Date : 2024-04-26

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24D12-PTH01
Customer Identification : Dill Weed - Canada - D10112R
Type : Essential Oil
Source : *Anethum graveolens*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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 : 2024-04-22

Physicochemical data

Refractive index : 1.4837 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2024-04-12

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
Ethanol	0.10	Aliphatic alcohol
Acetaldehyde	tr	Aliphatic aldehyde
Isobutyral	tr	Aliphatic aldehyde
Ethyl acetate	tr	Aliphatic ester
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	0.01	Simple phenolic
Hexanal	0.01	Aliphatic aldehyde
(2*E*)-Hexenal	0.01	Aliphatic aldehyde
(3*Z*)-Hexenol	0.06	Aliphatic alcohol
(2*E*)-Hexenol	0.02	Aliphatic alcohol
Hexanol	0.05	Aliphatic alcohol
Heptanal	0.01	Aliphatic aldehyde
α-Thujene	0.11	Monoterpene
α-Pinene	0.56	Monoterpene
Camphene	0.02	Monoterpene
Sabinene	0.06	Monoterpene
β-Pinene	0.03	Monoterpene
Dehydro-1,8-cineole	0.01	Monoterpenic ether
Myrcene	0.35	Monoterpene
Pseudolimonene	tr	Monoterpene
α-Phellandrene	17.94	Monoterpene
Δ3-Carene	0.01	Monoterpene
α-Terpinene	0.01	Monoterpene
Carvomenthene	tr	Aliphatic alcohol
para-Cymene	0.74	Monoterpene
Limonene	26.93	Monoterpene
β-Phellandrene	2.27	Monoterpene
(*Z*)-β-Ocimene	0.02	Monoterpene
(*E*)-β-Ocimene	0.01	Monoterpene
γ-Terpinene	0.02	Monoterpene
cis-Sabinene hydrate	tr	Monoterpenic alcohol
Fenchone	0.01	Monoterpenic ketone
para-Cymenene	0.06	Monoterpene
Terpinolene	0.05	Monoterpene
Linalool	0.01	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol

cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
Nopinone	0.01	Normonoterpenic ketone
cis-Limonene oxide	0.03	Monoterpenic ether
trans-Limonene oxide	0.02	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.01	Monoterpenic alcohol
Unknown	0.04	Oxygenated monoterpene
Camphenone isomer?	0.03	Monoterpenic ketone
Unknown	0.01	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Terpinen-4-ol	0.02	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Dill ether	5.85	Monoterpenic ether
cis-Dihydrocarvone	0.50	Monoterpenic ketone
Dihydrocarveol	0.02	Monoterpenic alcohol
trans-Dihydrocarvone	1.05	Monoterpenic ketone
iso-Dihydrocarveol ?	0.05	Monoterpenic alcohol
trans-Carveol	0.05	Monoterpenic alcohol
neoiso-Dihydrocarveol	0.09	Monoterpenic alcohol
cis-Carveol	0.06	Monoterpenic alcohol
Carvone	41.00	Monoterpenic ketone
Unknown	0.09	Unknown
Piperitone	0.02	Monoterpenic ketone
Isopiperitenone	0.05	Monoterpenic ketone
Bornyl acetate	0.01	Monoterpenic ester
Unknown	0.01	Monoterpenic ester
para-Menth-5-en-1,2-diol isomer III	0.07	Monoterpenic alcohol
Bicycloelemene	0.01	Sesquiterpene
Unknown	0.01	Unknown
Unknown	0.02	Unknown
cis-Carvyl acetate	0.02	Monoterpenic ester
(*trans*?)-6-Hydroxy-*para*-menth-1-en-3-one	0.01	Monoterpenic alcohol
para-Menth-1-en-9-yl acetate?	0.02	Monoterpenic ester
(*cis*?)-6-Hydroxy-*para*-menth-1-en-3-one	0.01	Monoterpenic alcohol
Dihydro-β-ionone	0.02	Apocarotenoid
Germacrene D	0.03	Sesquiterpene
(*E*)-β-Ionone	0.01	Apocarotenoid
Myristicin	0.01	Phenylpropanoid
Unknown	0.05	Unknown
α-Phellandrene dimer III	0.01	Diterpene
Consolidated total	**98.94**	

