Date : 2024-04-26

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24D12-PTH09
Customer Identification : Pine - Austria - P70111R
Type : Essential Oil
Source : *Pinus sylvestris*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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 : 2024-04-18

Physicochemical data

Refractive index : 1.471 ± 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
Toluene	tr	Simple phenolic
Cyclofenchene	tr	Monoterpene
Santene	0.12	Normonoterpene
(4*E*)-2,6-Dimethyloctene	tr	Monoterpene
Tricyclene	0.15	Monoterpene
α-Thujene	0.03	Monoterpene
α-Pinene	51.35	Monoterpene
α-Fenchene	0.10	Monoterpene
Camphene	2.30	Monoterpene
Thuja-2,4(10)-diene	0.04	Monoterpene
Benzaldehyde	0.01	Simple phenolic
Unknown	0.02	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.01	Monoterpene
Sabinene	0.04	Monoterpene
β-Pinene	10.13	Monoterpene
Unknown	0.09	Monoterpene
(6*E*)-2,6-Dimethyl-2,6-octadiene?	tr	Monoterpene
Myrcene	4.48	Monoterpene
2,7-Dimethyl-2,6-octadiene	0.04	Monoterpene
3-*para*-Menthene?	tr	Monoterpene
Octan-3-ol	0.01	Aliphatic alcohol
Pseudolimonene	0.29	Monoterpene
α-Phellandrene	0.08	Monoterpene
Δ3-Carene	11.83	Monoterpene
1,4-Cineole	0.05	Monoterpenic ether
α-Terpinene	0.22	Monoterpene
Carvomenthene	0.02	Aliphatic alcohol
para-Cymene	0.60	Monoterpene
1,8-Cineole	0.17	Monoterpenic ether
Limonene	8.68	Monoterpene
β-Phellandrene	0.75	Monoterpene
ortho-Cymene	tr	Monoterpene
(*Z*)-β-Ocimene	0.01	Monoterpene
(*E*)-β-Ocimene	0.02	Monoterpene
γ-Terpinene	0.17	Monoterpene
Unknown	0.02	Oxygenated monoterpene
Fenchone	tr	Monoterpenic ketone
Terpinolene isomer	0.03	Monoterpene
para-Cymenene	0.02	Monoterpene
Terpinolene	0.79	Monoterpene

α-Pinene oxide	0.04	Monoterpenic ether
Unknown	0.01	Unknown
Linalool	0.04	Monoterpenic alcohol
endo-Fenchol	0.07	Monoterpenic alcohol
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
α-Campholenal	0.01	Monoterpenic aldehyde
cis-Limonene oxide	0.02	Monoterpenic ether
Nopinone	0.01	Normonoterpenic ketone
trans-Pinocarveol	0.07	Monoterpenic alcohol
Camphor	0.02	Monoterpenic ketone
Camphene hydrate	0.04	Monoterpenic alcohol
trans-Verbenol	0.03	Monoterpenic alcohol
Unknown	0.02	Unknown
Pinocamphone	0.02	Monoterpenic ketone
Pinocarvone	0.01	Monoterpenic ketone
Borneol	0.14	Monoterpenic alcohol
Isopinocamphone	0.02	Monoterpenic ketone
Terpinen-4-ol	0.04	Monoterpenic alcohol
Cryptone	0.01	Normonoterpenic ketone
para-Cymen-8-ol	0.03	Monoterpenic alcohol
Myrtenal	0.02	Monoterpenic aldehyde
α-Terpineol	0.63	Monoterpenic alcohol
Methylchavicol	0.03	Phenylpropanoid
Myrtenol	0.02	Monoterpenic alcohol
Verbenone	0.01	Monoterpenic ketone
trans-Carveol	0.02	Monoterpenic alcohol
cis-Carveol	0.01	Monoterpenic alcohol
Thymol methyl ether	0.02	Monoterpenic ether
Unknown	0.01	Unknown
Bornyl acetate	2.02	Monoterpenic ester
Unknown	0.01	Unknown
α-Longipinene	0.09	Sesquiterpene
α-Cubebene	0.04	Sesquiterpene
Longicyclene	0.04	Sesquiterpene
α-Ylangene	0.02	Sesquiterpene
α-Copaene	0.08	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
β-Cubebene	0.01	Sesquiterpene
β-Longipinene	0.01	Sesquiterpene
Longifolene	0.75	Sesquiterpene
Methyleugenol	0.01	Phenylpropanoid
β-Caryophyllene	1.69	Sesquiterpene
β-Copaene	0.02	Sesquiterpene
Cadina-3,5-diene?	0.01	Sesquiterpene
α-Humulene	0.16	Sesquiterpene

