

Date : 2025-12-15

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 25J07-PTH04

Customer Identification : Peppermint - India - P50118R

Type : Essential Oil

Source : *Mentha x piperita*

Customer : Plant Therapy

Checked and 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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 2025-10-09 to make a correction in the sample identification section.



Laboratoire
PhytoChemia

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 : 2025-10-08

PHYSICOCHEMICAL DATA

Refractive index : 1.4594 ± 0.0003 (20 °C)

Method : PC-MAT-016 - Measure of the refractive index of a liquid.

Analyst : Cindy Caron B. Sc.

Date : 2025-10-07

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
Isovaleral	0.02	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	0.01	Aliphatic alcohol
Ethyl 2-methylbutyrate	0.01	Aliphatic ester
(3Z)-Hexenol	0.01	Aliphatic alcohol
Hexanol	tr	Aliphatic alcohol
<i>trans</i> -2,5-Diethyltetrahydrofuran	0.01	Furan
Hashishene	0.01	Monoterpene
α -Thujene	0.02	Monoterpene
α -Pinene	0.85	Monoterpene
<i>trans</i> -3-Methylcyclohexanol	0.02	Aliphatic alcohol
3-Methylcyclohexanone	0.04	Aliphatic ketone
Camphene	0.01	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
β -Pinene	1.26	Monoterpene
Sabinene	0.13	Monoterpene
<i>cis</i> -Carane	0.05	Monoterpene
Octen-3-ol	0.01	Aliphatic alcohol
Octan-3-one	0.02	Aliphatic ketone
Myrcene	0.11	Monoterpene
Octan-3-ol	0.06	Aliphatic alcohol
Pseudolimonene	0.02	Monoterpene
α -Phellandrene	0.03	Monoterpene
Δ^3 -Carene	0.02	Monoterpene
1,4-Cineole	[0.07]	Monoterpenic ether
α -Terpinene	[0.07]	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
<i>para</i> -Cymene	0.34	Monoterpene
Limonene	2.38	Monoterpene
1,8-Cineole	5.34	Monoterpenic ether
2-Ethylhexanol	0.01	Aliphatic alcohol
(Z)- β -Ocimene	0.05	Monoterpene
(E)- β -Ocimene	0.03	Monoterpene
γ -Terpinene	0.24	Monoterpene
<i>cis</i> -Sabinene hydrate	0.11	Monoterpenic alcohol
<i>para</i> -Mentha-3,8-diene	0.01	Monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Octanol	0.05	Aliphatic alcohol
Terpinolene isomer	0.01	Monoterpene
Terpinolene	0.04	Monoterpene

<i>para</i> -Cymenene	0.02	Monoterpene
<i>para</i> -Cresol	0.01	Simple phenolic
Nonan-3-ol	0.05	Aliphatic alcohol
Linalool	0.06	Monoterpenic alcohol
2-Methylbutyl 2-methylbutyrate	0.01	Aliphatic ester
Amyl isovalerate	0.01	Aliphatic ester
β -Thujone	0.02	Monoterpenic ketone
Octen-3-yl acetate	0.01	Aliphatic ester
<i>cis-para</i> -Menth-2-en-1-ol	0.02	Monoterpenic alcohol
Camphor	0.03	Monoterpenic ketone
<i>trans</i> -Sabinol	0.02	Monoterpenic alcohol
Isopulegol	0.13	Monoterpenic alcohol
<i>cis</i> - α -Dihydroterpineol	0.01	Monoterpenic alcohol
Menthone	25.94	Monoterpenic ketone
Isomenthone	4.04	Monoterpenic ketone
Menthofuran	1.29	Monoterpenic ether
neo-Menthol	3.22	Monoterpenic alcohol
Terpinen-4-ol	0.13	Monoterpenic alcohol
Menthol	40.61	Monoterpenic alcohol
Isomenthol	0.20	Monoterpenic alcohol
<i>para</i> -Cymen-8-ol	0.03	Monoterpenic alcohol
neoiso-Menthol	0.14	Monoterpenic alcohol
α -Terpineol	0.17	Monoterpenic alcohol
Methylchavicol	0.01	Phenylpropanoid
Dihydrocarveol	0.05	Monoterpenic alcohol
Unknown	tr	Unknown
4,7-Dimethylbenzofuran?	0.04	Furan
Unknown UNKN CCCXCVIII [m/z 43, 99 (91), 81 (48), 86 (45), 126 (36)...]	0.04	Unknown
<i>trans</i> -Carveol	0.02	Monoterpenic alcohol
<i>cis</i> -Carveol	0.02	Monoterpenic alcohol
Citronellol	0.02	Monoterpenic alcohol
Pulegone	0.54	Monoterpenic ketone
Carvone	0.03	Monoterpenic ketone
Piperitone	0.61	Monoterpenic ketone
neo-Menthyl acetate	0.09	Monoterpenic ester
2-Ethylmenthone?	0.01	Aliphatic ketone
Dihydroedulan I	0.02	Terpenic ether
Dihydroedulan II	0.03	Terpenic ether
Menthyl acetate	5.07	Monoterpenic ester
Thymol	0.02	Monoterpenic alcohol
Isomenthyl acetate	0.06	Monoterpenic alcohol
Bicycloelemene	0.04	Sesquiterpene
Piperitenone	0.01	Monoterpenic ketone
Longicyclene	0.03	Sesquiterpene

