Date : 2025-11-17

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 25J23-PTH06
Customer Identification : Spearmint - India - S30116R
Type : Essential Oil
Source : *Mentha spicata*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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. The compliance status of the sample is provided to facilitate the reading of the report. The client remains ultimately responsible for reviewing the results presented within this report and to establish compliance of the tested batch against relevant quality criteria.

This report is an update of the version first issued on October 30, 2025 to make a correction in the sample identification section.

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 : Jean-Christophe Fortin, M. Sc.
Date : 2025-10-28

Physicochemical data

Refractive index : 1.4882 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2025-10-27

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	0.02	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Isoamyl alcohol	0.01	Aliphatic alcohol
2-Methylbutanol	0.01	Aliphatic alcohol
Methyl 2-methylbutyrate	0.01	Aliphatic ester
Ethyl 2-methylbutyrate	0.01	Aliphatic ester
(3*Z*)-Hexenol	0.01	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
trans-2,5-Diethyltetrahydrofuran	0.08	Furan
Hashishene	0.12	Monoterpene
α-Thujene	0.05	Monoterpene
α-Pinene	0.82	Monoterpene
Camphene	0.03	Monoterpene
3-Methylcyclohexanone	0.01	Aliphatic ketone
Thuja-2,4(10)-diene	0.01	Monoterpene
β-Pinene	0.97	Monoterpene
Sabinene	0.60	Monoterpene
Octen-3-ol	0.02	Aliphatic alcohol
Octan-3-one	0.03	Aliphatic ketone
Myrcene	1.76	Monoterpene
Octan-3-ol	0.35	Aliphatic alcohol
Pseudolimonene	0.05	Monoterpene
Octanal	0.01	Aliphatic aldehyde
α-Phellandrene	0.02	Monoterpene
α-Terpinene	0.14	Monoterpene
para-Cymene	0.12	Monoterpene
1,8-Cineole	1.73	Monoterpenic ether
Limonene	22.57	Monoterpene
2-Ethylhexanol	0.01	Aliphatic alcohol
(*Z*)-β-Ocimene	0.07	Monoterpene
(*E*)-β-Ocimene	0.05	Monoterpene
γ-Terpinene	0.26	Monoterpene
cis-Sabinene hydrate	0.37	Monoterpenic alcohol
Octanol	0.06	Aliphatic alcohol
Terpinolene	0.10	Monoterpene
para-Cymenene	0.04	Monoterpene
trans-Sabinene hydrate	0.05	Monoterpenic alcohol
Linalool	0.06	Monoterpenic alcohol
Nonanal	0.05	Aliphatic aldehyde