cis-Muurola-4(15),5-diene	0.02	Sesquiterpene
trans-Cadina-1(6),4-diene	0.03	Sesquiterpene
γ-Muurolene	0.02	Sesquiterpene
γ-Amorphene	0.01	Sesquiterpene
α-Selinene	0.01	Sesquiterpene
β-Himachalene	0.01	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
β-Bisabolene	0.01	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
δ-Cadinene	0.09	Sesquiterpene
trans-Calamenene	0.01	Sesquiterpene
trans-Cadina-1,4-diene	0.02	Sesquiterpene
α-Cadinene	0.01	Sesquiterpene
Caryophyllene oxide	0.10	Sesquiterpenic ether
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Longiborneol	0.01	Sesquiterpenic alcohol
Guaiol	0.03	Sesquiterpenic alcohol
Humulene epoxide II	0.02	Sesquiterpenic ether
10-epi-γ-Eudesmol	0.01	Sesquiterpenic alcohol
1-epi-Cubenol	0.01	Sesquiterpenic alcohol
τ-Cadinol	0.01	Sesquiterpenic alcohol
Bulnesol	0.03	Sesquiterpenic alcohol
meta-Camphorene	0.03	Diterpene
Unknown	0.01	Oxygenated diterpene
para-Camphorene	0.01	Diterpene
Unknown	0.02	Unknown
Consolidated total	**99.66**	

