

Date : 2025-04-22

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 25D11-PTH04

Customer Identification : Organic Frankincense Frereana - Somalia - FE0112R

Type : Essential Oil

Source : *Boswellia frereana*

Customer : Plant Therapy

Checked and approved by:

Alexis St-Gelais, Ph. D., Chimiste 2013-174

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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 : 2025-04-15

PHYSICOCHEMICAL DATA

Refractive index : 1.4622 ± 0.0003 (20 °C)

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

Analyst : Cindy Caron B. Sc.

Date : 2025-04-11

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
3-Methyl-2-butanone	0.03	Aliphatic ketone
Unknown	tr	Unknown
4-Methyl-2-pentanone (Methyl isobutyl ketone)	0.01	Aliphatic ketone
Toluene	0.03	Simple phenolic
Hexadiene isomer?	0.01	Alkene
(Z)-Salvene	0.07	Normonoterpene
Unknown	0.01	Unknown
(E)-Salvene	0.03	Normonoterpene
Unknown	0.02	Unknown
Unknown	0.08	Monoterpene
Unknown	0.21	Unknown
Hashishene	0.51	Monoterpene
α -Thujene	59.84	Monoterpene
α -Pinene	2.38	Monoterpene
Unknown	2.52	Monoterpene
Camphene	0.03	Monoterpene
α -Fenchene	tr	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
Sabinene	6.35	Monoterpene
β -Pinene	0.27	Monoterpene
Pseudolimonene isomer	0.05	Monoterpene
6-Methyl-5-hepten-2-one	0.06	Aliphatic ketone
Dehydro-1,8-cineole	0.02	Monoterpenic ether
Myrcene	0.23	Monoterpene
6-Methyl-5-hepten-2-ol	0.13	Aliphatic alcohol
Pseudolimonene	0.03	Monoterpene
α -Phellandrene	0.90	Monoterpene
<i>ortho</i> -Methylanisole	0.02	Simple phenolic
Δ^3 -Carene	0.05	Monoterpene
α -Terpinene	0.44	Monoterpene
Carvomenthene	0.05	Aliphatic alcohol
<i>meta</i> -Cymene	0.46	Monoterpene
<i>para</i> -Cymene	9.95	Monoterpene
Limonene	0.49	Monoterpene
β -Phellandrene	[3.34]	Monoterpene
1,8-Cineole	[3.34]	Monoterpenic ether
Unknown	0.04	Unknown
(Z)- β -Ocimene	0.04	Monoterpene
Unknown	0.25	Unknown

(E)- β -Ocimene	0.02	Monoterpene
Unknown	0.03	Unknown
γ -Terpinene	0.61	Monoterpene
<i>cis</i> -Sabinene hydrate	0.05	Monoterpenic alcohol
Unknown	0.05	Oxygenated monoterpene
Terpinolene	0.15	Monoterpene
<i>para</i> -Cymenene	0.06	Monoterpene
<i>trans</i> -Sabinene hydrate	0.04	Monoterpenic alcohol
Unknown	0.04	Unknown
α -Thujone	0.08	Monoterpenic ketone
Linalool	0.08	Monoterpenic alcohol
β -Thujone	0.12	Monoterpenic ketone
Unknown	0.60	Oxygenated monoterpene
Unknown	0.05	Oxygenated monoterpene
<i>cis-para</i> -Menth-2-en-1-ol	0.14	Monoterpenic alcohol
<i>trans-para</i> -Mentha-2,8-dien-1-ol	0.16	Monoterpenic alcohol
Unknown	0.06	Unknown
<i>trans</i> -Pinocarveol	0.06	Monoterpenic alcohol
<i>cis</i> -Verbenol	0.05	Monoterpenic alcohol
<i>trans</i> -Sabinol	0.24	Monoterpenic alcohol
<i>trans</i> -Verbenol	0.03	Monoterpenic alcohol
<i>meta</i> -Mentha-4,6-dien-8-ol	0.02	Monoterpenic alcohol
Sabinaketone	0.05	Normonoterpenic ketone
Unknown	0.03	Oxygenated monoterpene
Unknown	0.06	Oxygenated monoterpene
α -Phellandren-8-ol	0.03	Monoterpenic alcohol
Umbellulone	0.10	Monoterpenic ketone
Unknown	0.02	Oxygenated monoterpene
<i>cis</i> -Sabinol	0.23	Monoterpenic alcohol
Terpinen-4-ol	3.02	Monoterpenic alcohol
Cryptone	0.02	Normonoterpenic ketone
Thuj-3-en-10-al	0.16	Monoterpenic aldehyde
<i>para</i> -Cymen-8-ol	0.19	Monoterpenic alcohol
α -Terpineol	0.03	Monoterpenic alcohol
Myrtenal	0.02	Monoterpenic aldehyde
<i>cis</i> -Piperitol	0.03	Monoterpenic alcohol
Myrtenol	0.05	Monoterpenic alcohol
<i>cis</i> - α -Phellandrene epoxide (iPr vs Me)	0.10	Monoterpenic ether
<i>trans</i> -Piperitol	0.06	Monoterpenic alcohol
<i>trans</i> -Carveol	0.02	Monoterpenic alcohol
Citronellol	0.04	Monoterpenic alcohol
Cuminal	0.06	Monoterpenic aldehyde
Carvone	0.01	Monoterpenic ketone
Carvotanacetone	0.07	Monoterpenic ketone
Unknown	0.05	Unknown

