Date : 2024-04-16

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24D02-PTH03
Customer Identification : Organic Frankincense Frereana - Somaliland - FE0109R
Type : Essential Oil
Source : *Boswellia frereana*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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 : Benoit Roger, Ph. D.
Date : 2024-04-16

Physicochemical data

Refractive index : 1.4688 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2024-04-04

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
3-Methyl-2-butanone	0.01	Aliphatic ketone
4-Methyl-2-pentanone	0.01	Aliphatic ketone
Toluene	0.04	Simple phenolic
Unknown	0.03	Alkene
(*Z*)-Salvene	0.01	Normonoterpene
Unknown	0.04	Unknown
Unknown	0.01	Unknown
Hashishene	0.34	Monoterpene
Tricyclene	0.10	Monoterpene
α-Thujene	17.75	Monoterpene
α-Pinene	42.10	Monoterpene
Thujadiene isomer	0.98	Monoterpene
Camphene	0.80	Monoterpene
α-Fenchene	0.02	Monoterpene
Thuja-2,4(10)-diene	0.39	Monoterpene
β-Pinene	2.08	Monoterpene
Sabinene	4.27	Monoterpene
Dehydro-1,8-cineole	0.05	Monoterpenic ether
6-Methyl-5-hepten-2-one	0.09	Aliphatic ketone
Myrcene	1.14	Monoterpene
6-Methyl-5-hepten-2-ol	0.02	Aliphatic alcohol
α-Phellandrene	1.14	Monoterpene
Pseudolimonene	0.01	Monoterpene
Δ3-Carene	0.08	Monoterpene
ortho-Methylanisole	0.04	Simple phenolic
α-Terpinene	0.30	Monoterpene
meta-Cymene	0.03	Monoterpene
Carvomenthene	0.04	Aliphatic alcohol
para-Cymene	9.16	Monoterpene
Unknown	0.28	Unknown
Limonene	2.08	Monoterpene
β-Phellandrene	1.03	Monoterpene
1,8-Cineole	1.13	Monoterpenic ether
(*Z*)-β-Ocimene	0.01	Monoterpene
Unknown	0.01	Unknown
Unknown	0.13	Unknown
γ-Terpinene	0.44	Monoterpene
cis-Sabinene hydrate	0.08	Monoterpenic alcohol
Unknown	0.03	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol

Unknown	0.07	Oxygenated monoterpene
Terpinolene	0.12	Monoterpene
para-Cymenene	0.13	Monoterpene
α-Pinene oxide	0.02	Monoterpenic ether
trans-Sabinene hydrate	0.05	Monoterpenic alcohol
Linalool	0.43	Monoterpenic alcohol
α-Thujone	0.05	Monoterpenic ketone
Unknown	0.02	Oxygenated monoterpene
β-Thujone	0.32	Monoterpenic ketone
Unknown	0.03	Oxygenated monoterpene
Dehydrosabinaketone	0.10	Normonoterpenic ketone
cis-para-Menth-2-en-1-ol	0.11	Monoterpenic alcohol
α-Campholenal	0.16	Monoterpenic aldehyde
Unknown	0.13	Unknown
trans-Pinocarveol	0.43	Monoterpenic alcohol
cis-Verbenol	0.22	Monoterpenic alcohol
trans-Sabinol	0.09	Monoterpenic alcohol
trans-Verbenol	0.65	Monoterpenic alcohol
meta-Mentha-4,6-dien-8-ol	0.13	Monoterpenic alcohol
Sabinaketone	0.05	Normonoterpenic ketone
Unknown	0.05	Oxygenated monoterpene
Pinocarvone	0.20	Monoterpenic ketone
Unknown	0.09	Oxygenated monoterpene
α-Phellandren-8-ol	0.35	Monoterpenic alcohol
cis-Sabinol	0.02	Monoterpenic alcohol
Umbellulone	0.21	Monoterpenic ketone
Terpinen-4-ol	3.24	Monoterpenic alcohol
Cryptone	0.13	Normonoterpenic ketone
para-Cymen-8-ol	0.17	Monoterpenic alcohol
Myrtenal	0.14	Monoterpenic aldehyde
α-Terpineol	0.85	Monoterpenic alcohol
Myrtenol	0.16	Monoterpenic alcohol
cis-α-Phellandrene epoxide (iPr vs Me)	0.24	Monoterpenic ether
Verbenone	0.38	Monoterpenic ketone
trans-Piperitol	0.07	Monoterpenic alcohol
trans-Carveol	0.13	Monoterpenic alcohol
Citronellol	0.08	Monoterpenic alcohol
Cuminal	0.03	Monoterpenic aldehyde
Carvone	0.04	Monoterpenic ketone
Carvotanacetone	0.06	Monoterpenic ketone
Unknown	0.12	Oxygenated monoterpene
Piperitone	0.05	Monoterpenic ketone
Bornyl acetate	0.84	Monoterpenic ester
Cuminol	0.05	Monoterpenic alcohol
Thymol	0.04	Monoterpenic alcohol