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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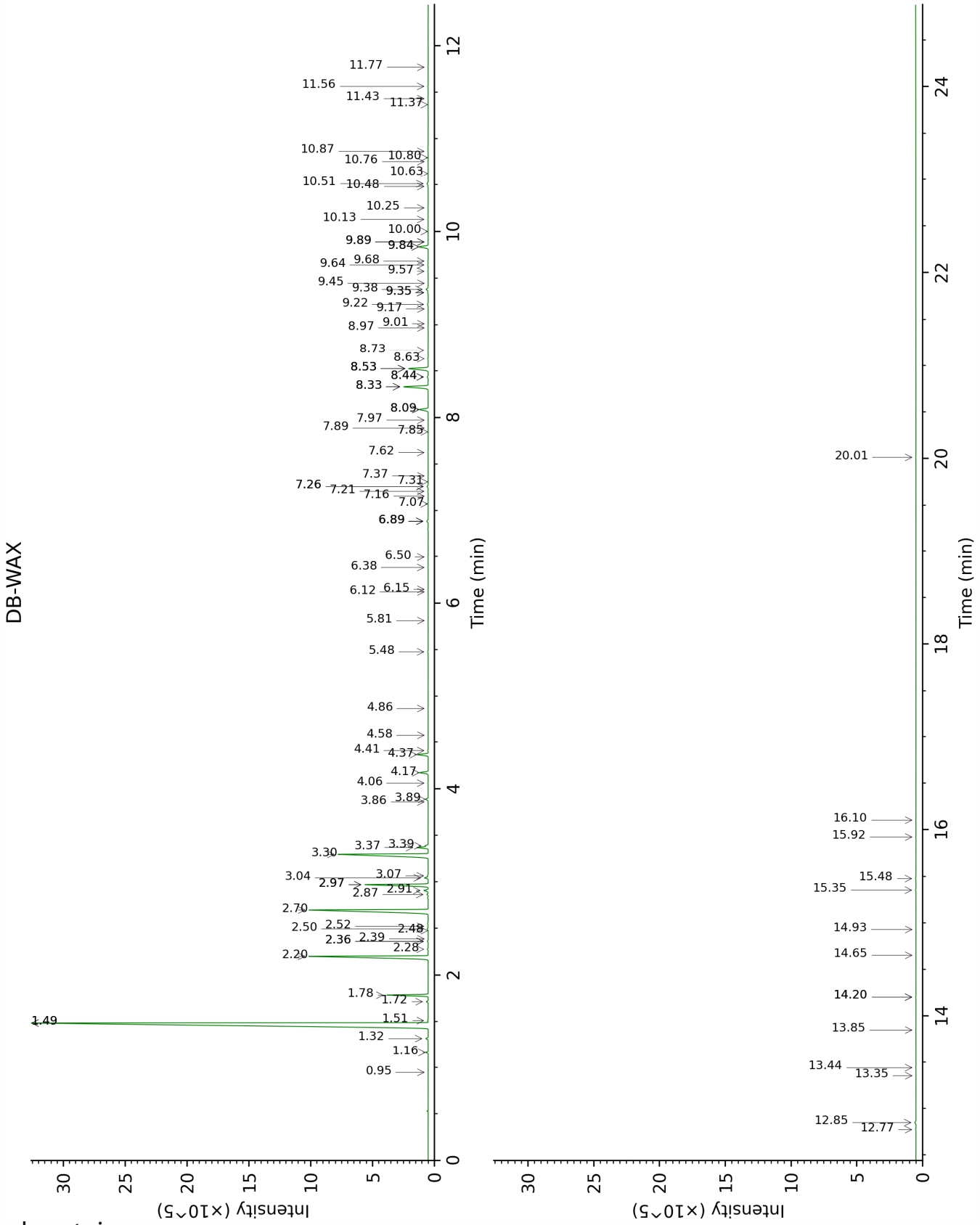
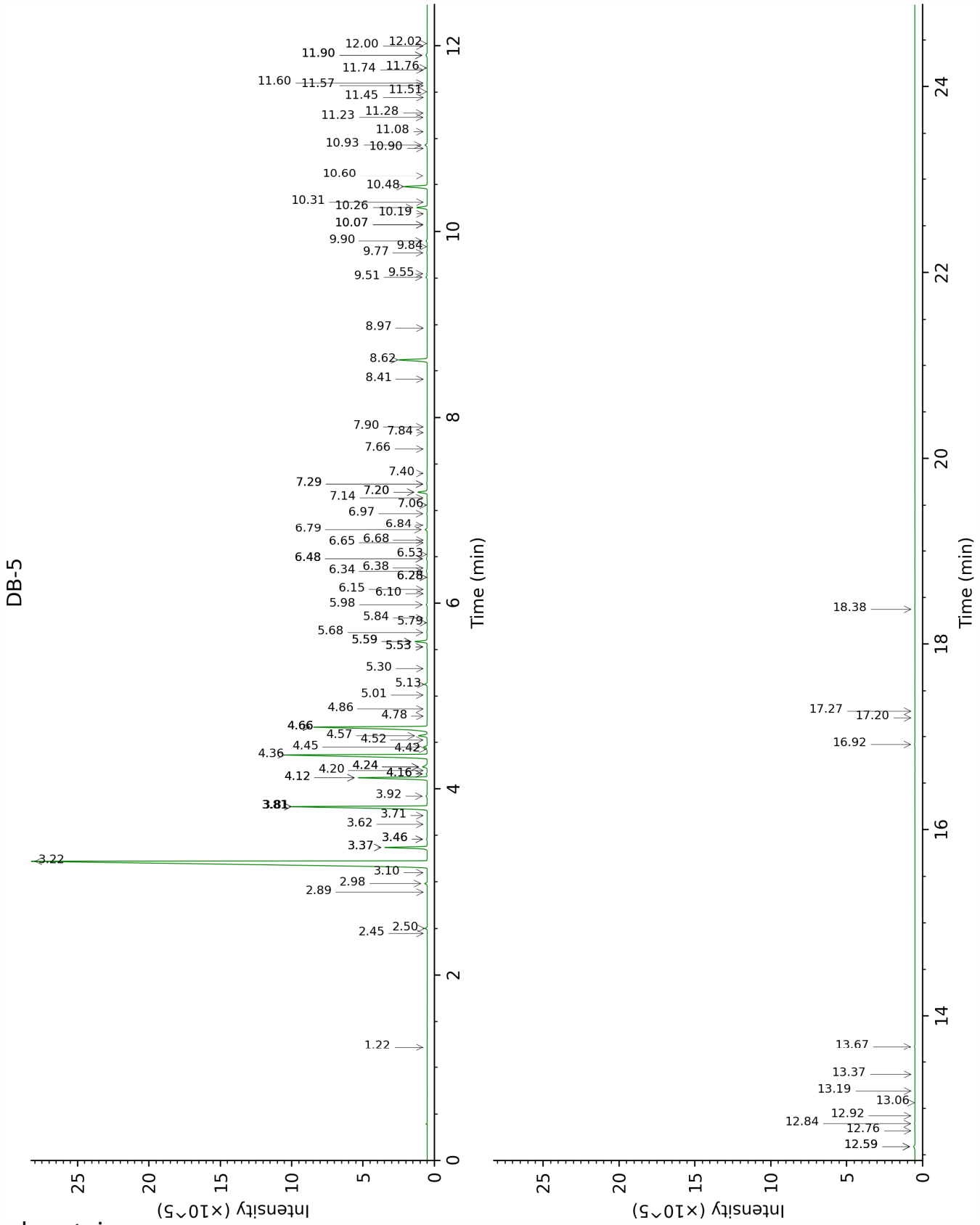

