Date : 2026-04-24

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 26B17-PTH02
Customer Identification : Peppermint ORGANIC - India - P40118
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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. 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 2026-02-23 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 : Sylvain Mercier, M. Sc., Chimiste 2014-005
Date : 2026-02-20

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 : 2026-02-18

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	0.01	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	0.03	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
trans-2,5-Diethyltetrahydrofuran	0.04	Furan
Hashishene	0.01	Monoterpene
α-Thujene	0.05	Monoterpene
α-Pinene	0.86	Monoterpene
trans-3-Methylcyclohexanol	0.01	Aliphatic alcohol
Camphene	0.02	Monoterpene
3-Methylcyclohexanone	0.07	Aliphatic ketone
α-Fenchene	tr	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Sabinene	0.49	Monoterpene
β-Pinene	1.13	Monoterpene
Octen-3-ol	0.08	Aliphatic alcohol
cis-Carane	0.01	Monoterpene
Octan-3-one	0.04	Aliphatic ketone
Myrcene	0.23	Monoterpene
Octan-3-ol	0.20	Aliphatic alcohol
Pseudolimonene	0.02	Monoterpene
α-Phellandrene	0.04	Monoterpene
α-Terpinene	0.21	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
para-Cymene	0.26	Monoterpene
1,8-Cineole	4.92	Monoterpenic ether
Limonene	2.20	Monoterpene
(*Z*)-β-Ocimene	0.16	Monoterpene
(*E*)-β-Ocimene	0.06	Monoterpene
γ-Terpinene	0.37	Monoterpene
cis-Sabinene hydrate	0.28	Monoterpenic alcohol
para-Mentha-3,8-diene	0.01	Monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
para-Cymenene	0.02	Monoterpene
Terpinolene	0.13	Monoterpene
trans-Linalool oxide (fur.)	tr	Monoterpenic alcohol

trans-Sabinene hydrate	0.04	Monoterpenic alcohol
Linalool	0.22	Monoterpenic alcohol
Nonan-3-ol	0.02	Aliphatic alcohol
2-Methylbutyl 2-methylbutyrate	0.04	Aliphatic ester
Amyl isovalerate	0.01	Aliphatic ester
β-Thujone	0.03	Monoterpenic ketone
Phenylethyl alcohol	0.01	Simple phenolic
cis-para-Menth-2-en-1-ol	0.05	Monoterpenic alcohol
Octan-3-yl acetate	0.02	Aliphatic ester
allo-Ocimene	0.01	Monoterpene
cis-para-Mentha-2,8-dien-1-ol	0.03	Monoterpenic alcohol
trans-Sabinol	0.07	Monoterpenic alcohol
Isopulegol	0.16	Monoterpenic alcohol
Menthone	25.21	Monoterpenic ketone
Menthofuran	2.61	Monoterpenic ether
Isomenthone	4.21	Monoterpenic ketone
neo-Menthol	3.39	Monoterpenic alcohol
Terpinen-4-ol	0.66	Monoterpenic alcohol
Menthol	34.56	Monoterpenic alcohol
Isomenthol	0.56	Monoterpenic alcohol
para-Cymen-8-ol	0.05	Monoterpenic alcohol
α-Terpineol	0.40	Monoterpenic alcohol
neoiso-Menthol	0.19	Monoterpenic alcohol
Methyl salicylate	tr	Phenolic ester
Dihydrocarveol	0.06	Monoterpenic alcohol
trans-Isopiperitenol	0.02	Monoterpenic alcohol
Dihydroanethole	0.01	Phenylpropanoid
Unknown	0.02	Unknown
Unknown UNKN CCCXCVIII [m/z 43, 99 (91), 81 (48), 86 (45), 126 (36)...]	0.05	Unknown
trans-Carveol	0.01	Monoterpenic alcohol
(3*Z*)-Hexenyl 2-methylbutyrate	0.03	Aliphatic ester
Citronellol	0.03	Monoterpenic alcohol
(3*Z*)-Hexenyl isovalerate	0.01	Aliphatic ester
Pulegone	1.50	Monoterpenic ketone
Carvone	0.07	Monoterpenic ketone
Piperitone	0.58	Monoterpenic ketone
Pseudodiosphenol	0.02	Monoterpenic alcohol
trans-Ascaridole glycol	0.02	Monoterpenic alcohol
Decanol	0.06	Aliphatic alcohol
neo-Menthyl acetate	0.31	Monoterpenic ester
Bornyl acetate	0.03	Monoterpenic ester
Dihydroedulan I	0.06	Terpenic ether
Dihydroedulan II	0.06	Terpenic ether
Thymol	0.04	Monoterpenic alcohol