Unknown	0.05	Oxygenated monoterpene
Piperitone	0.03	Monoterpenic ketone
Unknown	0.02	Unknown
3,5-Dimethoxytoluene	0.01	Simple phenolic
Unknown	0.03	Unknown
Bornyl acetate	0.07	Monoterpenic ester
Cuminol	0.04	Monoterpenic alcohol
Thymol	0.08	Monoterpenic alcohol
Carvacrol	0.06	Monoterpenic alcohol
exo-2-Hydroxycineole acetate	0.02	Monoterpenic ester
α -Cubebene	0.02	Sesquiterpene
Citronellyl acetate	0.05	Monoterpenic ester
α -Copaene	0.05	Sesquiterpene
β -Bourbonene	1.13	Sesquiterpene
β -Elemene	0.06	Sesquiterpene
β -Caryophyllene	0.06	Sesquiterpene
β -Ylangene	0.08	Sesquiterpene
β -Copaene	0.13	Sesquiterpene
Isogermacrene D	0.08	Sesquiterpene
α -Humulene	0.02	Sesquiterpene
allo-Aromadendrene	0.02	Sesquiterpene
Germacrene D	0.03	Sesquiterpene
γ -Cadinene	0.02	Sesquiterpene
δ -Cadinene	0.02	Sesquiterpene
Caryophyllene oxide	0.01	Sesquiterpenic ether
τ -Cadinol	0.03	Sesquiterpenic alcohol
α -Phellandrene dimer I	0.03	Diterpene
α -Phellandrene dimer II	0.44	Diterpene
α -Phellandrene dimer III	0.06	Diterpene
α -Phellandrene dimer IV	0.06	Diterpene
α -Phellandrene dimer VI	0.02	Diterpene
α -Phellandrene dimer VII	0.02	Diterpene
Consolidated total	99.03	