α -Ylangene	0.03	Sesquiterpene
α -Copaene	0.02	Sesquiterpene
β -Bourbonene isomer	0.04	Sesquiterpene
Unknown	0.15	Unknown
β -Bourbonene	0.08	Sesquiterpene
1,5-diepi- β -Bourbonene	0.05	Sesquiterpene
β -Elemene	0.06	Sesquiterpene
Longifolene	0.07	Sesquiterpene
Isocaryophyllene	0.04	Sesquiterpene
β -Ylangene	0.24	Sesquiterpene
β -Caryophyllene	3.24	Sesquiterpene
Unknown	[0.05]	Unknown
Unknown	[0.05]	Unknown
β -Copaene	0.05	Sesquiterpene
Aromadendrene	0.02	Sesquiterpene
Isogermacrene D	0.02	Sesquiterpene
Unknown	0.01	Sesquiterpene
α -Humulene	0.07	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.06	Sesquiterpene
γ -Murolene	0.03	Sesquiterpene
Germacrene D	0.25	Sesquiterpene
Viridiflorene	0.04	Sesquiterpene
Bicyclogermacrene	0.06	Sesquiterpene
5-Methyl-2,4-diisopropylphenol	0.01	Terpene derivative
α -Murolene	0.03	Sesquiterpene
γ -Cadinene	0.02	Sesquiterpene
δ -Cadinene	0.05	Sesquiterpene
Isocaryophyllene epoxide B	0.01	Sesquiterpenic ether
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.07	Sesquiterpenic ether
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Viridiflorol	0.04	Sesquiterpenic alcohol
Isospathulenol	0.02	Sesquiterpenic alcohol
Consolidated total	99.30	