2-Methylbutyl 2-methylbutyrate	0.02	Aliphatic ester
trans-*para*-Mentha-2,8-dien-1-ol	0.10	Monoterpenic alcohol
Octan-3-yl acetate	0.08	Aliphatic ester
cis-Limonene oxide	0.02	Monoterpenic ether
cis-*para*-Mentha-2,8-dien-1-ol	0.07	Monoterpenic alcohol
trans-Limonene oxide	0.05	Monoterpenic ether
Camphor	0.02	Monoterpenic ketone
Isopulegol	0.03	Monoterpenic alcohol
Menthone	0.22	Monoterpenic ketone
Menthofuran	0.02	Monoterpenic ether
Isomenthone	0.07	Monoterpenic ketone
neo-Menthol	0.08	Monoterpenic alcohol
δ-Terpineol	0.09	Monoterpenic alcohol
Menthol	0.89	Monoterpenic alcohol
Terpinen-4-ol	0.61	Monoterpenic alcohol
Isomenthol	0.01	Monoterpenic alcohol
α-Terpineol	0.30	Monoterpenic alcohol
cis-Dihydrocarvone	1.79	Monoterpenic ketone
neo-Dihydrocarveol	0.53	Monoterpenic alcohol
Dihydrocarveol	0.03	Monoterpenic alcohol
trans-Dihydrocarvone	0.26	Monoterpenic ketone
trans-Piperitol	0.02	Monoterpenic alcohol
iso-Dihydrocarveol ?	0.06	Monoterpenic alcohol
trans-Carveol	0.45	Monoterpenic alcohol
Pulegone	tr	Monoterpenic ketone
cis-Carveol	0.24	Monoterpenic alcohol
Carvone	56.14	Monoterpenic ketone
Piperitone	0.25	Monoterpenic ketone
cis-Carvone oxide	0.01	Monoterpenic ketone
Isopiperitenone	0.06	Monoterpenic ketone
trans-Carvone oxide	0.09	Monoterpenic ketone
Decanol	0.03	Aliphatic alcohol
Dihydroedulan I	0.02	Terpenic ether
Menthyl acetate	0.05	Monoterpenic ester
Dihydroedulan II	0.10	Terpenic ether
Isomenthyl acetate	0.01	Monoterpenic alcohol
neo-Dihydrocarvyl acetate	0.01	Monoterpenic ester
Dihydrocarvyl acetate	0.14	Monoterpenic ester
Bicycloelemene	0.02	Sesquiterpene
trans-Carvyl acetate	0.02	Monoterpenic ester
α-Cubebene	0.01	Sesquiterpene
iso-Dihydrocarvyl acetate	0.02	Monoterpenic ester
cis-Carvyl acetate	0.17	Monoterpenic ester
α-Copaene	0.04	Sesquiterpene
β-Bourbonene	1.32	Sesquiterpene

1,5-diepi-β-Bourbonene	0.11	Sesquiterpene
β-Elemene	0.14	Sesquiterpene
(*Z*)-Jasmone	0.17	Jasmonate
Unknown	0.01	Sesquiterpene
Isocaryophyllene	0.04	Sesquiterpene
β-Ylangene	0.24	Sesquiterpene
β-Caryophyllene	0.74	Sesquiterpene
β-Copaene	0.15	Sesquiterpene
Isogermacrene D	0.14	Sesquiterpene
α-Humulene	0.06	Sesquiterpene
allo-Aromadendrene	0.02	Sesquiterpene
(*E*)-β-Farnesene	0.04	Sesquiterpene
Unknown	0.57	Sesquiterpene
Germacrene D	0.73	Sesquiterpene
Viridiflorene	0.03	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
δ-Cadinene	0.05	Sesquiterpene
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.04	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Viridiflorol	0.09	Sesquiterpenic alcohol
Isospathulenol	0.01	Sesquiterpenic alcohol
τ-Cadinol	0.01	Sesquiterpenic alcohol
α-Cadinol	0.01	Sesquiterpenic alcohol
meta-Camphorene	0.02	Diterpene
para-Camphorene	0.01	Diterpene
Consolidated total	**98.73**	