Carvacrol	0.02	Monoterpenic alcohol
exo-2-Hydroxycineole acetate	0.02	Monoterpenic ester
Citronellyl acetate	0.03	Monoterpenic ester
α-Copaene	0.06	Sesquiterpene
β-Bourbonene	0.13	Sesquiterpene
1,5-diepi-β-Bourbonene	0.01	Sesquiterpene
β-Elemene	0.10	Sesquiterpene
β-Caryophyllene	0.05	Sesquiterpene
β-Copaene	0.02	Sesquiterpene
Isogermacrene D	0.01	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
β-Selinene	0.02	Sesquiterpene
δ-Cadinene	0.02	Sesquiterpene
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Viridiflorol	0.02	Sesquiterpenic alcohol
β-Eudesmol	0.01	Sesquiterpenic alcohol
α-Phellandrene dimer I	0.03	Diterpene
α-Phellandrene dimer II	0.62	Diterpene
α-Phellandrene dimer III	0.09	Diterpene
α-Phellandrene dimer IV	0.08	Diterpene
Consolidated total	**98.71**	

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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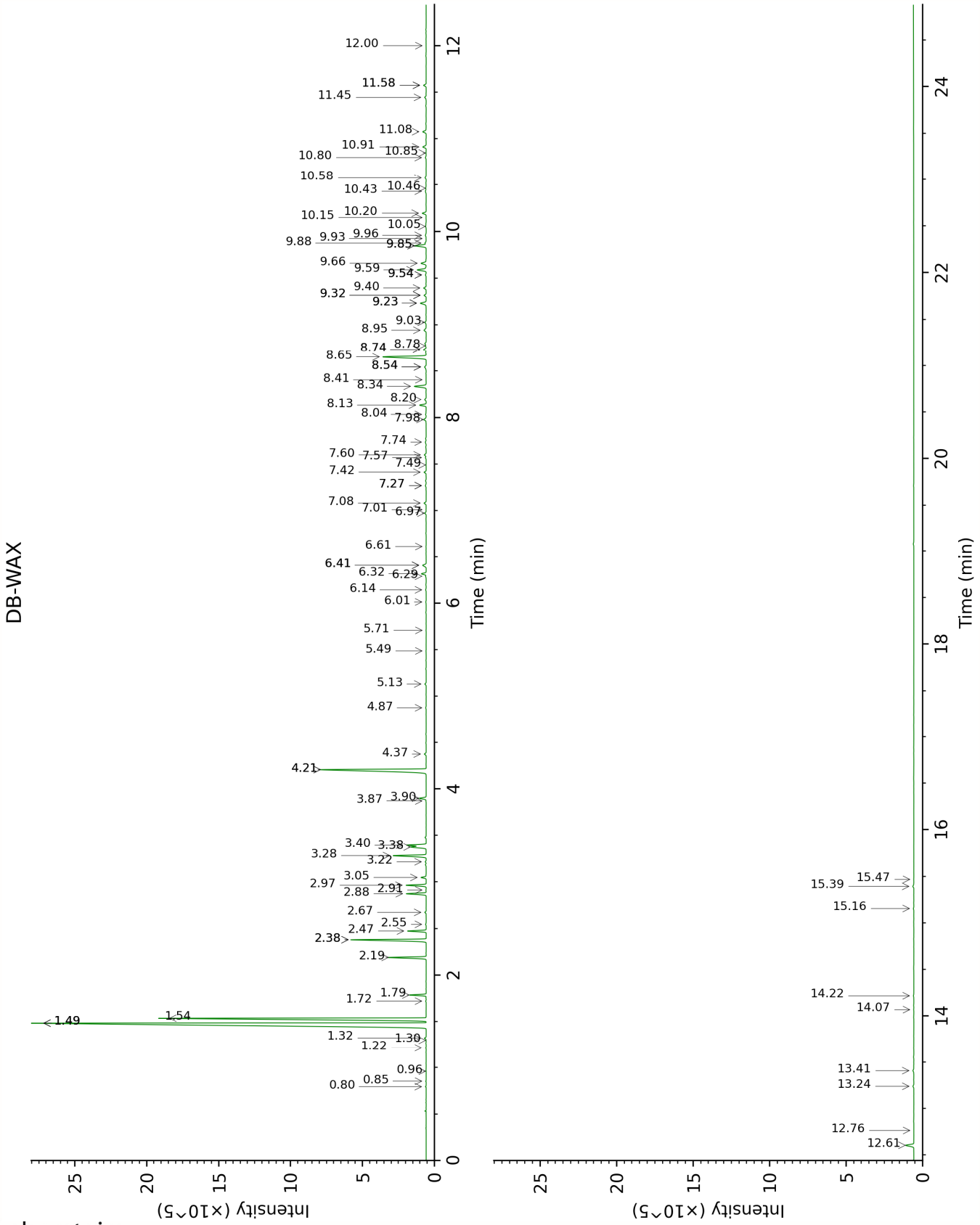
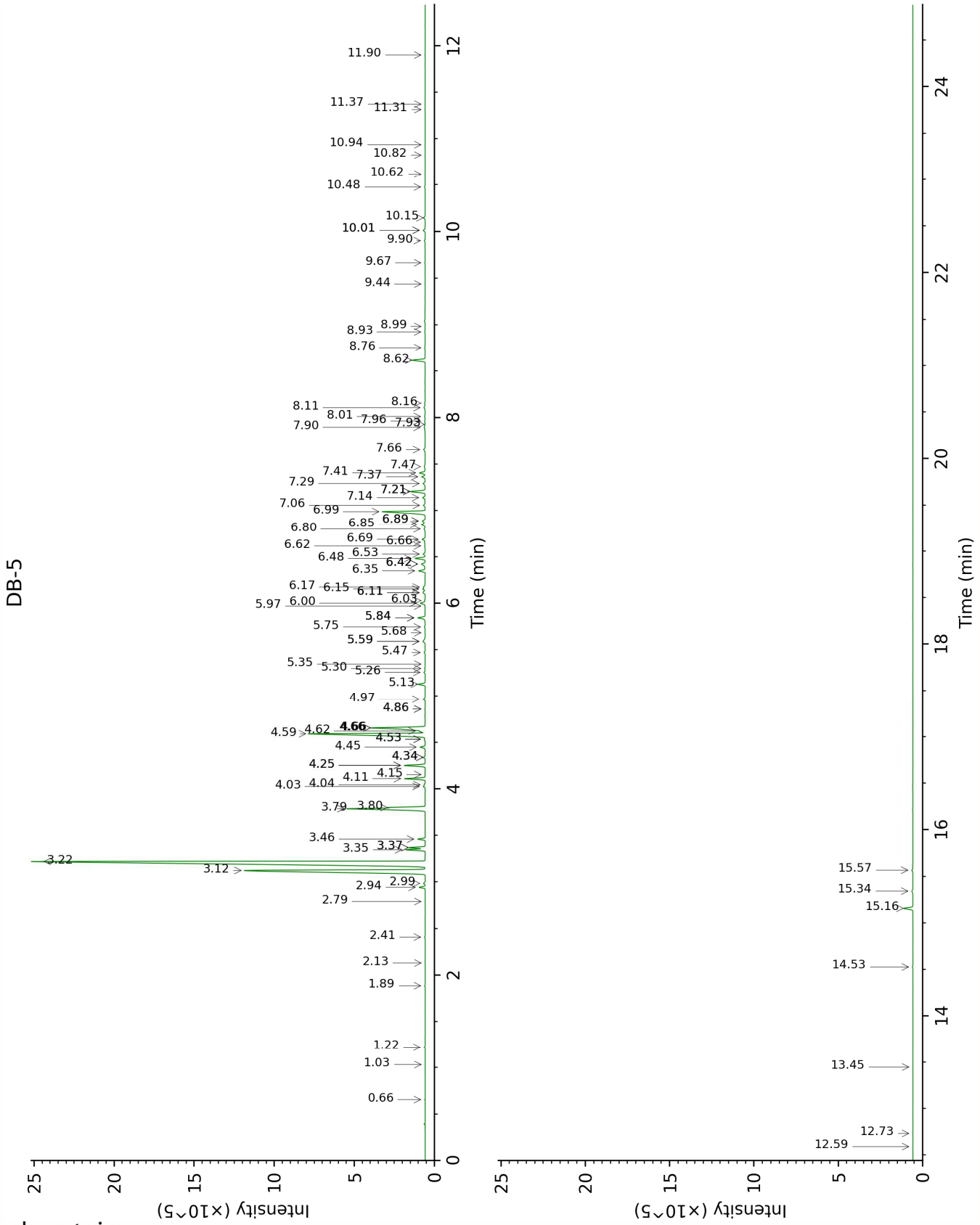