DB-WAX
Time (min)
Intensity (×10^5)
11.77
11.56
11.43
11.37
10.87
10.76
10.80
10.63
10.51
10.48
10.25
10.13
10.00
9.89
9.84
9.64
9.68
9.57
9.45
9.38
9.35
9.22
9.17
8.97
9.01
8.73
8.63
8.53
8.44
8.33
8.09
7.97
7.89
7.85
7.62
7.37
7.31
7.26
7.21
7.16
7.07
6.89
6.50
6.38
6.12
6.15
5.81
5.48
4.86
4.58
4.41
4.37
4.17
4.06
3.86
3.89
3.30
3.37
3.39
3.04
3.07
2.97
2.87
2.91
2.70
2.50
2.52
2.48
2.36
2.39
2.28
2.20
1.78
1.72
1.49
1.51
1.32
1.16
0.95
20.01
16.10
15.92
15.48
15.35
14.93
14.65
14.20
13.85
13.44
13.35
12.85
12.77


DB-5
Time (min)
Intensity (×10^5)
12.00
12.02
11.90
11.74
11.76
11.60
11.57
11.45
11.51
11.23
11.28
11.08
10.93
10.90
10.60
10.48
10.31
10.26
10.19
10.07
9.90
9.77
9.84
9.51
9.55
8.97
8.62
8.41
7.90
7.84
7.66
7.40
7.29
7.14
7.20
7.06
6.97
6.79
6.84
6.65
6.68
6.48
6.53
6.34
6.38
6.28
6.15
6.10
5.98
5.84
5.79
5.68
5.59
5.53
5.30
5.13
5.01
4.86
4.78
4.66
4.57
4.52
4.45
4.42
4.36
4.20
4.24
4.12
4.16
3.92
3.81
3.71
3.62
3.46
3.37
3.22
3.10
2.98
2.89
2.45
2.50
1.22
18.38
17.27
17.20
16.92
13.67
13.37
13.19
13.06
12.92
12.84
12.76
12.59

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Toluene	1.49*	1001.8	[51.29]	1.22	759.4	tr
Cyclofenchene	0.95	921.9	tr	2.45	878.8	tr
Santene	1.16	953.6	0.12	2.50	883.2	0.12
(4*E*)-2,6-Dimethyloctene				2.89	913.3	tr
Tricyclene	1.32	976.9	0.15	2.98	919.4	0.15
α-Thujene	1.51	1005.7	0.03	3.10	927.1	0.03
α-Pinene	1.49*	1001.8	[51.29]	3.22	935.1	51.35
α-Fenchene	1.72	1026.1	0.10	3.37*	944.9	[2.40]
Camphene	1.78	1032.6	2.30	3.37*	944.9	[2.40]
Thuja-2,4(10)-diene	2.36*	1086.7	[0.05]	3.46*	950.7	[0.05]
Benzaldehyde	7.37	1458.6	0.01	3.46*	950.7	[0.05]
Unknown BOSE VIII [m/z 121, 93 (86), 79 (71), 67 (62), 55 (49)... 136 (24)]				3.62	961.3	0.02
3,7,7-Trimethylcyclohepta-1,3,5-triene	2.97*	1136.8	[4.53]	3.71	967.5	0.01
Sabinene	2.36*	1086.7	[0.05]	3.81*	973.8	[10.17]
β-Pinene	2.20	1071.6	10.13	3.81*	973.8	[10.17]
Unknown ORVU I [m/z 93, 79 (73), 67 (49), 95 (42), 91 (41), 121 (38)...]	2.50	1099.3	0.06	3.92	981.2	0.09
(6*E*)-2,6-Dimethyl-2,6-octadiene?	2.48	1097.5	tr	4.12*	994.2	[4.48]
Myrcene	2.97*	1136.8	[4.53]	4.12*	994.2	[4.48]
2,7-Dimethyl-2,6-octadiene	2.28	1078.7	0.04	4.16*	996.9	[0.06]
3-*para*-Menthene?	2.39	1089.2	tr	4.16*	996.9	[0.06]
Octan-3-ol	6.15	1368.1	tr	4.20	999.3	0.01
Pseudolimonene	2.91	1132.1	0.29	4.24*	1001.9	[0.38]
α-Phellandrene	2.87	1128.9	0.08	4.24*	1001.9	[0.38]
Δ3-Carene	2.70	1116.3	11.82	4.36	1010.1	11.83
1,4-Cineole	3.07	1144.0	0.04	4.42	1013.9	0.05
α-Terpinene	3.04	1142.3	0.22	4.45	1015.4	0.22
Carvomenthene	2.52	1101.9	0.02	4.52	1020.1	0.02
para-Cymene	4.17	1226.6	0.61	4.57	1023.0	0.60
1,8-Cineole	3.39	1168.4	0.17	4.66*	1028.8	[9.61]
Limonene	3.30	1161.4	8.68	4.66*	1028.8	[9.61]
β-Phellandrene	3.37	1167.0	0.75	4.66*	1028.8	[9.61]
ortho-Cymene	4.58	1255.2	tr	4.78	1036.1	tr