Menthyl acetate	5.25	Monoterpenic ester
Diosphenol	0.01	Monoterpenic alcohol
Isomenthyl acetate	0.22	Monoterpenic alcohol
neoiso-Menthyl acetate?	0.01	Monoterpenic ester
Dihydrocarvyl acetate	0.01	Monoterpenic ester
Bicycloelemene	0.06	Sesquiterpene
Piperitenone	0.02	Monoterpenic ketone
α-Cubebene	0.02	Sesquiterpene
Eugenol	0.03	Phenylpropanoid
Longicyclene	0.02	Sesquiterpene
α-Ylangene	0.02	Sesquiterpene
α-Copaene	0.09	Sesquiterpene
β-Bourbonene isomer	0.01	Sesquiterpene
β-Bourbonene	0.24	Sesquiterpene
1,5-diepi-β-Bourbonene	0.02	Sesquiterpene
β-Elemene	0.13	Sesquiterpene
Cyperene	0.05	Sesquiterpene
Longifolene	0.03	Sesquiterpene
Isocaryophyllene	0.05	Sesquiterpene
β-Caryophyllene	2.89	Sesquiterpene
β-Ylangene	0.09	Sesquiterpene
Perillyl acetate	0.02	Monoterpenic ester
Unknown	0.01	Unknown
β-Copaene	0.08	Sesquiterpene
Aromadendrene	0.04	Sesquiterpene
Isogermacrene D	0.04	Sesquiterpene
Unknown	0.01	Sesquiterpene
ε-Muurolene?	0.07	Sesquiterpene
α-Humulene	0.15	Sesquiterpene
Muurola-4,11-diene	0.02	Sesquiterpene
(*E*)-β-Farnesene	0.23	Sesquiterpene
γ-Muurolene	0.03	Sesquiterpene
Germacrene D	0.94	Sesquiterpene
Menthalactone	0.04	Monoterpenic lactone
Viridiflorene	0.10	Sesquiterpene
Bicyclogermacrene	0.13	Sesquiterpene
α-Muurolene	0.04	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
δ-Cadinene	0.08	Sesquiterpene
α-Cadinene	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.01	Sesquiterpenic ether
Spathulenol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.07	Sesquiterpenic ether
Viridiflorol	0.07	Sesquiterpenic alcohol
Consolidated total	**99.06**	