DB-WAX
Time (min)
Intensity (×10^5)
12.00
11.58
11.45
11.08
10.91
10.85
10.80
10.58
10.46
10.43
10.20
10.15
10.05
9.96
9.93
9.88
9.85
9.66
9.59
9.54
9.40
9.32
9.23
9.03
8.95
8.78
8.74
8.65
8.54
8.41
8.34
8.20
8.13
8.04
7.98
7.74
7.60
7.57
7.49
7.42
7.27
7.08
7.01
6.97
6.61
6.41
6.32
6.29
6.14
6.01
5.71
5.49
5.13
4.87
4.37
4.21
3.90
3.87
3.40
3.38
3.28
3.22
3.05
2.97
2.91
2.88
2.67
2.55
2.47
2.38
2.19
1.79
1.72
1.54
1.49
1.32
1.30
1.22
0.96
0.85
0.80
15.47
15.39
15.16
14.22
14.07
13.41
13.24
12.76
12.61


DB-5
Time (min)
Intensity (×10^5)
11.90
11.37
11.31
10.94
10.82
10.62
10.48
10.15
10.01
9.90
9.67
9.44
8.99
8.93
8.76
8.62
8.16
8.11
8.01
7.96
7.93
7.90
7.66
7.47
7.41
7.37
7.29
7.21
7.14
7.06
6.99
6.89
6.85
6.80
6.69
6.66
6.62
6.53
6.48
6.42
6.35
6.17
6.15
6.11
6.03
6.00
5.97
5.84
5.75
5.68
5.59
5.47
5.35
5.30
5.26
5.13
4.97
4.86
4.66
4.62
4.59
4.53
4.45
4.34
4.25
4.15
4.11
4.04
4.03
3.80
3.79
3.46
3.37
3.35
3.22
3.12
2.99
2.94
2.79
2.41
2.13
1.89
1.22
1.03
0.66
15.57
15.34
15.16
14.53
13.45
12.73
12.59

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
3-Methyl-2-butanone	0.85	903.4	0.01	0.66	646.1	0.01
4-Methyl-2-pentanone	1.30	974.0	0.01	1.03	733.3	0.01
Toluene	1.48*	1001.7	[42.04]	1.22	759.4	0.04
Unknown BOCA I [m/z 109, 67 (32), 81 (14), 41 (12), 124 (10)]	0.80	884.0	0.02	1.89	832.7	0.03
(*Z*)-Salvene	0.96	923.8	tr	2.13	852.7	0.01
Unknown BOCA II [m/z 79, 78 (45), 91 (28), 77 (28), 41 (13), 80 (12), 107 (11)... 122 (1)]	1.22	961.7	0.03	2.41	875.6	0.04
Unknown BOFR II [m/z 93, 91 (72), 121 (58), 77 (49), 79 (41), 43 (22), 105 (20),107 (20), 41 (18), 136 (17), 92 (17)]				2.79	906.7	0.01
Hashishene	1.48*	1001.7	[42.04]	2.94	916.7	0.34
Tricyclene	1.32	977.6	0.10	2.99	919.5	0.10
α-Thujene	1.54	1009.5	17.69	3.12	928.7	17.75
α-Pinene	1.48*	1001.7	[42.04]	3.22	935.0	42.10
Thujadiene isomer	2.47	1097.2	0.98	3.35*†	943.3	[1.00]
Camphene	1.79	1032.8	0.80	3.37*†	944.9	[0.81]
α-Fenchene	1.72	1026.7	0.02	3.37*†	944.9	[0.81]
Thuja-2,4(10)-diene	2.38*	1088.4	[4.59]	3.46	950.8	0.39
β-Pinene	2.19	1070.6	2.08	3.79*†	972.4	[5.04]
Sabinene	2.38*	1088.4	[4.59]	3.80*†	973.2	[1.32]
Dehydro-1,8-cineole	3.22	1155.4	0.05	4.03*†	988.1	[0.11]
6-Methyl-5-hepten-2-one	5.13	1295.0	0.09	4.04*†	989.3	[0.06]
Myrcene	2.97	1136.4	1.13	4.11	993.6	1.14
6-Methyl-5-hepten-2-ol	7.01	1431.4	0.01	4.15	996.5	0.02
α-Phellandrene	2.88	1129.6	1.14	4.25*	1003.0	[1.22]
Pseudolimonene	2.91	1132.5	0.01	4.25*	1003.0	[1.22]
Δ3-Carene	2.67	1114.4	0.08	4.34*	1008.5	[0.10]
ortho-Methylanisole	6.01	1358.4	0.04	4.34*	1008.5	[0.10]
α-Terpinene	3.05	1142.7	0.29	4.45	1015.4	0.30
meta-Cymene	4.21*	1228.9	[9.17]	4.53*	1020.7	[0.07]
Carvomenthene	2.55	1103.9	0.04	4.53*	1020.7	[0.07]
para-Cymene	4.21*	1228.9	[9.17]	4.59	1024.4	9.16