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

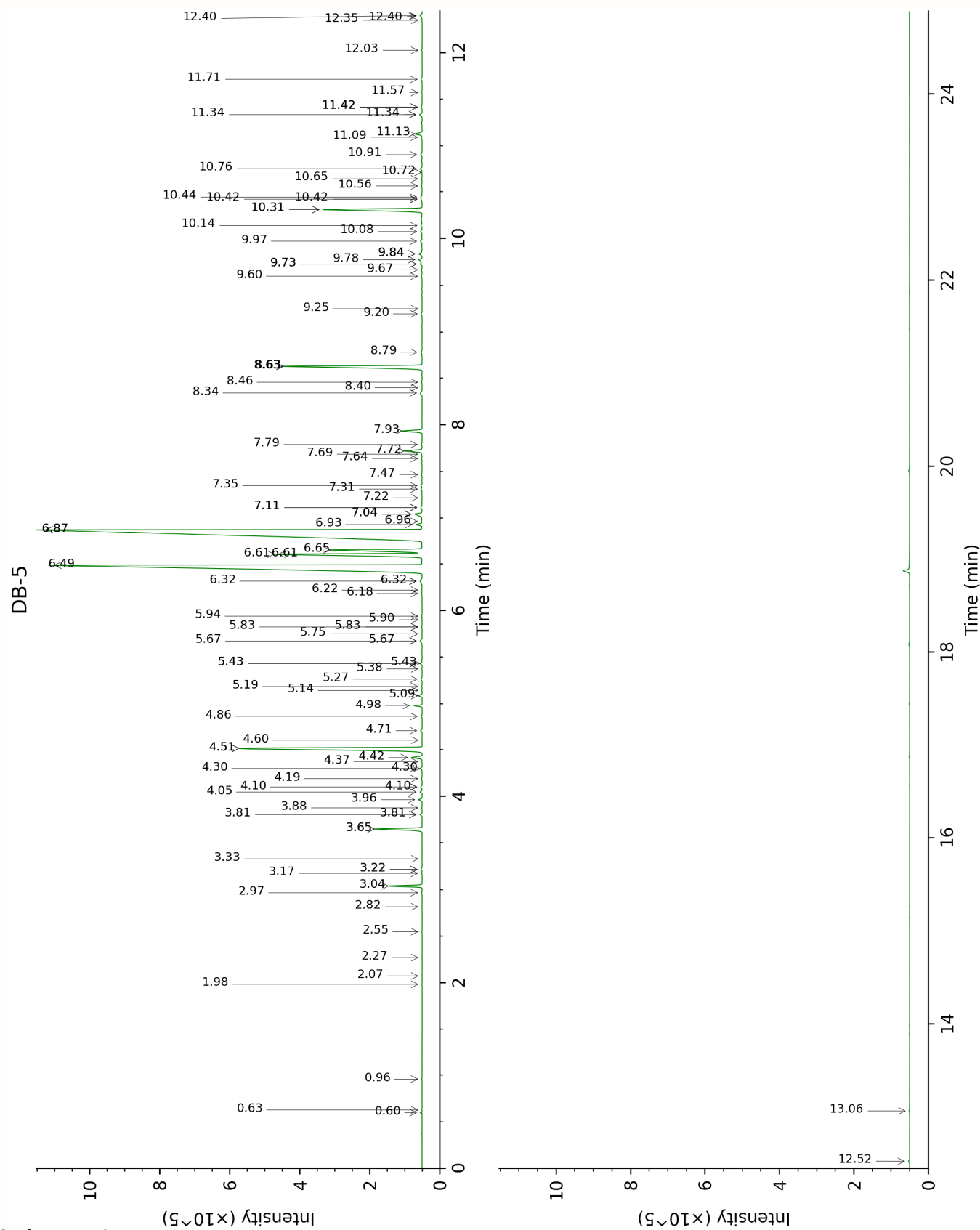
Note: no correction factor was applied

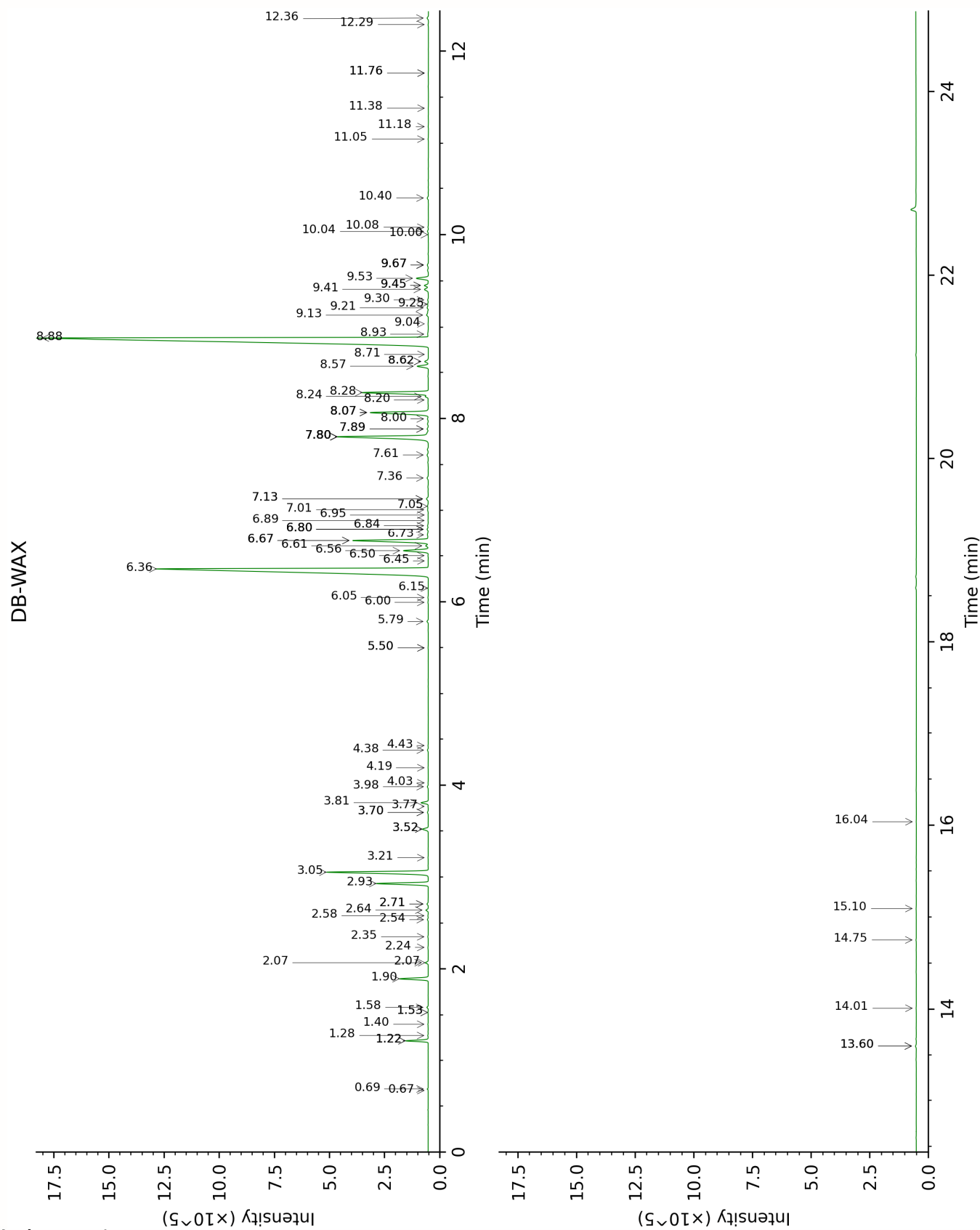
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