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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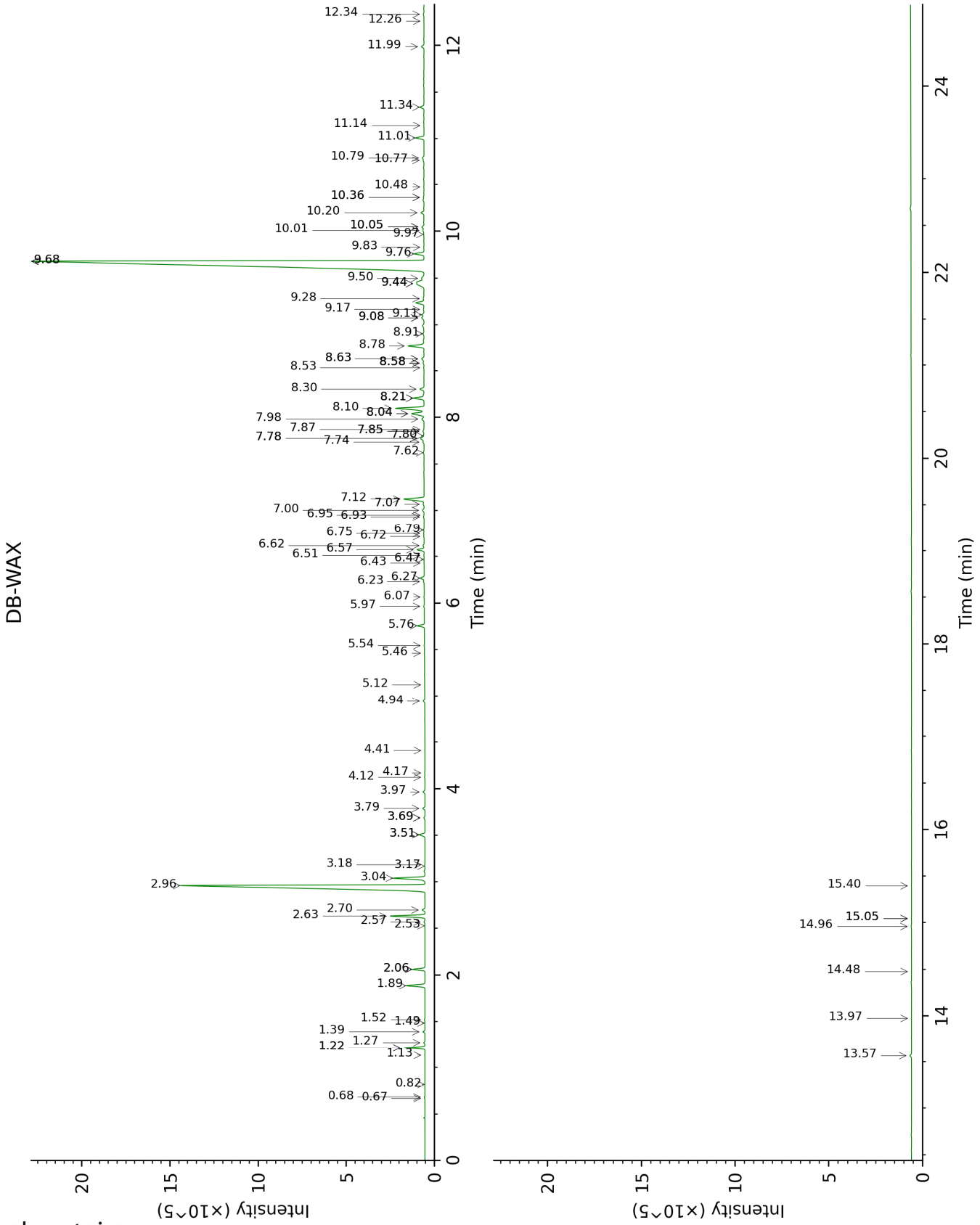
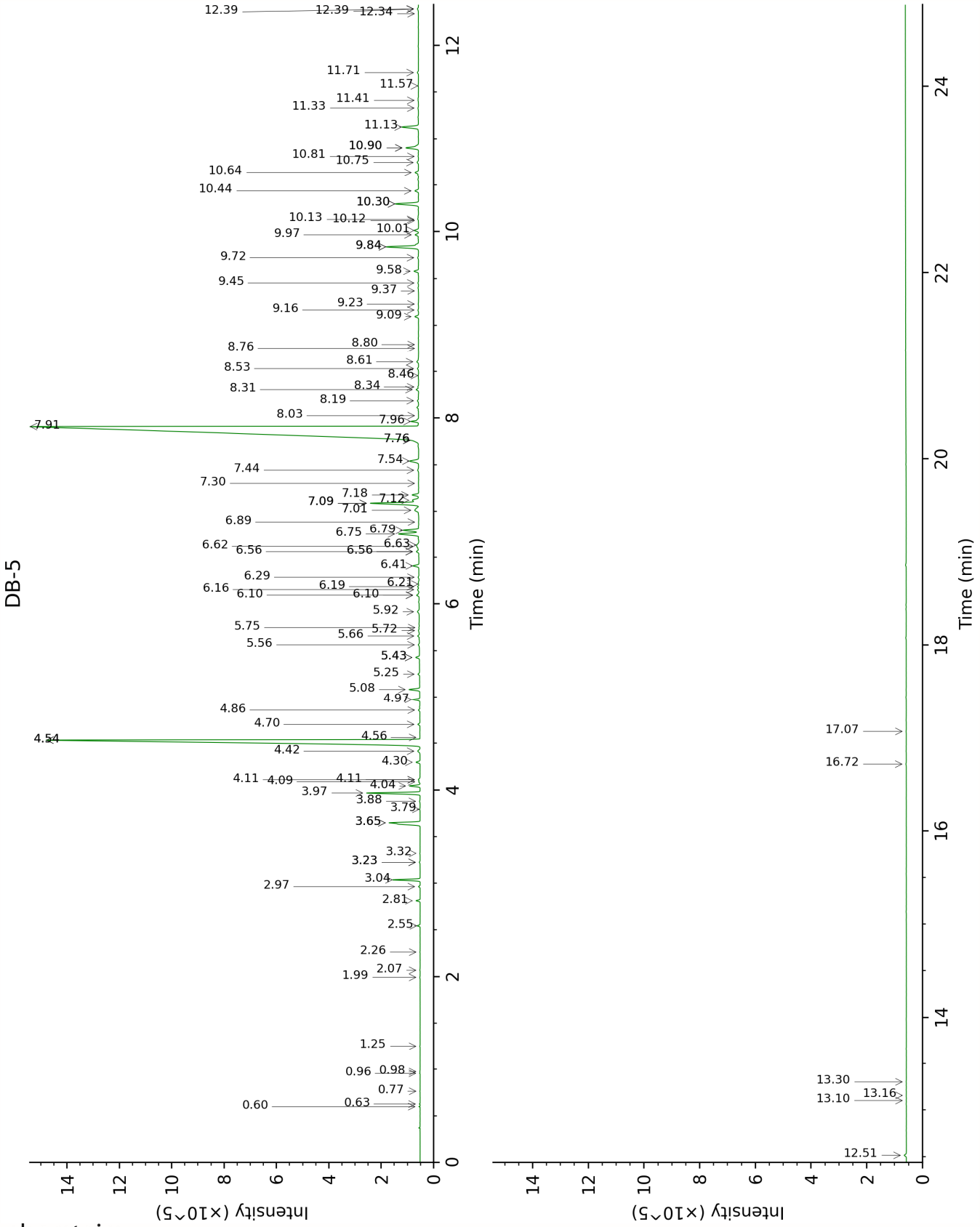