Unknown BODA IV [m/z 109, 43 (58), 95 (26)... 137 (15)...]	6.32	1380.3	0.32	4.62	1026.3	0.28
Limonene	3.28	1160.5	2.08	4.66*	1028.3	[4.32]
β-Phellandrene	3.38	1167.5	1.03	4.66*	1028.3	[4.32]
1,8-Cineole	3.40	1169.0	1.13	4.66*	1028.3	[4.32]
(*Z*)-β-Ocimene	3.87	1204.9	0.01	4.86*	1041.0	[0.02]
Unknown ARAN I [m/z 43, 55 (65), 41 (34), 67 (32), 107 (30), 122 (26)... 125 (10)]	5.71	1336.4	0.01	4.86*	1041.0	[0.02]
Unknown BOFR III [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	7.42	1461.7	0.14	4.97	1047.9	0.13
γ-Terpinene	3.90	1207.1	0.44	5.13	1058.1	0.44
cis-Sabinene hydrate	6.98	1428.6	0.10	5.26	1066.1	0.08
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	4.87	1276.2	0.03	5.30	1068.6	0.03
cis-Linalool oxide (fur.)	6.61	1401.4	0.01	5.35	1071.6	0.02
Unknown BODA VI [m/z 43, 94 (63), 109 (61), 59 (55), 79 (51)...152 (2)]	7.27*	1450.8	[0.07]	5.47	1079.4	0.07
Terpinolene	4.37	1240.9	0.12	5.59*	1086.9	[0.25]
para-Cymenene	6.41*	1386.9	[0.30]	5.59*	1086.9	[0.25]
α-Pinene oxide	5.49	1320.4	0.02	5.68	1092.7	0.02
trans-Sabinene hydrate	8.04	1508.3	0.04	5.75	1096.6	0.05
Linalool	8.14	1516.2	0.43	5.84*	1102.7	[0.51]
α-Thujone	6.14	1367.8	0.05	5.84*	1102.7	[0.51]
Unknown BOSE I [m/z 109, 81 (54), 91 (32), 79 (22)...]	6.29	1378.3	0.04	5.97	1110.7	0.02
β-Thujone	6.41*	1386.9	[0.30]	6.00	1112.7	0.32
Unknown BOSE II [m/z 109, 91 (57), 93 (47), 81 (44), 77 (40)... 154 (1)]				6.03	1114.5	0.03
Dehydrosabinaketone	8.74*	1563.6	[0.19]	6.11*	1119.9	[0.20]
cis-para-Menth-2-en-	8.20	1520.9	0.11	6.11*	1119.9	[0.20]