This page was intentionally left blank. The following pages present the complete data of the analysis.





FULL ANALYSIS DATA

Isovaleral	Column DB-5			Column DB-WAX		
	0.60	642.4	0.02	0.69	885.2	0.02
2-Methylbutyral	0.63	653.0	tr	0.67	878.6	tr
Isoamyl alcohol	0.96	732.7	0.01	3.21	1178.6	0.01
Ethyl 2-methylbutyrate	1.98	849.1	0.01	1.53*	1025.6	[0.01]
(3Z)-Hexenol	2.07	856.6	0.01	5.50*	1347.9	[0.01]
Hexanol	2.27	873.2	tr			
trans-2,5-Diethyltetrahydrofuran	2.55	896.7	0.01	1.40	1012.3	0.01
Hashishene	2.82	916.3	0.01	1.22*	988.3	[0.85]
α -Thujene	2.97	926.3	0.02	1.28	998.3	0.02
α -Pinene	3.04	931.2	0.85	1.22*	988.3	[0.85]
trans-3-Methylcyclohexanol	3.18	940.3	0.02	6.50	1421.5	0.02
3-Methylcyclohexanone	3.22*	943.1	[0.04]	4.38	1268.2	0.04
Camphene	3.22*	943.1	[0.04]	1.53*	1025.6	[0.01]
Thuja-2,4(10)-diene	3.33	950.7	0.01	2.07*	1081.7	[0.12]
β -Pinene	3.65*	972.2	[1.39]	1.90	1063.6	1.26
Sabinene	3.65*	972.2	[1.39]	2.07*	1081.7	[0.12]
cis-Carane	3.80*	982.5	[0.07]	1.58	1031.4	0.05
Octen-3-ol	3.80*	982.5	[0.07]	6.45	1417.2	0.01
Octan-3-one	3.88	987.4	0.02	3.70*	1217.3	[0.04]
Myrcene	3.96	993.2	0.11	2.64	1132.4	0.10
Octan-3-ol	4.05	998.8	0.06	5.79	1368.8	0.06
Pseudolimonene	4.10*	1002.4	[0.06]	2.58	1127.4	0.02
α -Phellandrene	4.10*	1002.4	[0.06]	2.54	1124.0	0.03
Δ^3 -Carene	4.19	1008.2	0.02	2.35	1109.0	0.02
1,4-Cineole	4.30*	1015.1	[0.07]	2.71*	1137.7	[0.06]
α -Terpinene	4.30*	1015.1	[0.07]	2.71*	1137.7	[0.06]
Carvomenthene	4.37	1019.8	0.01	2.24	1099.1	0.02
para-Cymene	4.42	1022.5	0.34	3.81	1225.3	0.33
Limonene	4.52*	1028.8	[7.67]	2.93	1155.8	2.38
1,8-Cineole	4.52*	1028.8	[7.67]	3.05	1165.8	5.34
2-Ethylhexanol	4.60	1034.4	0.01	6.95	1455.2	0.01
(Z)- β -Ocimene	4.71	1040.9	0.05	3.52*	1203.8	[0.29]
(E)- β -Ocimene	4.86	1050.6	0.03	3.70*	1217.3	[0.04]
γ -Terpinene	4.98	1058.0	0.24	3.52*	1203.8	[0.29]
cis-Sabinene hydrate	5.09	1065.2	0.11	6.61	1429.5	0.12
para-Mentha-3,8-diene	5.14	1068.8	0.01	3.77	1222.3	0.01
cis-Linalool oxide (fur.)	5.19	1071.4	0.01	6.15	1395.2	0.01
Octanol	5.27	1076.4	0.05	7.89*	1526.4	[0.06]
Terpinolene isomer	5.38	1083.4	0.01	4.02	1241.5	0.01
Terpinolene	5.43*†	1087.1	[0.06]	3.98	1238.3	0.04