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

Note: no correction factor was applied

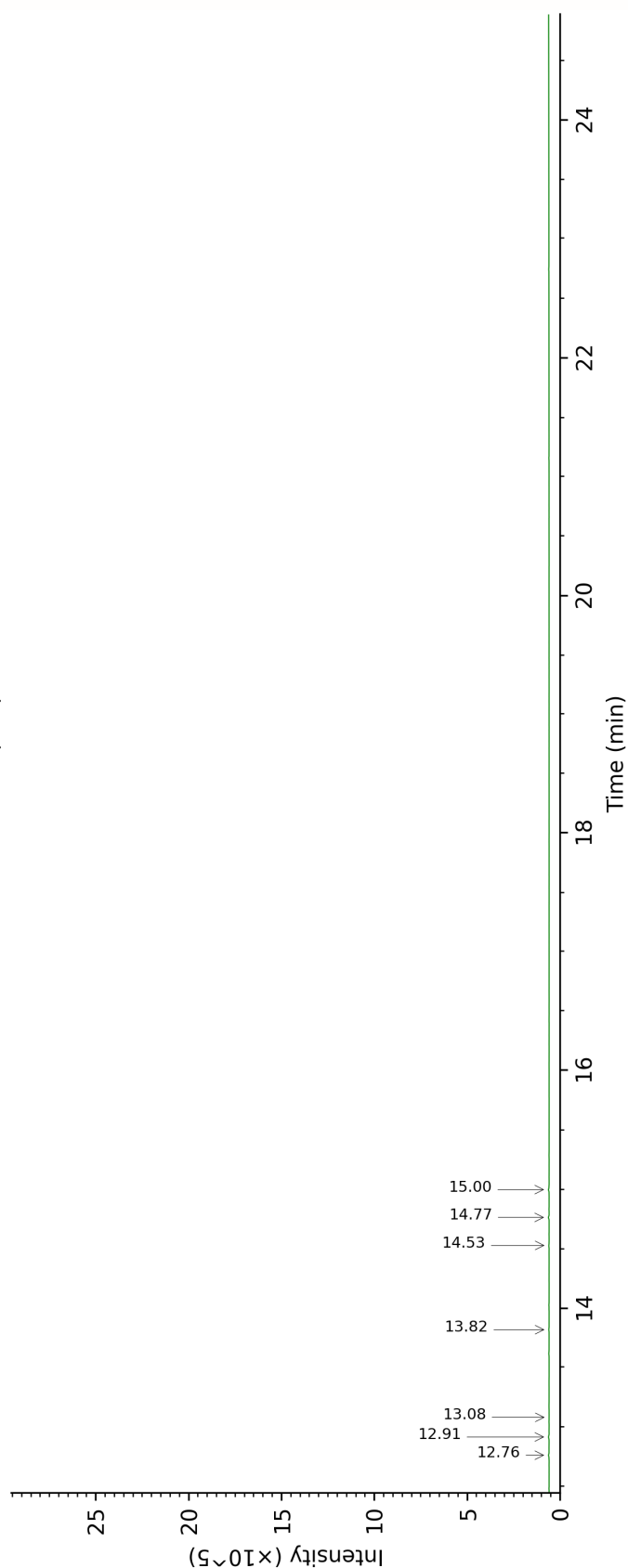
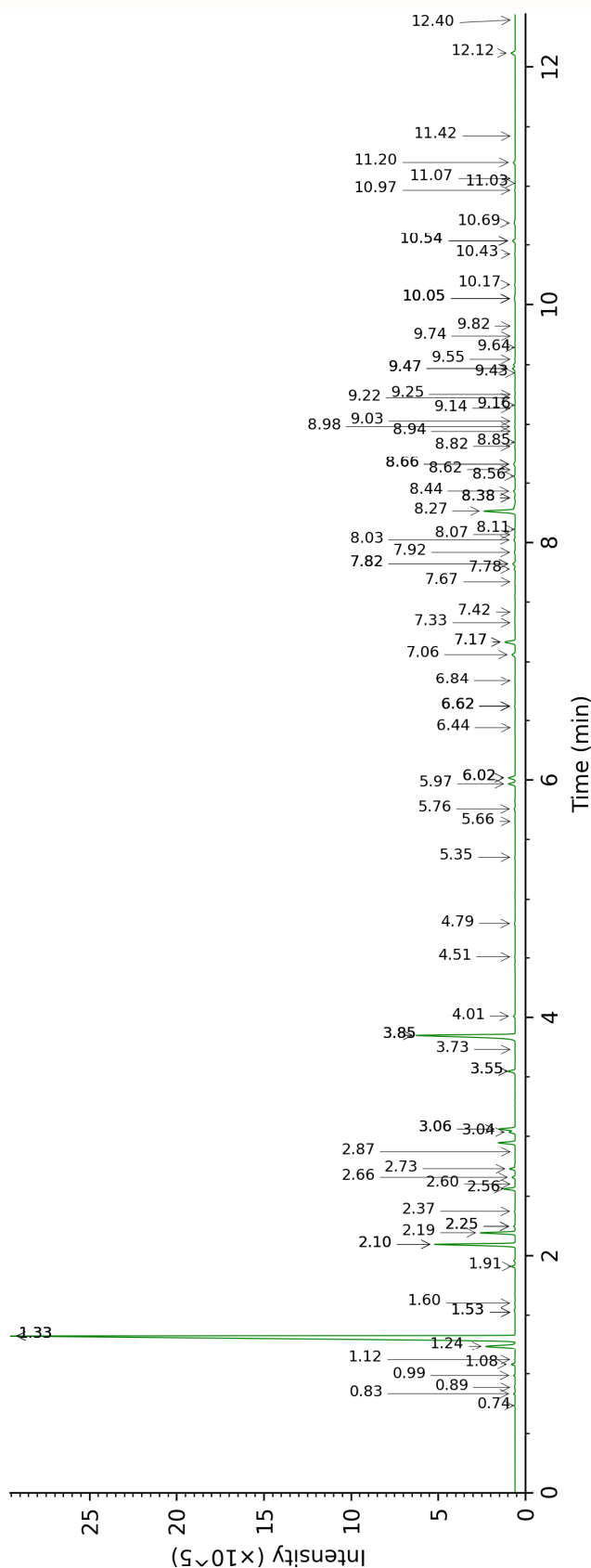
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