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

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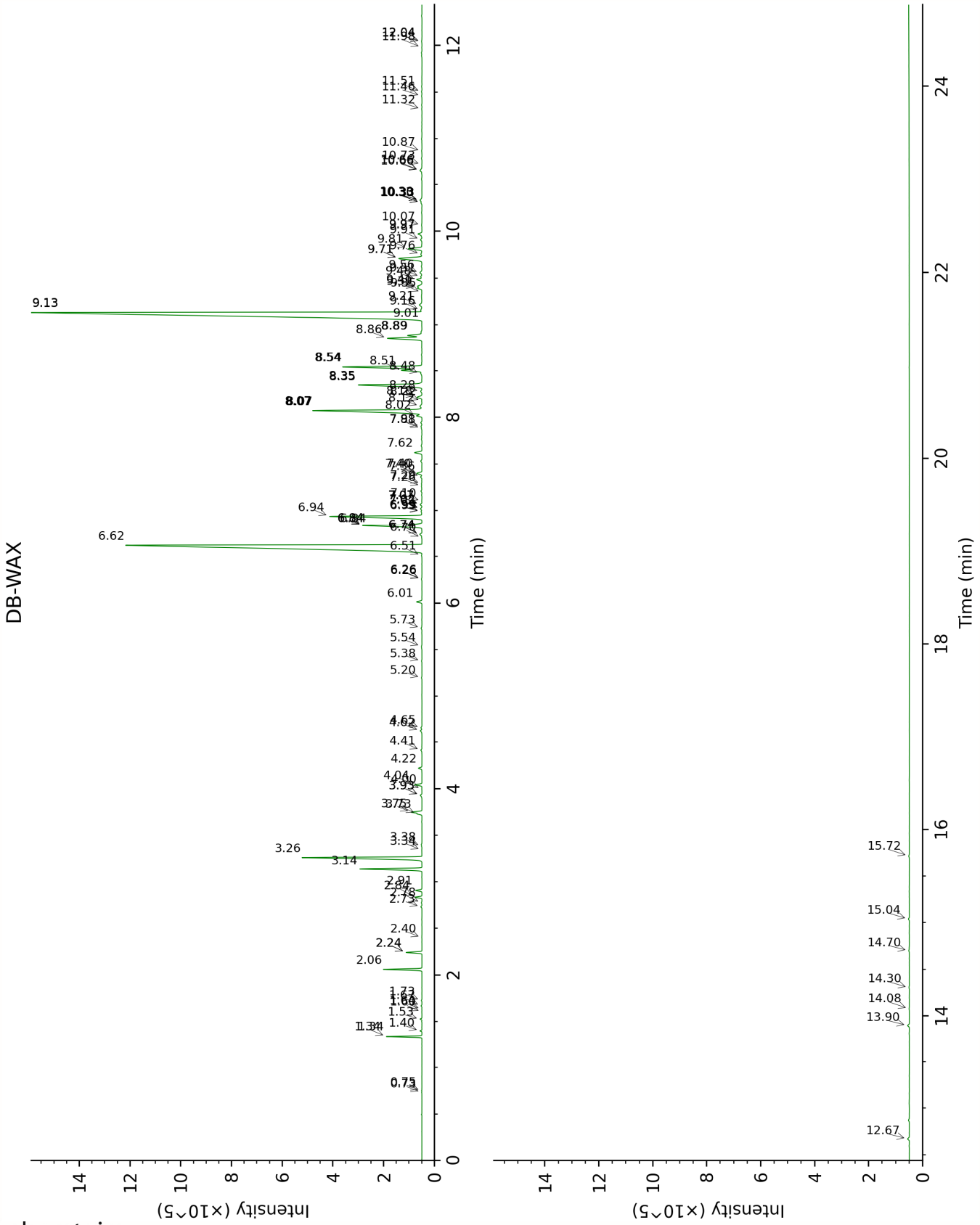
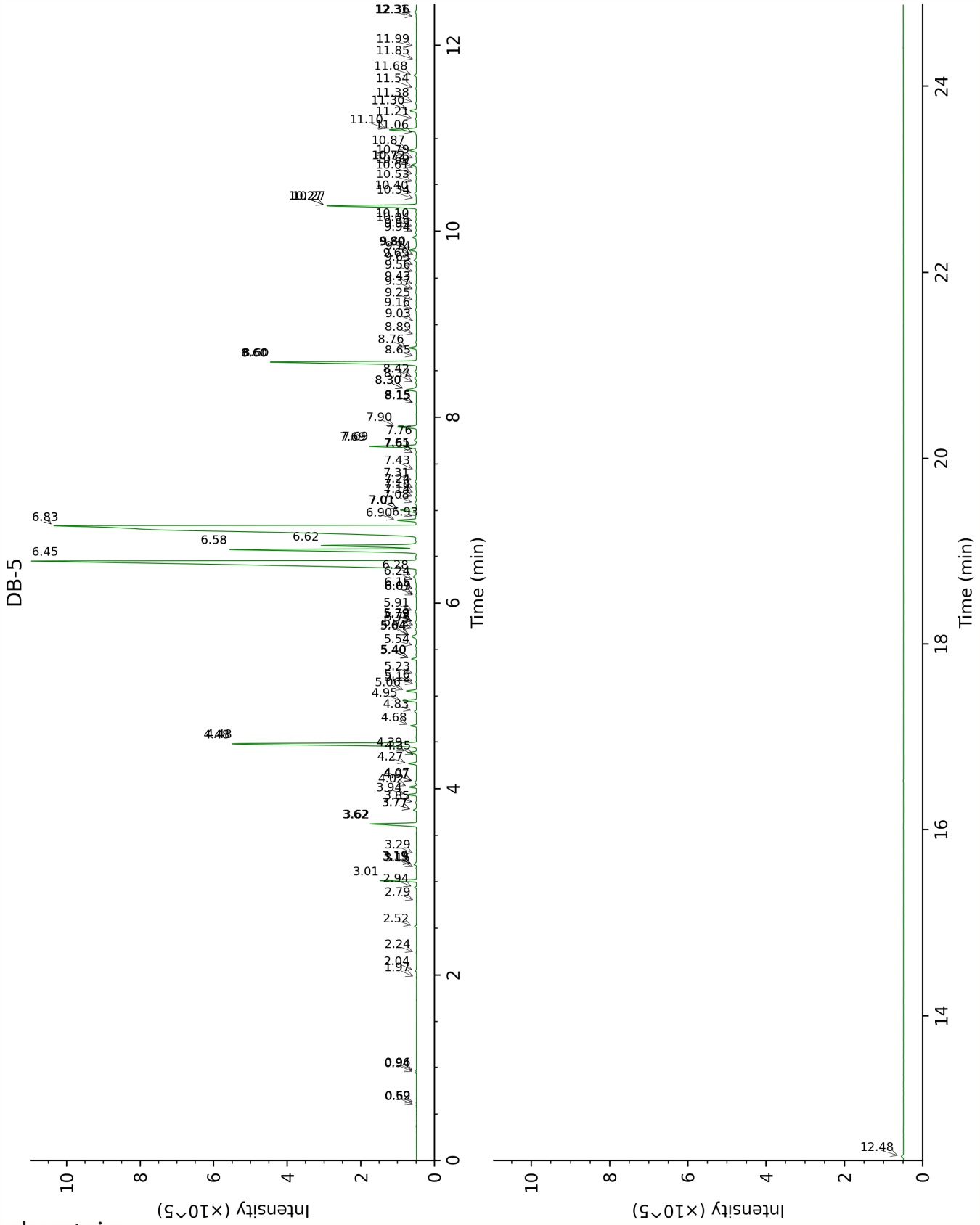