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

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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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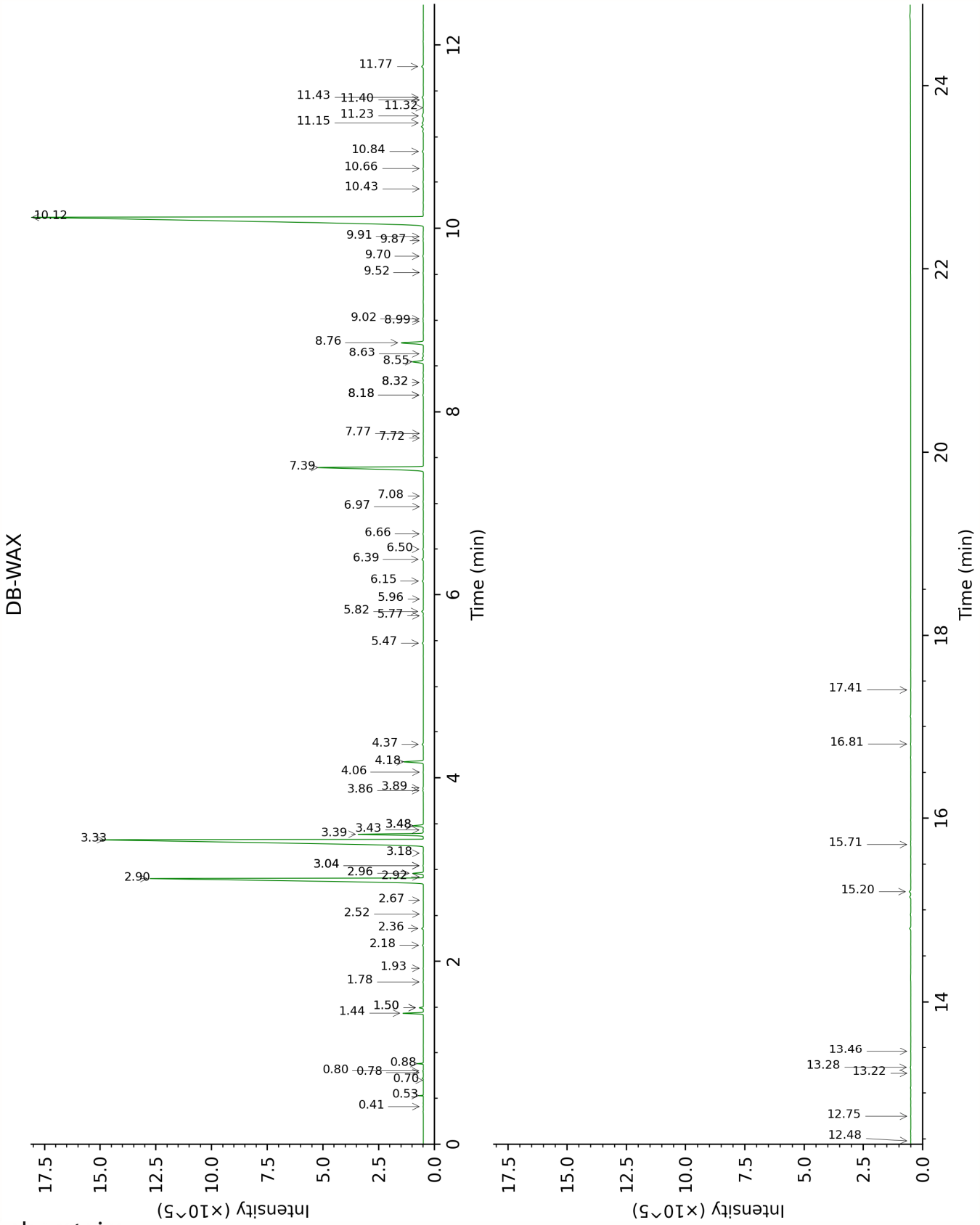
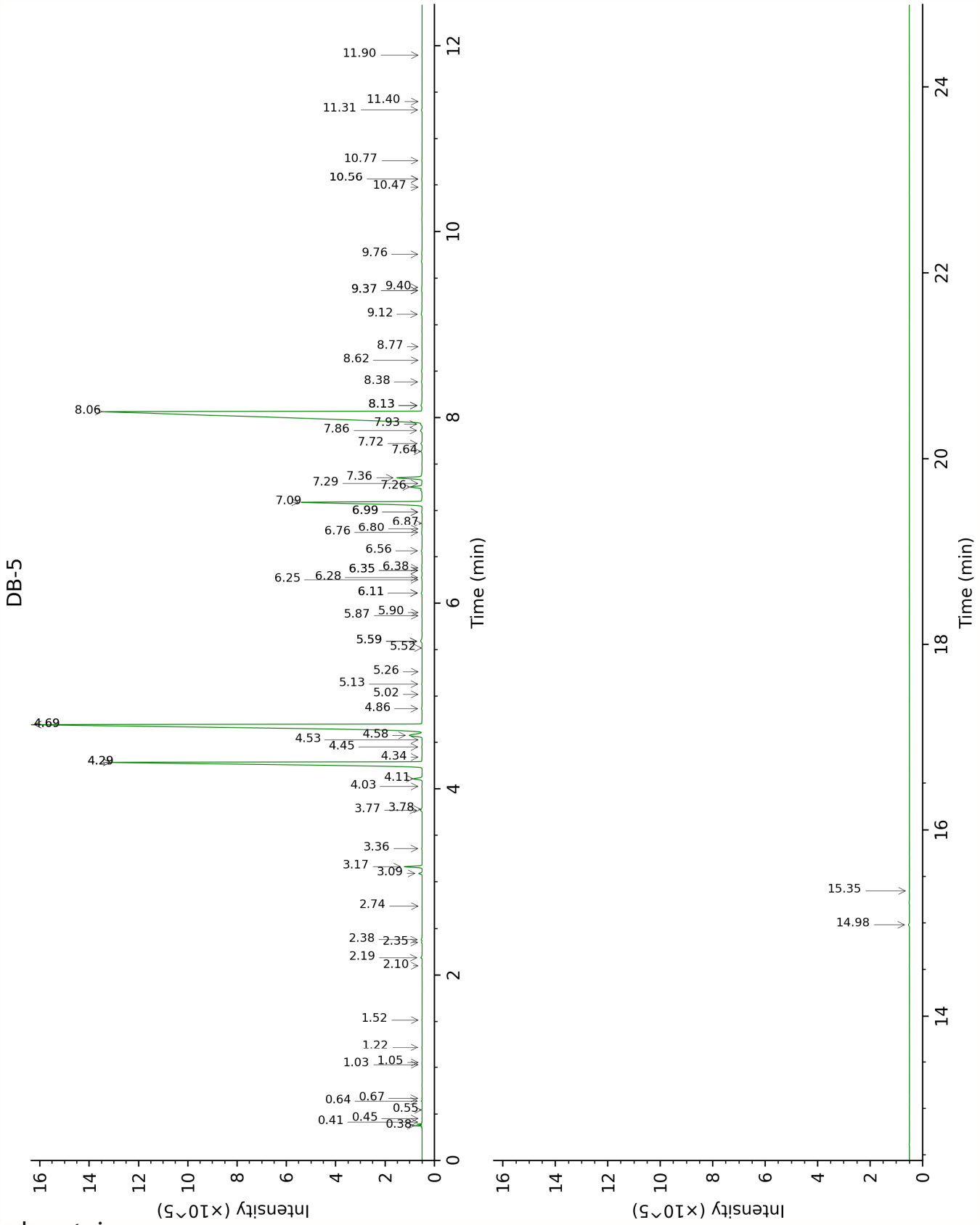