DB-WAX
Time (min)
Intensity (×10^5)
12.34
12.26
11.99
11.34
11.14
11.01
10.79
10.77
10.48
10.36
10.20
10.05
10.01
9.97
9.83
9.76
9.68
9.50
9.44
9.28
9.17
9.11
9.08
8.91
8.78
8.63
8.58
8.53
8.30
8.21
8.10
8.04
7.98
7.87
7.85
7.80
7.78
7.74
7.62
7.12
7.07
7.00
6.95
6.93
6.79
6.75
6.72
6.62
6.57
6.51
6.47
6.43
6.27
6.23
6.07
5.97
5.76
5.54
5.46
5.12
4.94
4.41
4.17
4.12
3.97
3.79
3.69
3.51
3.18
3.17
3.04
2.96
2.70
2.63
2.57
2.53
2.06
1.89
1.52
1.49
1.39
1.27
1.22
1.13
0.82
0.68
0.67
15.40
15.05
14.96
14.48
13.97
13.57


DB-5
Time (min)
Intensity (×10^5)
12.39
12.34
11.71
11.57
11.41
11.33
11.13
10.90
10.81
10.75
10.64
10.44
10.30
10.13
10.12
9.97
10.01
9.84
9.72
9.58
9.45
9.37
9.23
9.16
9.09
8.80
8.76
8.61
8.53
8.46
8.34
8.31
8.19
8.03
7.96
7.91
7.76
7.54
7.44
7.30
7.18
7.09
7.12
7.01
6.89
6.79
6.75
6.63
6.62
6.56
6.56
6.41
6.29
6.21
6.19
6.16
6.10
6.10
5.92
5.75
5.72
5.66
5.56
5.43
5.25
5.08
4.97
4.86
4.70
4.56
4.54
4.42
4.30
4.11
4.09
4.11
4.04
3.97
3.88
3.79
3.65
3.32
3.23
3.04
2.97
2.81
2.55
2.26
2.07
1.99
1.25
0.98
0.96
0.77
0.63
0.60
17.07
16.72
13.30
13.16
13.10
12.51

FULL ANALYSIS DATA

Isovaleral	Column DB-WAX			Column DB-5		
	0.68	886.3	0.02	0.60	642.7	0.02
2-Methylbutyral	0.67	880.4	0.01	0.63	652.9	0.01
2-Ethylfuran	0.82	921.2	tr	0.76	702.6	tr
Isoamyl alcohol	3.17	1177.4	0.01	0.96	732.4	0.01
2-Methylbutanol	3.18	1178.5	0.01	0.98	735.1	0.01
Methyl 2-methylbutyrate	1.13	976.4	0.01	1.25	775.0	0.01
Ethyl 2-methylbutyrate	1.49	1024.4	0.01	1.99	849.7	0.01
(3*Z*)-Hexenol	5.46	1347.2	0.01	2.07	856.1	0.01
Hexanol	5.12	1322.3	0.01	2.26	872.5	0.01
trans-2,5-Diethyltetrahydrofuran	1.39	1014.7	0.09	2.55	896.3	0.08
Hashishene	1.22*	990.9	[0.95]	2.81	915.9	0.12
α-Thujene	1.27	1000.8	0.05	2.97	926.1	0.05
α-Pinene	1.22*	990.9	[0.95]	3.04	930.9	0.82
Camphene	1.52	1028.1	0.03	3.23*	943.4	[0.03]
3-Methylcyclohexanone	4.41	1271.6	0.01	3.23*	943.4	[0.03]
Thuja-2,4(10)-diene	2.06*	1083.8	[0.61]	3.32	949.9	0.01
β-Pinene	1.89	1065.7	0.97	3.65*	971.8	[1.57]
Sabinene	2.06*	1083.8	[0.61]	3.65*	971.8	[1.57]
Octen-3-ol	6.47	1421.4	0.02	3.79	981.5	0.02
Octan-3-one	3.69*	1218.0	[0.07]	3.88	987.2	0.03
Myrcene	2.63	1134.4	1.76	3.97	993.2	1.76
Octan-3-ol	5.76	1368.7	0.36	4.04	998.3	0.35
Pseudolimonene	2.57	1129.2	0.05	4.09	1001.3	0.05
Octanal	4.17	1253.7	0.01	4.11*	1002.8	[0.08]
α-Phellandrene	2.53	1126.0	0.02	4.11*	1002.8	[0.08]
α-Terpinene	2.70	1139.6	0.14	4.30	1014.8	0.14
para-Cymene	3.79	1225.5	0.12	4.42	1022.3	0.12
1,8-Cineole	3.04	1167.0	1.73	4.54*	1029.8	[24.31]
Limonene	2.96	1160.6	22.57	4.54*	1029.8	[24.31]
2-Ethylhexanol	6.95	1457.8	0.01	4.56	1031.6	0.01
(*Z*)-β-Ocimene	3.51*	1204.6	[0.34]	4.70	1040.5	0.07
(*E*)-β-Ocimene	3.69*	1218.0	[0.07]	4.86	1050.2	0.05
γ-Terpinene	3.51*	1204.6	[0.34]	4.97	1057.6	0.26
cis-Sabinene hydrate	6.57	1429.3	0.38	5.08	1064.6	0.37
Octanol	7.85*	1526.6	[0.06]	5.25	1075.1	0.06
Terpinolene	3.97	1238.6	0.10	5.43*	1086.5	[0.14]
para-Cymenene	5.97	1384.0	0.04	5.43*	1086.5	[0.14]
trans-Sabinene hydrate	7.62	1508.5	0.04	5.56	1095.2	0.05
Linalool	7.74	1517.5	0.06	5.66	1101.2	0.06