(*Z*)-β-Ocimene	3.86	1204.1	0.01	4.86	1041.0	0.01
(*E*)-β-Ocimene	4.06	1218.6	0.02	5.01	1050.8	0.02
γ-Terpinene	3.89	1206.3	0.18	5.13	1058.0	0.17
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	4.86	1275.6	0.02	5.30	1068.6	0.02
Fenchone	5.81	1343.9	tr	5.53*	1083.2	[0.03]
Terpinolene isomer	4.41	1243.5	0.03	5.53*	1083.2	[0.03]
para-Cymenene	6.38	1385.1	0.02	5.59*	1086.8	[0.80]
Terpinolene	4.37	1240.4	0.79	5.59*	1086.8	[0.80]
α-Pinene oxide	5.48	1319.7	0.03	5.68	1092.8	0.04
Unknown PINI III [m/z 109, 43 (65), 95 (54), 119 (50), 91 (47)... 149 (8)...]	6.12	1366.1	0.01	5.79	1099.4	0.01
Linalool	8.09*	1512.4	[0.76]	5.84	1102.6	0.04
endo-Fenchol	8.44*	1540.0	[0.07]	5.98	1111.6	0.07
trans-para-Mentha-2,8-dien-1-ol	9.01	1585.6	0.01	6.10	1119.2	0.01
α-Campholenal	7.07	1436.1	0.02	6.15	1122.1	0.01
cis-Limonene oxide	6.50	1393.2	0.02	6.28*	1130.4	[0.02]
Nopinone	8.33*	1531.7	[2.05]	6.28*	1130.4	[0.02]
trans-Pinocarveol	9.22	1602.0	0.06	6.34	1134.5	0.07
Camphor	7.26*	1450.1	[0.10]	6.38	1136.8	0.02
Camphene hydrate	8.53*	1547.1	[1.72]	6.48*	1143.1	[0.07]
trans-Verbenol	9.58	1630.9	0.03	6.48*	1143.1	[0.07]
Unknown MEAL II [m/z 109, 124 (45), 119 (41), 43 (35), 91 (28), 95 (25)...]	6.89*	1422.0	[0.12]	6.52	1146.1	0.02
Pinocamphone	7.31	1453.8	0.01	6.65	1154.1	0.02
Pinocarvone	7.97	1503.7	0.01	6.68	1155.9	0.01
Borneol	9.84*	1652.6	[0.79]	6.79	1163.1	0.14
Isopinocamphone	7.62	1477.5	0.02	6.84	1166.3	0.02
Terpinen-4-ol	8.63	1555.5	0.03	6.97	1174.5	0.04
Cryptone	9.17	1598.1	0.01	7.06	1180.4	0.01
para-Cymen-8-ol	11.56	1790.8	0.03	7.14	1185.3	0.03
Myrtenal	8.73	1562.8	0.02	7.20*	1189.2	[0.65]
α-Terpineol	9.84*	1652.6	[0.79]	7.20*	1189.2	[0.65]
Methylchavicol	9.35*	1612.0	[0.04]	7.29*	1194.8	[0.06]
Myrtenol	10.87	1739.6	0.02	7.29*	1194.8	[0.06]
Verbenone	9.64	1636.6	0.03	7.40	1202.1	0.01
trans-Carveol	11.43	1779.2	0.02	7.66	1219.4	0.02

