.39*	1413.1	[2.53]
β-Caryophyllene	8.18*	1540.4	[2.41]	10.39*	1413.1	[2.53]
β-Copaene	8.18*	1540.4	[2.41]	10.53	1423.4	0.10
trans-α-Bergamotene	8.18*	1540.4	[2.41]	10.65	1432.4	0.02
Isogermacrene D	8.76*†	1585.1	[0.43]	10.73	1438.3	0.05
ε-Muurolene?	8.99*	1603.4	[28.91]	10.84*	1446.7	[0.22]
α-Humulene	9.04	1607.7	0.10	10.84*	1446.7	[0.22]
Muurola-4,11-diene	8.99*	1603.4	[28.91]	10.94	1454.1	0.02
(*E*)-β-Farnesene	9.32*†	1630.3	[0.18]	10.99	1457.8	0.19
γ-Muurolene	9.34	1632.1	0.04	11.19	1472.3	0.04
Germacrene D	9.53	1647.5	0.49	11.22	1474.9	0.48
Bicyclogermacrene	9.81*	1669.6	[0.10]	11.43*	1490.2	[0.22]
Viridiflorene	9.40	1636.7	0.02	11.43*	1490.2	[0.22]
α-Muurolene	9.78	1667.7	0.05	11.51	1496.2	0.02
γ-Cadinene	10.13	1696.1	0.02	11.67	1508.5	0.02
δ-Cadinene	10.17*	1699.0	[0.07]	11.81*	1519.2	[0.06]
trans-Calamenene	10.97	1767.3	0.01	11.81*	1519.2	[0.06]
Caryophyllene oxide	12.51	1903.0	0.03	12.50	1573.3	0.04
Viridiflorol	13.74	2018.0	0.04	12.63	1584.1	0.04
Total reported		96.88%			99.41%	

*: 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