DB-WAX
Time (min)
Intensity (×10^5)
9.13
8.89
8.54
8.35
8.07
6.94
6.62
6.26
3.26
3.14
2.24
2.06
15.72
15.04
14.70
14.30
14.08
13.90
12.67



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FULL ANALYSIS DATA

Isovaleral	Column DB-WAX			Column DB-5		
	0.75	886.5	tr	0.59	642.6	0.01
2-Methylbutyral	0.73	880.2	tr	0.62	653.0	tr
Isoamyl alcohol	3.38	1176.8	0.01	0.94	731.8	0.02
2-Methylbutanol	3.34	1173.4	0.01	0.96	734.7	0.01
Ethyl 2-methylbutyrate	1.64	1023.3	tr	1.97	849.9	0.01
(3*Z*)-Hexenol	5.73	1346.8	0.03	2.04	855.7	0.03
Hexanol	5.38	1321.3	0.02	2.24	872.3	0.01
trans-2,5-Diethyltetrahydrofuran	1.53	1012.7	0.04	2.52	896.6	0.04
Hashishene	1.34*	990.2	[0.85]	2.79	916.3	0.01
α-Thujene	1.40	1000.0	0.04	2.94	926.3	0.05
α-Pinene	1.34*	990.2	[0.85]	3.01	931.1	0.86
trans-3-Methylcyclohexanol	6.74*	1420.4	[0.10]	3.14	939.9	0.01
Camphene	1.67	1026.8	0.02	3.19*	942.7	[0.09]
3-Methylcyclohexanone	4.62	1269.9	0.07	3.19*	942.7	[0.09]
α-Fenchene	1.60	1020.2	tr	3.19*	942.7	[0.09]
Thuja-2,4(10)-diene	2.24*	1083.4	[0.46]	3.29	949.9	0.01
Sabinene	2.24*	1083.4	[0.46]	3.62*	972.0	[1.62]
β-Pinene	2.06	1065.4	1.13	3.62*	972.0	[1.62]
Octen-3-ol	6.74*	1420.4	[0.10]	3.77*	982.0	[0.10]
cis-Carane	1.73	1032.4	0.01	3.77*	982.0	[0.10]
Octan-3-one	3.93*	1218.8	[0.08]	3.85	987.3	0.04
Myrcene	2.84	1133.5	0.22	3.94	993.2	0.23
Octan-3-ol	6.01	1367.3	0.20	4.02	998.7	0.20
Pseudolimonene	2.78	1128.9	0.02	4.07*	1002.2	[0.07]
α-Phellandrene	2.73	1125.5	0.04	4.07*	1002.2	[0.07]
α-Terpinene	2.91	1139.3	0.21	4.27	1014.9	0.21
Carvomenthene	2.40	1099.4	0.01	4.35	1019.8	0.01
para-Cymene	4.04	1227.0	0.26	4.39	1022.3	0.26
1,8-Cineole	3.26	1167.1	4.92	4.48*	1028.4	[7.11]
Limonene	3.14	1157.5	2.20	4.48*	1028.4	[7.11]
(*Z*)-β-Ocimene	3.73	1204.2	0.14	4.68	1040.6	0.16
(*E*)-β-Ocimene	3.93*	1218.8	[0.08]	4.83	1050.4	0.06
γ-Terpinene	3.75	1205.4	0.38	4.94	1057.7	0.37
cis-Sabinene hydrate	6.84*	1427.6	[2.89]	5.06	1064.9	0.28
para-Mentha-3,8-diene	4.00	1223.6	0.01	5.12	1069.1	0.01
cis-Linalool oxide (fur.)	6.51	1403.3	0.02	5.16	1071.1	0.01
Octanol	8.12	1524.6	0.11	5.23	1076.0	0.02
para-Cymenene	6.26*	1384.9	[0.02]	5.40*	1086.7	[0.14]
Terpinolene	4.22	1240.2	0.13	5.40*	1086.7	[0.14]
trans-Linalool oxide	6.84*	1427.6	[2.89]	5.40*	1086.7	[0.14]