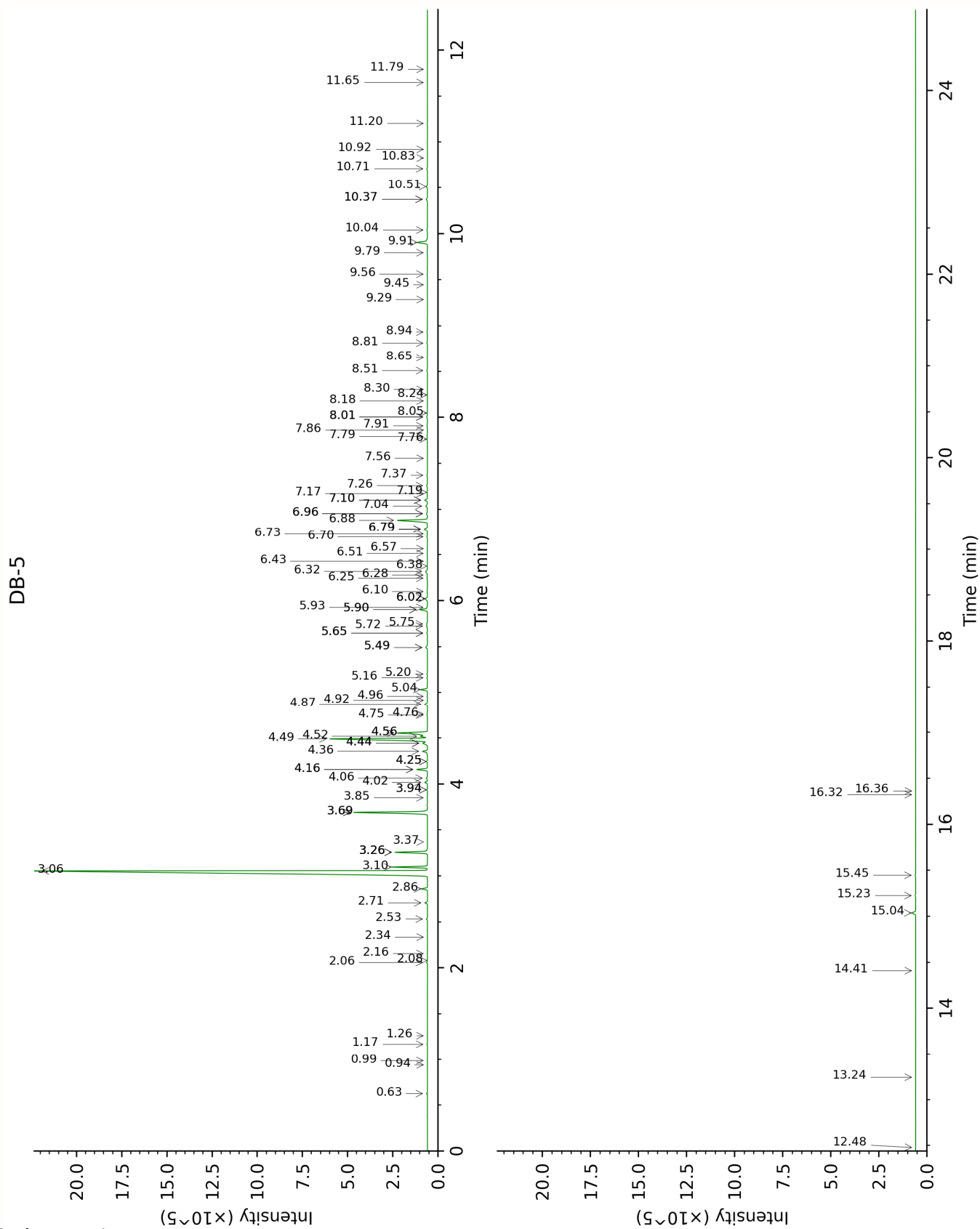
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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.