DB-WAX
Time (min)
Intensity (×10^5)
11.77
11.43
11.40
11.32
11.23
11.15
10.84
10.66
10.43
10.12
9.91
9.87
9.70
9.52
9.02
8.99
8.76
8.63
8.55
8.32
8.18
7.77
7.72
7.39
7.08
6.97
6.66
6.50
6.39
6.15
5.96
5.82
5.77
5.47
4.37
4.18
4.06
3.86
3.89
3.48
3.43
3.39
3.33
3.18
3.04
2.96
2.92
2.90
2.67
2.52
2.36
2.18
1.93
1.78
1.50
1.44
0.88
0.80
0.78
0.70
0.53
0.41
17.41
16.81
15.71
15.20
13.46
13.28
13.22
12.75
12.48


DB-5
Time (min)
Intensity (×10^5)
11.90
11.40
11.31
10.77
10.56
10.47
9.76
9.37
9.40
9.12
8.77
8.62
8.38
8.13
8.06
7.93
7.86
7.72
7.64
7.36
7.29
7.26
7.09
6.99
6.87
6.80
6.76
6.56
6.38
6.35
6.28
6.25
6.11
5.90
5.87
5.59
5.52
5.26
5.13
5.02
4.86
4.69
4.58
4.53
4.45
4.34
4.29
4.11
4.03
3.78
3.77
3.36
3.17
3.09
2.74
2.38
2.35
2.19
2.10
1.52
1.22
1.03
1.05
0.67
0.64
0.55
0.45
0.41
0.38
15.35
14.98

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Ethanol	0.88	911.9	0.11	0.38	500.8	0.10
Acetaldehyde	0.41	655.7	tr	0.41	501.0	tr
Isobutyral	0.53	778.4	0.06	0.45	536.7	tr
Ethyl acetate	0.70	852.8	tr	0.54	608.8	tr
Isovaleral	0.80	886.2	0.01	0.64	640.8	0.01
2-Methylbutyral	0.78	880.2	tr	0.67	650.8	tr
Isoamyl alcohol	3.48*	1175.3	[0.37]	1.03	733.0	tr
2-Methylbutanol	3.48*	1175.3	[0.37]	1.06	736.3	tr
Toluene	1.50*	1003.7	[0.11]	1.22	759.3	0.01
Hexanal	1.93	1045.9	0.01	1.52	800.0	0.01
(2*E*)-Hexenal	3.43	1171.8	0.02	2.10	850.3	0.01
(3*Z*)-Hexenol	5.82	1344.4	0.07	2.19	857.4	0.06
(2*E*)-Hexenol	6.15	1368.2	0.05	2.35	870.8	0.02
Hexanol	5.48	1319.5	0.05	2.38	873.3	0.05
Heptanal	3.04*	1142.3	[0.02]	2.74	902.8	0.01
α-Thujene	1.50*	1003.7	[0.11]	3.09	926.6	0.11
α-Pinene	1.44	994.8	0.55	3.16	931.3	0.56
Camphene	1.78	1032.0	0.01	3.36	944.1	0.02
Sabinene	2.36	1086.6	0.06	3.77*†	971.2	[0.06]
β-Pinene	2.18	1069.4	0.03	3.78*†	972.0	[0.03]
Dehydro-1,8-cineole	3.18	1152.6	0.01	4.03	988.1	0.01
Myrcene	2.96	1136.1	0.35	4.11	993.5	0.35
Pseudolimonene	2.92	1133.1	tr	4.28*	1005.1	[18.39]
α-Phellandrene	2.90	1131.8	17.94	4.28*	1005.1	[18.39]
Δ3-Carene	2.67	1114.0	tr	4.34	1008.7	0.01
α-Terpinene	3.04*	1142.3	[0.02]	4.45	1015.5	0.01
Carvomenthene	2.52	1101.3	0.01	4.53	1020.3	tr
para-Cymene	4.18	1226.7	0.75	4.58	1023.3	0.74
Limonene	3.33	1163.7	26.93	4.69*	1030.5	[29.28]
β-Phellandrene	3.39	1168.2	2.27	4.69*	1030.5	[29.28]
(*Z*)-β-Ocimene	3.86	1204.2	0.02	4.86	1041.2	0.02
(*E*)-β-Ocimene	4.06	1218.7	0.01	5.02	1051.3	0.01
γ-Terpinene	3.89	1206.5	0.02	5.13	1058.2	0.02
cis-Sabinene hydrate	6.97	1428.1	0.01	5.26	1066.5	tr
Fenchone	5.77	1340.9	0.01	5.52	1082.4	0.01
para-Cymenene	6.39	1385.3	0.06	5.59*	1087.0	[0.10]
Terpinolene	4.36	1240.2	0.05	5.59*	1087.0	[0.10]
Linalool	8.18*	1520.0	[0.03]	5.87	1104.1	0.01
Nonanal	5.96	1354.1	0.01	5.90	1106.3	0.01
trans-para-Mentha-2,8-	9.02	1586.0	0.02	6.11*	1119.7	[0.04]