<i>para</i> -Cymenene	5.43*†	1087.1	[0.06]	6.00	1383.9	0.02
<i>para</i> -Cresol	5.43*†	1087.1	[0.06]	13.60*	2018.2	[0.04]
Nonan-3-ol	5.68*	1102.5	[0.10]	7.01	1459.5	0.05
Linalool	5.68*	1102.5	[0.10]	7.80*	1519.8	[5.58]
2-Methylbutyl 2-methylbutyrate	5.75	1107.4	0.01	4.19	1253.8	0.01
Amyl isovalerate	5.83*	1112.2	[0.02]	4.43	1272.0	0.01
β-Thujone	5.83*	1112.2	[0.02]	6.05	1387.8	0.02
Octen-3-yl acetate	5.90	1117.2	0.01	5.50*	1347.9	[0.01]
<i>cis-para</i> -Menth-2-en-1-ol	5.94	1119.7	0.02	7.80*	1519.8	[5.58]
Camphor	6.18	1135.4	0.03	6.89	1450.7	0.02
<i>trans</i> -Sabinol	6.22	1137.8	0.02	9.45*†	1651.1	[0.21]
Isopulegol	6.32*	1144.0	[0.14]	7.80*	1519.8	[5.58]
<i>cis</i> -α-Dihydroterpineol	6.32*	1144.0	[0.14]	7.89*	1526.4	[0.06]
Menthone	6.49	1155.1	25.94	6.36	1410.7	26.19
Isomenthone	6.61*	1162.8	[5.33]	6.67*	1433.9	[4.09]
Menthofuran	6.61*	1162.8	[5.33]	6.56	1425.6	1.29
neo-Menthol	6.65	1165.8	3.22	8.28	1557.5	3.24
Terpinen-4-ol	6.87*	1180.3	[40.86]	8.24	1554.1	0.13
Menthol	6.87*	1180.3	[40.86]	8.88	1604.5	40.61
Isomenthol	6.93	1184.0	0.20	8.62*	1583.9	[0.20]
<i>para</i> -Cymen-8-ol	6.96	1186.2	0.03	11.18	1796.8	0.02
neoiso-Menthol	7.04*	1191.3	[0.31]	9.13	1624.8	0.14
α-Terpineol	7.04*	1191.3	[0.31]	9.45*†	1651.1	[0.21]
Methylchavicol	7.11*	1195.9	[0.06]	9.04	1617.0	0.01
Dihydrocarveol	7.11*	1195.9	[0.06]	10.04	1698.9	0.05
Unknown MEPI V [m/z 43, 99 (84), 81 (46), 986 (43), 126 (36), 71 (28)... 170 (12)]	7.22	1202.6	tr			
4,7-Dimethylbenzofuran?	7.31	1208.9	0.04			
Unknown UNKN CCCXCVIII [m/z 43, 99 (91), 81 (48), 86 (45), 126 (36)...]	7.35	1211.4	0.04			
<i>trans</i> -Carveol	7.47	1219.5	0.02	11.05	1785.2	0.02
<i>cis</i> -Carveol	7.64	1231.2	0.02	11.38	1814.4	0.01
Citronellol	7.69	1234.4	0.02	10.40	1729.7	0.07
Pulegone	7.72	1236.8	0.54	8.57	1579.9	0.57
Carvone	7.79	1241.5	0.03	9.67*	1669.2	[0.07]
Piperitone	7.94	1251.4	0.61	9.53	1657.4	0.61
neo-Menthyl acetate	8.34	1279.3	0.09	7.36	1485.5	0.07
2-Ethylmenthone?	8.40	1283.2	0.01			