DB-WAX





FULL ANALYSIS DATA

3-Methyl-2-butanone	Column DB-WAX			Column DB-5		
	0.74	894.9	0.04	0.63	640.8	0.03
Unknown BODA I [m/z 93, 91 (70), 77 (48), 108 (42)]				0.94	722.1	tr
4-Methyl-2-pentanone (Methyl isobutyl ketone)	1.12	965.2	0.02	0.99	728.8	0.01
Toluene	1.33*	999.4	[59.86]	1.17	755.2	0.03
Hexadiene isomer?				1.26	768.7	0.01
(Z)-Salvene	0.84	913.0	0.07	2.06	849.6	0.07
Unknown PRME II [m/z 109, 43 (28), 124 (28), 41 (14), 55 (11), 79 (9), 81 (8)...]	1.53*	1020.3	[0.02]	2.08	851.6	0.01
(E)-Salvene	0.89	922.6	0.03	2.16	857.9	0.03
Unknown BOCA II [m/z 79, 78 (45), 91 (28), 77 (28), 41 (13), 80 (12), 107 (11)... 122 (1)]	1.08	957.9	0.23	2.34	873.0	0.02
Unknown BOFR I [m/z 93, 91 (75), 121 (61), 77 (58), 79 (38), 92 (26), 43 (24), 41 (23), 105 (22), 107 (19), 136 (16)]	0.99	941.0	0.08	2.53	889.6	0.08
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)]				2.71	904.1	0.21
Hashishene	1.33*	999.4	[59.86]	2.86	914.3	0.51
α -Thujene	1.33*	999.4	[59.86]	3.06	927.3	59.84
α -Pinene	1.24	986.6	2.88	3.10	930.1	2.38
Unknown SAOF I [m/z 91, 92 (47), 65 (11)... 134 (1)]	2.19	1090.5	2.52	3.26*	940.9	[2.54]

Camphene	1.60	1028.4	0.03	3.26*	940.9	[2.54]
α -Fenchene	1.53*	1020.3	[0.02]	3.26*	940.9	[2.54]
Thuja-2,4(10)-diene	2.10*	1080.3	[6.35]	3.37	948.4	0.02
Sabinene	2.10*	1080.3	[6.35]	3.69*	970.0	[6.62]
β -Pinene	1.91	1060.9	0.27	3.69*	970.0	[6.62]
Pseudolimonene isomer	2.25*	1096.1	[0.10]	3.85	980.6	0.05
6-Methyl-5-hepten-2-one	4.79	1292.4	0.06	3.94*	986.4	[0.07]
Dehydro-1,8-cineole	2.87	1146.7	0.02	3.94*	986.4	[0.07]
Myrcene	2.66	1129.5	0.23	4.02	991.8	0.23
6-Methyl-5-hepten-2-ol	6.62*	1427.9	[0.06]	4.06	994.9	0.13
Pseudolimonene	2.60	1124.9	0.03	4.16*	1001.2	[0.93]
α -Phellandrene	2.56	1121.6	0.90	4.16*	1001.2	[0.93]
<i>ortho</i> -Methylanisole	5.66	1356.0	0.02	4.24*	1006.7	[0.09]
Δ^3 -Carene	2.37	1106.4	0.05	4.24*	1006.7	[0.09]
α -Terpinene	2.73	1135.2	0.43	4.36	1013.7	0.44
Carvomenthene	2.25*	1096.1	[0.10]	4.44*	1019.3	[0.56]
<i>meta</i> -Cymene	3.85*	1223.2	[10.41]	4.44*	1019.3	[0.56]
<i>para</i> -Cymene	3.85*	1223.2	[10.41]	4.49	1022.3	9.95
Limonene	3.04	1160.1	0.49	4.52*†	1024.1	[0.60]
β -Phellandrene	3.06*	1162.1	[1.36]	4.56*†	1026.4	[3.23]
1,8-Cineole	3.06*	1162.1	[1.36]	4.56*†	1026.4	[3.23]
Unknown ARAN I [m/z 43, 55 (65), 41 (34), 67 (32), 107 (30), 122 (26)... 125 (10)]	5.35	1333.9	0.04	4.75	1038.7	0.04
(Z)- β -Ocimene	3.55*	1201.0	[0.64]	4.76	1039.5	0.04
Unknown BOFR III [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	7.06	1461.2	0.34	4.87	1046.5	0.25
(E)- β -Ocimene	3.73	1214.4	0.02	4.92	1049.3	0.02
Unknown BOFR IV [m/z 109, 45 (67), 41 (40), 67 (39), 81 (33), 79 (27), 95 (24), 91 (23), 82	6.62*	1427.9	[0.06]	4.96	1052.0	0.03