dien-1-ol						
cis-para-Menth-2-en-1-ol	8.18*	1520.0	[0.03]	6.11*	1119.7	[0.04]
Nopinone	8.32*	1530.8	[0.02]	6.25*†	1128.7	[0.01]
cis-Limonene oxide	6.50	1393.3	0.03	6.28*†	1130.2	[0.03]
trans-Limonene oxide	6.66	1405.4	0.02	6.35*	1135.1	[0.02]
cis-para-Mentha-2,8-dien-1-ol	9.52	1626.5	0.02	6.35*	1135.1	[0.02]
trans-para-Menth-2-en-1-ol	8.99	1583.8	0.01	6.38	1136.9	0.01
Unknown CALU I [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]				6.56	1148.6	0.04
Camphenone isomer?				6.76	1161.2	0.03
Unknown CALU II [m/z 95, 110 (38), 81 (21), 79 (16)... 152 (7)]	7.72	1484.3	tr	6.80	1163.6	0.01
Unknown CALU III [m/z 95, 110 (43), 81 (28), 41 (15)... 152 (8)]	7.77	1488.1	0.01	6.87	1167.9	0.02
Terpinen-4-ol	8.63	1555.4	0.02	6.99*	1175.6	[0.03]
Unknown CASA XVIII [m/z 69, 84 (62), 41 (30), 123 (26), 97 (24), 109 (23)...]	9.70	1641.2	0.02	6.99*	1175.6	[0.03]
Dill ether	7.40	1460.2	5.82	7.09	1182.4	5.85
cis-Dihydrocarvone	8.55	1548.6	0.49	7.26	1192.8	0.50
Dihydrocarveol	10.43	1701.9	0.01	7.29	1195.2	0.02
trans-Dihydrocarvone	8.76	1565.5	1.01	7.36	1199.1	1.05
iso-Dihydrocarveol ?	10.84	1737.7	0.05	7.64	1217.7	0.05
trans-Carveol	11.43	1779.4	0.06	7.72	1223.4	0.05
neoiso-Dihydrocarveol	11.15	1754.9	0.07	7.86	1232.7	0.09

cis-Carveol	11.77	1808.8	0.08	7.93	1237.4	0.06
Carvone	10.12	1676.3	40.86	8.06	1246.3	41.00
Unknown CALU IV [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]	11.23	1761.6	0.09	8.13*	1250.7	[0.09]
Piperitone	9.91	1659.0	0.02	8.13*	1250.7	[0.09]
Isopiperitenone	11.32	1769.4	0.02	8.38	1267.6	0.05
Bornyl acetate	8.32*	1530.8	[0.02]	8.62	1283.2	0.01
Unknown SCMO II [m/z 93, 43 (60), 108 (58), 69 (36), 41 (35)... 150 (5), 184 (1)]	13.28	1948.4	0.03	8.77	1293.4	0.01
para-Menth-5-en-1,2-diol isomer III	15.20	2135.9	0.08	9.12	1317.2	0.07
Bicycloelemene	7.08	1436.8	0.01	9.37*	1335.1	[0.03]
Unknown SCMO III [m/z 43, 97 (99), 107 (47), 41 (35), 55 (30)...]	13.46	1965.0	0.01	9.37*	1335.1	[0.03]
Unknown CYFL VIII [m/z 82, 59 (44), 41 (43), 95 (31), 43 (29), 81 (24)...]	12.75	1898.2	0.01	9.40	1337.5	0.02
cis-Carvyl acetate	10.66	1721.4	0.02	9.76	1362.4	0.02
(*trans*?)-6-Hydroxy-*para*-menth-1-en-3-one	16.81	2302.9	0.02	10.48	1413.4	0.01
para-Menth-1-en-9-yl acetate?				10.56*	1419.9	[0.03]
(*cis*?)-6-Hydroxy-*para*-menth-1-en-3-one	17.41	2367.7	0.01	10.56*	1419.9	[0.03]
Dihydro-β-ionone	11.40	1776.8	0.01	10.77	1435.2	0.02
Germacrene D	9.87	1655.3	0.02	11.31	1475.7	0.03
(*E*)-β-Ionone	12.48	1873.5	0.01	11.40	1482.4	0.01
Myristicin	15.72	2188.2	0.01	11.90	1520.2	0.01
Unknown ANGR				14.98	1773.5	0.05

l [m/z 92, 93 (36), 105 (33), 134 (29), 91 (27), 119 (19), 77 (13)...]						
α-Phellandrene dimer III	13.22	1942.3	0.01	15.35	1805.1	0.01
Total reported		98.97%			99.43%	

*: 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