Nonanal	5.54	1353.2	0.02	5.72	1104.9	0.05
2-Methylbutyl 2-methylbutyrate	4.12	1250.2	0.02	5.75	1106.9	0.02
trans-*para*-Mentha-2,8-dien-1-ol	8.63*	1587.8	[0.17]	5.92	1118.0	0.10
Octan-3-yl acetate	4.94	1309.1	0.08	6.10*	1129.5	[0.11]
cis-Limonene oxide	6.07	1391.3	0.02	6.10*	1129.5	[0.11]
cis-*para*-Mentha-2,8-dien-1-ol	9.11	1626.5	0.11	6.16	1133.4	0.07
trans-Limonene oxide	6.23	1403.5	0.06	6.19	1135.4	0.05
Camphor	6.93	1456.3	0.04	6.22	1137.2	0.02
Isopulegol	7.78*	1520.7	[0.27]	6.29	1142.0	0.03
Menthone	6.27	1406.2	0.22	6.41	1149.9	0.22
Menthofuran	6.51	1424.6	0.02	6.56*	1159.8	[0.10]
Isomenthone	6.62	1432.5	0.07	6.56*	1159.8	[0.10]
neo-Menthol	8.21*	1554.6	[0.59]	6.62	1163.6	0.08
δ-Terpineol	9.08*	1623.7	[0.17]	6.63	1164.4	0.09
Menthol	8.78	1599.3	0.94	6.75	1172.2	0.89
Terpinen-4-ol	8.21*	1554.6	[0.59]	6.79	1174.7	0.61
Isomenthol	8.53	1580.3	0.02	6.89	1180.9	0.01
α-Terpineol	9.44*†	1653.8	[0.63]	7.01	1189.2	0.30
cis-Dihydrocarvone	8.10	1546.0	1.79	7.09*†	1194.1	[2.03]
neo-Dihydrocarveol	9.76	1680.0	0.53	7.09*†	1194.1	[2.03]
Dihydrocarveol	10.05*	1703.7	[0.12]	7.12*†	1196.2	[0.32]
trans-Dihydrocarvone	8.30	1562.2	0.24	7.18	1199.9	0.26
trans-Piperitol	9.97	1697.1	0.02	7.30	1208.0	0.02
iso-Dihydrocarveol ?	10.36*	1730.6	[0.04]	7.44	1217.6	0.06
trans-Carveol	11.01	1786.1	0.47	7.54	1224.3	0.45
Pulegone	8.58*	1584.2	[0.05]	7.76*	1239.5	[0.24]
cis-Carveol	11.34	1814.9	0.24	7.76*	1239.5	[0.24]
Carvone	9.68*	1673.4	[56.11]	7.91	1249.6	56.14
Piperitone	9.50	1658.4	0.20	7.96	1253.3	0.25
cis-Carvone oxide	10.48	1740.3	0.01	8.03	1257.6	0.01
Isopiperitenone	10.77	1765.4	0.05	8.19	1268.6	0.06
trans-Carvone oxide	10.79	1767.6	0.10	8.31	1276.7	0.09
Decanol	10.36*	1730.6	[0.04]	8.34	1278.7	0.03
Dihydroedulan I	6.75	1442.5	0.03	8.46	1287.0	0.02
Menthyl acetate	7.80	1522.8	0.02	8.53	1292.1	0.05
Dihydroedulan II	7.07	1466.6	0.06	8.60	1297.2	0.10
Isomenthyl acetate	7.87	1528.1	0.01	8.80	1306.5	0.01
neo-Dihydrocarvyl acetate	8.58*	1584.2	[0.05]	8.76	1307.4	0.01
Dihydrocarvyl acetate	9.08*	1623.7	[0.17]	9.09	1327.7	0.14
Bicycloelemene	6.72	1440.0	0.03	9.16	1332.8	0.02
trans-Carvyl acetate	9.83	1685.8	0.02	9.23	1337.3	0.02