cis-Carveol	11.77	1808.9	0.01	7.84	1231.2	0.01
Thymol methyl ether	8.53*	1547.1	[1.72]	7.90	1235.3	0.02
Unknown PECR X [m/z 109, 43 (83), 95 (70), 110 (70), 99 (53), 119 (48)...]				8.41	1269.5	0.01
Bornyl acetate	8.33*	1531.7	[2.05]	8.62	1283.4	2.02
Unknown PIPO I [m/z 69, 41 (79), 91 (59), 92 (55), 79 (52), 107 (40)...]				8.97	1306.7	0.01
α-Longipinene	6.89*	1422.0	[0.12]	9.51	1345.1	0.09
α-Cubebene	6.89*	1422.0	[0.12]	9.55	1347.7	0.04
Longicyclene	7.21	1446.2	0.03	9.77	1363.5	0.04
α-Ylangene	7.16	1442.2	0.01	9.84	1368.2	0.02
α-Copaene	7.26*	1450.1	[0.10]	9.90	1372.5	0.08
Geranyl acetate	10.63	1718.7	0.01	10.07*	1384.7	[0.04]
β-Cubebene	7.89	1497.2	0.01	10.07*	1384.7	[0.04]
β-Longipinene	7.85	1494.2	0.01	10.19	1392.9	0.01
Longifolene	8.09*	1512.4	[0.76]	10.26	1397.6	0.75
Methyleugenol	13.35	1955.1	tr	10.31	1401.7	0.01
β-Caryophyllene	8.53*	1547.1	[1.72]	10.48	1413.9	1.69
β-Copaene	8.44*	1540.0	[0.07]	10.60	1422.7	0.02
Cadina-3,5-diene?	8.97	1582.1	0.01	10.90	1444.9	0.01
α-Humulene	9.38	1614.8	0.18	10.93	1447.6	0.16
cis-Muurola-4(15),5-diene	9.45	1620.2	0.01	11.08	1458.3	0.02
trans-Cadina-1(6),4-diene	9.35*	1612.0	[0.04]	11.23	1469.7	0.03
γ-Muurolene	9.68	1640.0	0.03	11.28	1473.2	0.02
γ-Amorphene	9.89*	1657.0	[0.02]	11.44	1485.6	0.01
α-Selinene	10.00	1666.3	0.01	11.51	1490.2	0.01
β-Himachalene	9.89*	1657.0	[0.02]	11.57	1495.1	0.01
α-Muurolene	10.13	1677.0	0.03	11.60	1497.1	0.02
β-Bisabolene	10.25	1687.3	0.02	11.74	1507.6	0.01
γ-Cadinene	10.48	1706.4	0.03	11.76	1509.4	0.02
δ-Cadinene	10.51	1708.9	0.09	11.90*	1520.0	[0.13]
trans-Calamenene	11.37	1773.6	0.01	11.90*	1520.0	[0.13]
trans-Cadina-1,4-diene	10.76	1730.0	0.01	12.00	1527.8	0.02
α-Cadinene	10.80	1733.7	0.01	12.02	1529.9	0.01
Caryophyllene oxide	12.85	1907.3	0.10	12.59*	1574.4	[0.13]
Caryophyllene oxide isomer	12.77	1900.4	0.03	12.59*	1574.4	[0.13]
Longiborneol	14.65	2081.0	0.01	12.76	1587.8	0.01

Guaiol	14.20*	2036.8	[0.03]	12.84	1593.8	0.03
Humulene epoxide II	13.44	1963.4	0.01	12.92	1600.5	0.02
10-epi-γ-Eudesmol	14.20*	2036.8	[0.03]	13.06	1611.7	0.01
1-epi-Cubenol	13.85	2002.3	0.01	13.19	1622.1	0.01
τ-Cadinol	14.93	2108.2	tr	13.37	1636.8	0.01
Bulnesol	15.35	2151.2	0.03	13.67	1661.9	0.03
meta-Camphorene	15.48	2163.9	0.03	16.92	1949.8	0.03
Unknown PISI V [m/z 105, 91 (100), 81 (89), 79 (86), 109 (86), 257 (83)... 275 (12)...]	16.10	2228.4	0.01	17.20	1977.0	0.01
para-Camphorene	15.92	2209.4	0.01	17.27	1983.8	0.01
Unknown PISY I [m/z 191, 81 (47), 95 (41), 69 (39), 109 (32), 93 (32)...]	20.01	2666.3	0.02	18.38	2092.1	0.02
Total reported		99.48%			99.73%	

*: 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