(21), 55 (21), 93 (20)...						
γ -Terpinene	3.55*	1201.0	[0.64]	5.04	1056.7	0.61
<i>cis</i> -Sabinene hydrate	6.62*	1427.9	[0.06]	5.16	1064.8	0.05
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	4.51	1271.8	0.04	5.20	1067.3	0.05
Terpinolene	4.01	1235.0	0.15	5.49*	1085.5	[0.21]
<i>para</i> -Cymenene	6.02*	1382.9	[0.64]	5.49*	1085.5	[0.21]
<i>trans</i> -Sabinene hydrate	7.67	1507.7	0.04	5.65*	1095.4	[0.07]
Unknown BOFR VII [m/z 109, 43 (48), 91 (39), 81 (33), 95 (32), 93 (32), 67 (31)... 152 (9)]				5.65*	1095.4	[0.07]
α -Thujone	5.76	1363.7	0.08	5.72*†	1100.2	[0.10]
Linalool	7.78	1516.2	0.08	5.75*†	1101.8	[0.08]
β -Thujone	6.02*	1382.9	[0.64]	5.90*	1111.8	[0.72]
Unknown BOSE I [m/z 109, 81 (54), 91 (32), 79 (22)...	5.97	1379.2	0.60	5.90*	1111.8	[0.72]
Unknown BOSE II [m/z 109, 91 (57), 93 (47), 81 (44), 77 (40)... 154 (1)]				5.93	1113.3	0.05
<i>cis-para</i> -Menth-2-en-1-ol	7.82*	1519.6	[0.23]	6.02*	1119.4	[0.29]
<i>trans-para</i> -Mentha-2,8-dien-1-ol	8.66*	1585.5	[0.18]	6.02*	1119.4	[0.29]
Unknown BOSE III [m/z 111, 43 (22), 55 (14), 41 (12), 110 (11)...				6.10	1124.3	0.06
<i>trans</i> -Pinocarveol	8.82	1597.8	0.04	6.25	1133.7	0.06
<i>cis</i> -Verbenol	8.98	1611.4	0.06	6.28	1135.8	0.05
<i>trans</i> -Sabinol	9.47*	1651.3	[0.27]	6.32	1138.4	0.24
<i>trans</i> -Verbenol	9.16	1626.2	0.03	6.38	1142.1	0.03
<i>meta</i> -Mentha-4,6-dien-8-ol	9.03	1615.1	0.04	6.43	1145.5	0.02
Sabinaketone	8.38*	1563.3	[0.07]	6.52	1151.0	0.05