α-Cubebene	6.43	1418.5	0.01	9.37	1347.3	0.01
iso-Dihydrocarvyl acetate				9.45	1353.3	0.02
cis-Carvyl acetate	10.20	1716.6	0.17	9.58	1362.3	0.17
α-Copaene	6.79	1445.3	0.03	9.72	1372.5	0.04
β-Bourbonene	7.12	1470.9	1.32	9.84*	1380.8	[1.35]
1,5-diepi-β-Bourbonene	7.00	1461.7	0.11	9.84*	1380.8	[1.35]
β-Elemene	8.04*	1541.5	[0.87]	9.97	1389.9	0.14
(*Z*)-Jasmone	11.99	1873.2	0.16	10.01	1393.3	0.17
Unknown MEPI VIII [m/z 106, 119 (99), 43 (78), 91 (74), 105 (60), 134 (55)... 204 (19)]	11.14	1797.5	0.01	10.12	1400.7	0.01
Isocaryophyllene	7.85*	1526.6	[0.06]	10.13	1401.6	0.04
β-Ylangene	7.78*	1520.7	[0.27]	10.30*	1413.9	[1.00]
β-Caryophyllene	8.04*	1541.5	[0.87]	10.30*	1413.9	[1.00]
β-Copaene	7.98	1537.0	0.15	10.44	1424.3	0.15
Isogermacrene D	8.58*	1584.2	[0.05]	10.64	1439.5	0.14
α-Humulene	8.91	1609.7	0.06	10.75	1447.5	0.06
allo-Aromadendrene	8.63*	1587.8	[0.17]	10.81	1452.5	0.02
(*E*)-β-Farnesene	9.17	1631.1	0.04	10.90*	1459.4	[0.61]
Unknown MISC XLIX [m/z 161, 105 (56), 91 (50), 93 (36), 119 (33), 79 (31)...204 (5)]				10.90*	1459.4	[0.61]
Germacrene D	9.44*†	1653.8	[0.63]	11.13	1476.1	0.73
Viridiflorene	9.28	1640.6	0.05	11.33	1491.3	0.03
α-Muurolene	9.68*	1673.4	[56.11]	11.41	1497.5	0.02
γ-Cadinene	10.01	1700.6	0.09	11.57	1509.3	0.02
δ-Cadinene	10.05*	1703.7	[0.12]	11.71	1520.6	0.05
Spathulenol	13.97	2059.7	0.01	12.34	1570.4	0.01
Caryophyllene oxide	12.34	1904.4	0.04	12.39*	1574.6	[0.05]
Caryophyllene oxide isomer	12.26	1897.8	0.01	12.39*	1574.6	[0.05]
Viridiflorol	13.57	2020.0	0.09	12.51	1584.1	0.09
Isospathulenol	15.05*	2166.5	[0.01]	13.10	1631.8	0.01
τ-Cadinol	14.48	2108.7	0.01	13.16	1636.4	0.01
α-Cadinol	15.05*	2166.5	[0.01]	13.30	1648.5	0.01
meta-Camphorene	14.96	2157.8	0.03	16.72	1951.0	0.02
para-Camphorene	15.40	2202.0	0.01	17.07	1984.5	0.01
Total reported		97.53%			98.75%	

*: 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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