(fur.)						
trans-Sabinene hydrate	7.90	1507.8	0.04	5.54	1095.7	0.04
Linalool	8.02	1516.7	0.22	5.64*	1102.1	[0.21]
Nonan-3-ol	7.26	1459.6	0.02	5.64*	1102.1	[0.21]
2-Methylbutyl 2-methylbutyrate	4.41	1254.5	0.05	5.72	1107.1	0.04
Amyl isovalerate	4.65	1272.3	0.04	5.75	1109.1	0.01
β-Thujone	6.26*	1384.9	[0.02]	5.79*	1111.7	[0.05]
Phenylethyl alcohol	12.04*	1849.0	[0.02]	5.79*	1111.7	[0.05]
cis-para-Menth-2-en-1-ol	8.08*	1521.1	[5.55]	5.91	1119.4	0.05
Octan-3-yl acetate	5.20	1308.2	0.02	6.07	1129.7	0.02
allo-Ocimene	5.54	1332.7	0.02	6.09	1131.1	0.01
cis-para-Mentha-2,8-dien-1-ol	9.41	1626.5	0.20	6.15	1134.7	0.03
trans-Sabinol	9.76	1654.4	0.06	6.24	1140.6	0.07
Isopulegol	8.08*	1521.1	[5.55]	6.28	1143.4	0.16
Menthone	6.62	1411.6	25.20	6.45	1154.5	25.21
Menthofuran	6.84*	1427.6	[2.89]	6.58*	1162.5	[6.81]
Isomenthone	6.94	1435.3	4.21	6.58*	1162.5	[6.81]
neo-Menthol	8.54*†	1557.6	[3.25]	6.62	1165.3	3.39
Terpinen-4-ol	8.51*†	1554.8	[0.81]	6.83*	1179.1	[35.59]
Menthol	9.13*	1603.6	[34.58]	6.83*	1179.1	[35.59]
Isomenthol	8.89*	1584.4	[0.58]	6.90	1183.4	0.56
para-Cymen-8-ol	11.46	1797.4	0.02	6.93	1185.4	0.05
α-Terpineol	9.71*	1650.6	[1.34]	7.01*	1190.6	[0.62]
neoiso-Menthol	9.39	1624.8	0.19	7.01*	1190.6	[0.62]
Methyl salicylate	10.33*	1701.5	[0.11]	7.01*	1190.6	[0.62]
Dihydrocarveol	10.30*	1699.1	[0.04]	7.08	1195.0	0.06
trans-Isopiperitenol	10.33*	1701.5	[0.11]	7.14	1199.3	0.02
Dihydroanethole	8.54*†	1557.6	[3.25]	7.18	1202.0	0.01
Unknown MEPI V [m/z 43, 99 (84), 81 (46), 986 (43), 126 (36), 71 (28)... 170 (12)]				7.24	1205.3	0.02
Unknown UNKN CCCXCVIII [m/z 43, 99 (91), 81 (48), 86 (45), 126 (36)...]				7.31	1210.7	0.05
trans-Carveol	11.32	1785.3	0.01	7.43	1218.8	0.01
(3*Z*)-Hexenyl 2-methylbutyrate	6.99*†	1439.3	[0.04]	7.61	1230.6	0.03
Citronellol	10.66*	1729.2	[0.11]	7.65	1233.7	0.03
(3*Z*)-Hexenyl	7.10	1447.6	0.01	7.69*	1236.4	[1.46]