1-ol						
α-Campholenal	7.08	1436.7	0.15	6.15	1122.5	0.16
Unknown BOSE III [m/z 111, 43 (22), 55 (14), 41 (12), 110 (11)...]				6.17	1123.7	0.13
trans-Pinocarveol	9.24*	1603.0	[0.48]	6.35	1134.9	0.43
cis-Verbenol	9.32*	1609.7	[0.15]	6.42*	1139.5	[0.30]
trans-Sabinol	9.88	1655.9	0.09	6.42*	1139.5	[0.30]
trans-Verbenol	9.59	1632.2	0.68	6.48	1143.4	0.65
meta-Mentha-4,6-dien-8-ol	9.40	1616.1	0.18	6.53	1146.3	0.13
Sabinaketone	8.78	1566.9	0.05	6.62	1152.0	0.05
Unknown BOCA III [m/z 97, 81 (96), 109 (80), 43 (53), 53 (40), 41 (36), 56 (29), 95 (25)... 152 (1)]	7.57	1473.4	0.05	6.66	1154.5	0.05
Pinocarvone	7.98	1504.2	0.20	6.69	1156.5	0.20
Unknown CALU II [m/z 95, 110 (38), 81 (21), 79 (16)... 152 (7)]	7.74	1486.0	0.08	6.80	1163.7	0.09
α-Phellandren-8-ol	10.20	1682.6	0.27	6.85	1166.8	0.35
cis-Sabinol	10.85	1738.0	0.02	6.89*	1169.4	[0.22]
Umbellulone	8.94	1580.1	0.21	6.89*	1169.4	[0.22]
Terpinen-4-ol	8.65	1557.1	3.29	6.99	1175.9	3.24
Cryptone	9.24*	1603.0	[0.48]	7.06	1180.2	0.13
para-Cymen-8-ol	11.58*	1791.8	[0.18]	7.14	1185.5	0.17
Myrtenal	8.74*	1563.6	[0.19]	7.21*	1189.7	[0.99]
α-Terpineol	9.85*	1653.7	[0.87]	7.21*	1189.7	[0.99]
Myrtenol	10.91	1743.8	0.27	7.29	1195.2	0.16
cis-α-Phellandrene epoxide (iPr vs Me)	11.08	1758.1	0.29	7.37	1199.8	0.24
Verbenone	9.66	1638.1	0.40	7.41	1202.5	0.38
trans-Piperitol	10.43	1702.2	0.09	7.48	1206.8	0.07
trans-Carveol	11.58*	1791.8	[0.18]	7.66	1219.0	0.13
Citronellol	10.80	1733.7	0.07	7.90	1235.0	0.08
Cuminal	10.58	1714.3	0.09	7.93	1237.1	0.03
Carvone	10.06	1670.8	0.05	7.96	1239.5	0.04
Carvotanacetone	9.54*	1627.7	[0.06]	8.01	1242.8	0.06
Unknown BODA V [m/z 109, 119 (84), 91 (81), 134 (55)... 137 (27)...]	11.45	1780.5	0.12	8.11	1249.1	0.12
Piperitone	9.96	1662.9	0.07	8.16	1252.4	0.05

Bornyl acetate	8.34	1532.1	0.87	8.62	1283.2	0.84
Cuminol	14.22	2038.3	0.04	8.76	1292.6	0.05
Thymol	15.16	2131.1	0.04	8.93	1303.9	0.04
Carvacrol	15.39	2155.4	0.09	8.99	1308.0	0.02
exo-2-Hydroxycineole acetate	10.15	1678.7	0.02	9.44	1340.0	0.02
Citronellyl acetate	9.54*	1627.7	[0.06]	9.67	1356.0	0.03
α-Copaene	7.27*	1450.8	[0.07]	9.90	1372.7	0.06
β-Bourbonene	7.60	1475.6	0.13	10.01*	1380.5	[0.15]
1,5-diepi-β-Bourbonene	7.49	1467.5	0.01	10.01*	1380.5	[0.15]
β-Elemene	8.54*	1548.5	[0.16]	10.15	1389.9	0.10
β-Caryophyllene	8.54*	1548.5	[0.16]	10.48	1413.6	0.05
β-Copaene	8.41	1537.7	0.02	10.62	1424.2	0.02
Isogermacrene D	9.03	1586.8	0.10	10.82	1439.5	0.01
α-Humulene	9.32*	1609.7	[0.15]	10.94	1447.9	0.02
Germacrene D	9.85*	1653.7	[0.87]	11.32	1476.0	0.02
β-Selinene	9.93	1660.0	0.01	11.37	1480.3	0.02
δ-Cadinene	10.46	1704.9	0.05	11.90	1520.2	0.02
Caryophyllene oxide isomer	12.76	1899.6	0.01	12.59	1574.4	0.02
Viridiflorol	14.07	2023.6	0.01	12.73	1585.6	0.02
β-Eudesmol	15.47	2163.0	0.01	13.45	1643.5	0.01
α-Phellandrene dimer I	12.00	1830.1	0.02	14.53	1734.1	0.03
α-Phellandrene dimer II	12.60	1885.2	0.62	15.16	1788.8	0.62
α-Phellandrene dimer III	13.24	1944.4	0.07	15.34	1804.8	0.09
α-Phellandrene dimer IV	13.41	1960.4	0.09	15.57	1825.1	0.08
Total reported		97.94%			98.93%	

*: 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