Unknown BOCA III [m/z 97, 81 (96), 109 (80), 43 (53), 53 (40), 41 (36), 56 (29), 95 (25)... 152 (1)]	7.17*	1469.2	[1.04]	6.57	1154.4	0.03
Unknown CALU II [m/z 95, 110 (38), 81 (21), 79 (16)... 152 (7)]	7.33	1481.4	0.04	6.70	1162.7	0.06
α -Phellandren-8-ol	9.82	1680.5	0.02	6.73	1164.7	0.03
Umbellulone	8.56	1577.6	0.10	6.78*	1168.3	[0.36]
Unknown CALU III [m/z 95, 110 (43), 81 (28), 41 (15)... 152 (8)]	7.42	1488.2	0.02	6.78*	1168.3	[0.36]
<i>cis</i> -Sabinol	10.54*	1740.9	[0.25]	6.78*	1168.3	[0.36]
Terpinen-4-ol	8.27	1554.5	3.04	6.88	1174.5	3.02
Cryptone	8.85	1600.6	0.02	6.96*	1179.2	[0.12]
Thuj-3-en-10-al	8.44	1567.7	0.16	6.96*	1179.2	[0.12]
<i>para</i> -Cymen-8-ol	11.20	1798.0	0.19	7.04	1184.5	0.19
α -Terpineol	9.47*	1651.3	[0.27]	7.10*	1188.7	[0.27]
Myrtenal	8.38*	1563.3	[0.07]	7.10*	1188.7	[0.27]
<i>cis</i> -Piperitol	9.25	1633.6	0.02	7.17	1193.2	0.03
Myrtenol	10.54*	1740.9	[0.25]	7.19	1194.1	0.05
<i>cis</i> - α -Phellandrene epoxide (iPr vs Me)	10.69	1754.3	0.13	7.26	1198.8	0.10
<i>trans</i> -Piperitol	10.05*	1699.4	[0.15]	7.37	1206.1	0.06
<i>trans</i> -Carveol	11.07	1786.4	0.02	7.56	1218.5	0.02
Citronellol	10.42	1731.3	0.07	7.76	1232.5	0.04
Cuminal	10.17	1709.4	0.06	7.79	1234.5	0.06
Carvone	9.64	1665.9	0.02	7.86	1239.1	0.01
Carvotanacetone	9.22	1631.2	0.05	7.91	1242.2	0.07
Unknown CALU IV [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]				8.01*	1248.7	[0.10]
Unknown BODA V [m/z 109, 119 (84), 91 (81), 134 (55)... 137 (27)...]	10.97	1777.9	0.05	8.01*	1248.7	[0.10]
Piperitone	9.55	1657.7	0.04	8.05	1251.6	0.03
Unknown CIGL III [m/z 43, 97 (78), 41	13.08	1969.0	0.02	8.18	1260.4	0.02

(45), 55 (35), 69 (28), 107 (24), 83 (23)...						
3,5-Dimethoxytoluene	11.03	1783.0	0.01	8.24	1264.8	0.01
Unknown PECH X [m/z 109, 43 (83), 95 (70), 110 (70), 99 (53), 119 (48)...				8.30	1268.8	0.03
Bornyl acetate	7.92	1527.2	0.07	8.51	1282.6	0.07
Cuminol	13.82	2040.0	0.03	8.65	1292.2	0.04
Thymol	14.77	2132.8	0.07	8.82	1303.1	0.08
Carvacrol	15.00	2156.3	0.07	8.94	1311.5	0.06
exo-2-Hydroxycineole acetate	9.74	1673.6	0.04	9.29	1336.5	0.02
α -Cubebene	6.44	1414.3	0.01	9.45	1347.8	0.02
Citronellyl acetate	9.14	1624.0	0.03	9.56	1355.9	0.05
α -Copaene	6.84	1444.1	0.03	9.79	1372.3	0.05
β -Bourbonene	7.17*	1469.2	[1.04]	9.91	1380.2	1.13
β -Elemene	8.07	1539.0	0.06	10.04	1389.7	0.06
β -Caryophyllene	8.11	1542.4	0.06	10.37*	1413.7	[0.14]
β -Ylangene	7.82*	1519.6	[0.23]	10.37*	1413.7	[0.14]
β -Copaene	8.02	1535.4	0.14	10.51	1424.1	0.13
Isogermacrene D	8.62	1581.9	0.03	10.71	1439.0	0.08
α -Humulene	8.94	1608.0	0.02	10.83	1447.7	0.02
allo-Aromadendrene	8.66*	1585.5	[0.18]	10.92	1454.8	0.02
Germacrene D	9.43	1648.3	0.05	11.20	1475.8	0.03
γ -Cadinene	10.05*	1699.4	[0.15]	11.65	1509.2	0.02
δ -Cadinene	10.05*	1699.4	[0.15]	11.79	1520.5	0.02
Caryophyllene oxide	12.40	1905.4	0.02	12.48	1574.2	0.01
τ -Cadinol	14.53	2109.1	0.03	13.24	1636.1	0.03
α -Phellandrene dimer I	11.42	1817.7	0.02	14.41	1733.7	0.03
α -Phellandrene dimer II	12.12	1880.1	0.44	15.04	1788.1	0.44
α -Phellandrene dimer III	12.76	1939.3	0.06	15.23	1804.4	0.06
α -Phellandrene dimer IV	12.92	1953.6	0.07	15.45	1824.5	0.06
α -Phellandrene dimer VI				16.32	1904.0	0.02
α -Phellandrene				16.36	1907.8	0.02

dimer VII						
Total reported	97.01%			99.25%		

*: 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