isovalerate						
Pulegone	8.86	1582.0	1.50	7.69*	1236.4	[1.46]
Carvone	9.91	1667.0	0.07	7.76	1241.0	0.07
Piperitone	9.82	1659.2	0.59	7.90	1250.5	0.58
Pseudodiosphenol	10.07	1679.8	0.02	8.15*	1267.6	[0.02]
trans-Ascaridole glycol	14.08	2036.7	0.02	8.15*	1267.6	[0.02]
Decanol	10.66*	1729.2	[0.11]	8.30*	1277.8	[0.37]
neo-Menthyl acetate	7.62	1486.5	0.31	8.30*	1277.8	[0.37]
Bornyl acetate	8.18	1529.0	0.02	8.37	1282.9	0.03
Dihydroedulan I	7.02*†	1441.4	[0.06]	8.42	1286.2	0.06
Dihydroedulan II	7.36	1466.9	0.06	8.60*	1298.0	[5.34]
Thymol	15.04	2130.9	0.04	8.60*	1298.0	[5.34]
Menthyl acetate	8.08*	1521.1	[5.55]	8.60*	1298.0	[5.34]
Diosphenol	10.87	1747.0	0.02	8.65	1301.9	0.01
Isomenthyl acetate	8.22	1532.2	0.24	8.76	1305.7	0.22
neoiso-Menthyl acetate?				8.89	1315.6	0.01
Dihydrocarvyl acetate	9.35	1621.0	0.01	9.03	1325.4	0.01
Bicycloelemene	7.02*†	1441.4	[0.06]	9.16	1334.7	0.06
Piperitenone	11.98	1843.5	0.01	9.25	1341.1	0.02
α-Cubebene	6.70	1417.5	0.01	9.37	1349.6	0.02
Eugenol	14.70	2096.9	0.03	9.43	1353.5	0.03
Longicyclene	7.07*	1444.8	[0.07]	9.56	1363.1	0.02
α-Ylangene	6.99*†	1439.3	[0.04]	9.63	1368.0	0.02
α-Copaene	7.07*	1444.8	[0.07]	9.69	1372.4	0.09
β-Bourbonene isomer	7.07*	1444.8	[0.07]	9.74	1375.7	0.01
β-Bourbonene	7.40*	1469.8	[0.22]	9.80*	1380.3	[0.26]
1,5-diepi-β-Bourbonene	7.29	1461.6	0.02	9.80*	1380.3	[0.26]
β-Elemene	8.35*	1542.5	[3.01]	9.94	1389.8	0.13
Cyperene	7.40*	1469.8	[0.22]	9.99	1393.5	0.05
Longifolene	7.88	1506.1	0.02	10.04	1397.2	0.03
Isocaryophyllene	8.08*	1521.1	[5.55]	10.10	1401.7	0.05
β-Caryophyllene	8.35*	1542.5	[3.01]	10.27*	1414.3	[2.99]
β-Ylangene	8.08*	1521.1	[5.55]	10.27*	1414.3	[2.99]
Perillyl acetate	11.51	1801.3	0.02	10.27*	1414.3	[2.99]
Unknown MISC CX [m/z 177, 109 (32), 192 (26), 95 (25), 137 (23)]				10.34	1419.6	0.01
β-Copaene	8.28	1537.1	0.06	10.40	1424.1	0.08
Aromadendrene	8.48	1552.3	0.06	10.53	1433.3	0.04
Isogermacrene D	8.89*	1584.4	[0.58]	10.61	1439.5	0.04
Unknown PIRA III [m/z 91, 93 (92), 105 (79), 133 (70), 79 (70), 92	9.01	1594.0	0.01	10.68	1445.2	0.01

(65)... 204 (5)]						
ε-Muurolene?	9.16	1605.6	0.07	10.72*	1447.7	[0.17]
α-Humulene	9.21	1610.2	0.15	10.72*	1447.7	[0.17]
Muurola-4,11-diene	9.13*	1603.6	[34.58]	10.78	1452.7	0.02
(*E*)-β-Farnesene	9.48	1632.3	0.23	10.87	1459.3	0.23
γ-Muurolene	9.51	1634.7	0.05	11.06	1473.3	0.03
Germacrene D	9.71*	1650.6	[1.34]	11.10	1476.0	0.94
Menthalactone	15.72	2198.7	0.03	11.21	1484.7	0.04
Viridiflorene	9.56	1638.4	0.10	11.30*	1491.3	[0.23]
Bicyclogermacrene	9.97*	1672.0	[0.19]	11.30*	1491.3	[0.23]
α-Muurolene	9.97*	1672.0	[0.19]	11.38	1497.3	0.04
γ-Cadinene	10.30*	1699.1	[0.04]	11.54	1509.4	0.03
δ-Cadinene	10.33*	1701.5	[0.11]	11.68	1520.5	0.08
α-Cadinene	10.73	1734.9	tr	11.84	1533.6	0.01
Isocaryophyllene epoxide B	12.04*	1849.0	[0.02]	11.99	1544.9	0.01
Spathulenol	14.30	2058.5	0.02	12.31	1570.3	0.02
Caryophyllene oxide	12.67	1905.1	0.08	12.36	1574.4	0.07
Viridiflorol	13.90	2019.3	0.08	12.48	1584.1	0.07
Total reported		98.88%			99.30%	

*: 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