Dihydroedulan I	8.46	1287.1	0.02	6.80*	1443.5	[0.06]
Dihydroedulan II	8.63*	1298.8	[5.11]	7.13*	1468.4	[0.11]
Menthyl acetate	8.63*	1298.8	[5.11]	7.80*	1519.8	[5.58]
Thymol	8.63*	1298.8	[5.11]	14.75	2131.3	0.02
Isomenthyl acetate	8.79	1306.7	0.06	8.00	1535.0	0.04
Bicycloelemene	9.20	1335.8	0.04	6.73	1438.5	0.07
Piperitenone	9.25	1339.7	0.01	11.76*	1848.6	[0.02]
Longicyclone	9.60	1364.4	0.03	6.80*	1443.5	[0.06]
α -Ylangene	9.67	1369.2	0.03	6.67*	1433.9	[4.09]
α -Copaene	9.73*	1373.6	[0.06]	6.80*	1443.5	[0.06]
β -Bourbonene isomer	9.73*	1373.6	[0.06]	6.84	1446.5	0.04
Unknown UNKN CLXIV [m/z 81, 163 (41), 80 (31), 107 (15), 79 (14), 93 (10)...]	9.78	1376.9	0.15			
β -Bourbonene	9.84*	1381.3	[0.13]	7.13*	1468.4	[0.11]
1,5-diepi- β - Bourbonene	9.84*	1381.3	[0.13]	7.05	1462.4	0.05
β -Elemene	9.97	1391.0	0.06	8.07*	1540.4	[3.34]
Longifolene	10.08	1398.3	0.07	7.60	1504.3	0.08
Isocaryophyllene	10.14	1402.8	0.04	7.80*	1519.8	[5.58]
β -Ylangene	10.31*	1415.5	[3.48]	7.80*	1519.8	[5.58]
β -Caryophyllene	10.31*	1415.5	[3.48]	8.07*	1540.4	[3.34]
Unknown MISC CX [m/z 177, 109 (32), 192 (26), 95 (25), 137 (23)]	10.42*	1423.7	[0.05]			
Unknown MISC CXLVIII [m/z 109, 81 (79), 95 (73), 68 (63), 82 (55), 69 (54), 55 (51), 163 (47)...]	10.42*	1423.7	[0.05]			
β -Copaene	10.44	1425.4	0.05	8.07*	1540.4	[3.34]
Aromadendrene	10.56	1434.3	0.02	8.20	1551.1	0.01
Isogermacrene D	10.65	1440.7	0.02	8.62*	1583.9	[0.20]
Unknown PIRA III [m/z 91, 93 (92), 105 (79), 133 (70), 79 (70), 92 (65)... 204 (5)]	10.72	1445.8	0.01	8.71	1590.5	0.01
α -Humulene	10.76	1448.8	0.07	8.92	1607.9	0.05
(E)- β -Farnesene	10.91	1460.0	0.06	9.21	1631.3	0.07
γ -Murolene	11.09	1474.0	0.03	9.25	1634.4	0.04
Germacrene D	11.13	1476.9	0.25	9.41*†	1647.6	[0.25]
Viridiflorene	11.34*	1492.2	[0.09]	9.30	1638.2	0.04
Bicyclgermacrene	11.34*	1492.2	[0.09]	9.67*	1669.2	[0.07]
5-Methyl-2,4- diisopropylphenol	11.42*	1498.3	[0.04]	16.04	2263.2	0.01

α -Muurolene	11.42*	1498.3	[0.04]	9.67*	1669.2	[0.07]
γ -Cadinene	11.57	1510.2	0.02	10.00	1696.1	0.02
δ -Cadinene	11.71	1521.3	0.05	10.08	1702.6	0.03
Isocaryophyllene epoxide B	12.03	1545.9	0.01	11.76*	1848.6	[0.02]
Spathulenol	12.35	1571.4	0.01	14.01	2058.0	0.01
Caryophyllene oxide	12.40*	1575.4	[0.10]	12.36	1902.1	0.07
Caryophyllene oxide isomer	12.40*	1575.4	[0.10]	12.29	1895.8	0.02
Viridiflorol	12.52	1585.0	0.04	13.60*	2018.2	[0.04]
Isospathulenol	13.06	1628.9	0.02	15.10	2165.8	0.02
Total reported		99.37%			99.19%	

*: 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