

Date : 2025-09-04

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 25H20-PTH04

Customer Identification : Balsam Fir - Canada - BN0113R

Type : Essential Oil

Source : *Abies balsamea* ct. Eastern / Low thymol

Customer : Plant Therapy

Checked and 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

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 : 2025-08-27

PHYSICOCHEMICAL DATA

Refractive index : 1.4744 ± 0.0003 (20 °C)

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

Analyst : Kassandra Baker

Date : 2025-08-21

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-Methylfuran	tr	Furan
Isovaleral	tr	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Toluene	0.01	Simple phenolic
Unknown	0.01	Unknown
Hexanal	tr	Aliphatic aldehyde
Ethyl 2-methylbutyrate	0.01	Aliphatic ester
(3Z)-Hexenol	0.03	Aliphatic alcohol
Santene	2.43	Normonoterpene
Styrene	tr	Simple phenolic
Unknown	0.02	Normonoterpene
Bornylene	0.01	Monoterpene
Tricyclene	0.91	Monoterpene
α -Thujene	0.17	Monoterpene
α -Pinene	13.40	Monoterpene
α -Fenchene	0.05	Monoterpene
Camphene	6.21	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
Benzaldehyde	0.01	Simple phenolic
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.05	Monoterpene
β -Pinene	25.90	Monoterpene
Sabinene	0.24	Monoterpene
Unknown	0.01	Monoterpene
Myrcene	1.63	Monoterpene
2-Carene	0.01	Monoterpene
α -Phellandrene	0.17	Monoterpene
Pseudolimonene	0.02	Monoterpene
Δ^3 -Carene	17.53	Monoterpene
(3Z)-Hexenyl acetate	0.01	Aliphatic ester
α -Terpinene	0.14	Monoterpene
<i>meta</i> -Cymene	0.10	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
<i>para</i> -Cymene	0.37	Monoterpene
β -Phellandrene	6.05	Monoterpene
Limonene	9.30	Monoterpene
(Z)- β -Ocimene	0.01	Monoterpene
(E)- β -Ocimene	0.01	Monoterpene
γ -Terpinene	0.27	Monoterpene
Unknown	0.01	Oxygenated monoterpene
<i>meta</i> -Cymenene	0.01	Monoterpene

Fenchone	0.13	Monoterpenic ketone
Isoterpinolene	0.06	Monoterpene
γ -Campholenal	0.01	Aliphatic alcohol
<i>para</i> -Cymenene	0.09	Monoterpene
Terpinolene	1.07	Monoterpene
α -Pinene oxide	0.03	Monoterpenic ether
Unknown	0.02	Unknown
α -Thujone	0.01	Monoterpenic ketone
Linalool	0.10	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
endo-Fenchol	0.08	Monoterpenic alcohol
<i>cis-para</i> -Menth-2-en-1-ol	0.03	Monoterpenic alcohol
α -Campholenal	0.02	Monoterpenic aldehyde
Nopinone	0.04	Normonoterpenic ketone
<i>trans</i> -Pinocarveol	0.09	Monoterpenic alcohol
Camphor	0.59	Monoterpenic ketone
<i>trans-para</i> -Menth-2-en-1-ol	0.03	Monoterpenic alcohol
Camphene hydrate	0.09	Monoterpenic alcohol
<i>meta</i> -Mentha-4,6-dien-8-ol	0.01	Monoterpenic alcohol
Isoborneol	0.02	Monoterpenic alcohol
Pinocamphone	0.01	Monoterpenic ketone
Myrtenyl methyl ether	0.01	Monoterpenic ether
Pinocarvone	0.05	Monoterpenic ketone
Borneol	0.55	Monoterpenic alcohol
α -Phellandren-8-ol	0.01	Monoterpenic alcohol
Isopinocamphone	0.04	Monoterpenic ketone
Terpinen-4-ol	0.30	Monoterpenic alcohol
Cryptone	0.07	Normonoterpenic ketone
<i>para</i> -Cymen-8-ol	0.07	Monoterpenic alcohol
α -Terpineol	0.45	Monoterpenic alcohol
Myrtenal	0.03	Monoterpenic aldehyde
Myrtenol	0.05	Monoterpenic alcohol
Methylchavicol	0.04	Phenylpropanoid
Unknown	0.04	Unknown
Verbenone	0.06	Monoterpenic ketone
<i>trans</i> -Piperitol	0.01	Monoterpenic alcohol
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
endo-Fenchyl acetate	0.04	Monoterpenic ester
3-Methyl-3-butenyl 4-methylvalerate	0.01	Aliphatic ester
<i>cis</i> -Carveol	0.01	Monoterpenic alcohol
Citronellol	0.01	Monoterpenic alcohol
Thymol methyl ether	0.05	Monoterpenic ether
Carvone	0.01	Monoterpenic ketone
Piperitone	0.26	Monoterpenic ketone
Phellandral	0.01	Monoterpenic aldehyde

Bornyl acetate	7.10	Monoterpenic ester
Isobornyl acetate	0.02	Monoterpenic ester
Methyl myrtenate	0.09	Monoterpenic ester
<i>trans</i> -Pinocarvyl acetate	0.01	Monoterpenic ester
Thymol	0.05	Monoterpenic alcohol
Isohexyl isocaproate	0.03	Aliphatic ester
Myrtenyl acetate	0.01	Monoterpenic ester
Unknown	0.02	Unknown
α -Longipinene	0.08	Sesquiterpene
α -Terpinyl acetate	0.01	Monoterpenic ester
Citronellyl acetate	0.03	Monoterpenic ester
Longicyclene	0.02	Sesquiterpene
α -Ylangene	0.04	Sesquiterpene
Neryl acetate	tr	Monoterpenic ester
α -Copaene	0.03	Sesquiterpene
β -Bourbonene	0.01	Sesquiterpene
Geranyl acetate	0.04	Monoterpenic ester
β -Elemene	0.02	Sesquiterpene
β -Longipinene	0.02	Sesquiterpene
Longifolene	0.30	Sesquiterpene
Methyleugenol	0.02	Phenylpropanoid
β -Caryophyllene	0.27	Sesquiterpene
β -Copaene	0.01	Sesquiterpene
Aromadendrene	0.01	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.04	Sesquiterpene
α -Himachalene	0.02	Sesquiterpene
α -Humulene	0.13	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.04	Sesquiterpene
γ -Murolene	0.01	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
β -Selinene	0.03	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.04	Sesquiterpene
α -Selinene	0.03	Sesquiterpene
β -Himachalene	0.04	Sesquiterpene
α -Murolene	0.01	Sesquiterpene
δ -Amorphene	0.03	Sesquiterpene
β -Bisabolene	0.49	Sesquiterpene
δ -Cadinene	0.03	Sesquiterpene
(<i>E</i>)- γ -Bisabolene	0.01	Sesquiterpene
α -Calacorene	0.01	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.06	Sesquiterpene
(<i>E</i>)-Nerolidol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Caryophyllene oxide	0.04	Sesquiterpenic ether
Humulene epoxide II	0.02	Sesquiterpenic ether

Consolidated total	99.21	
---------------------------	--------------	--

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

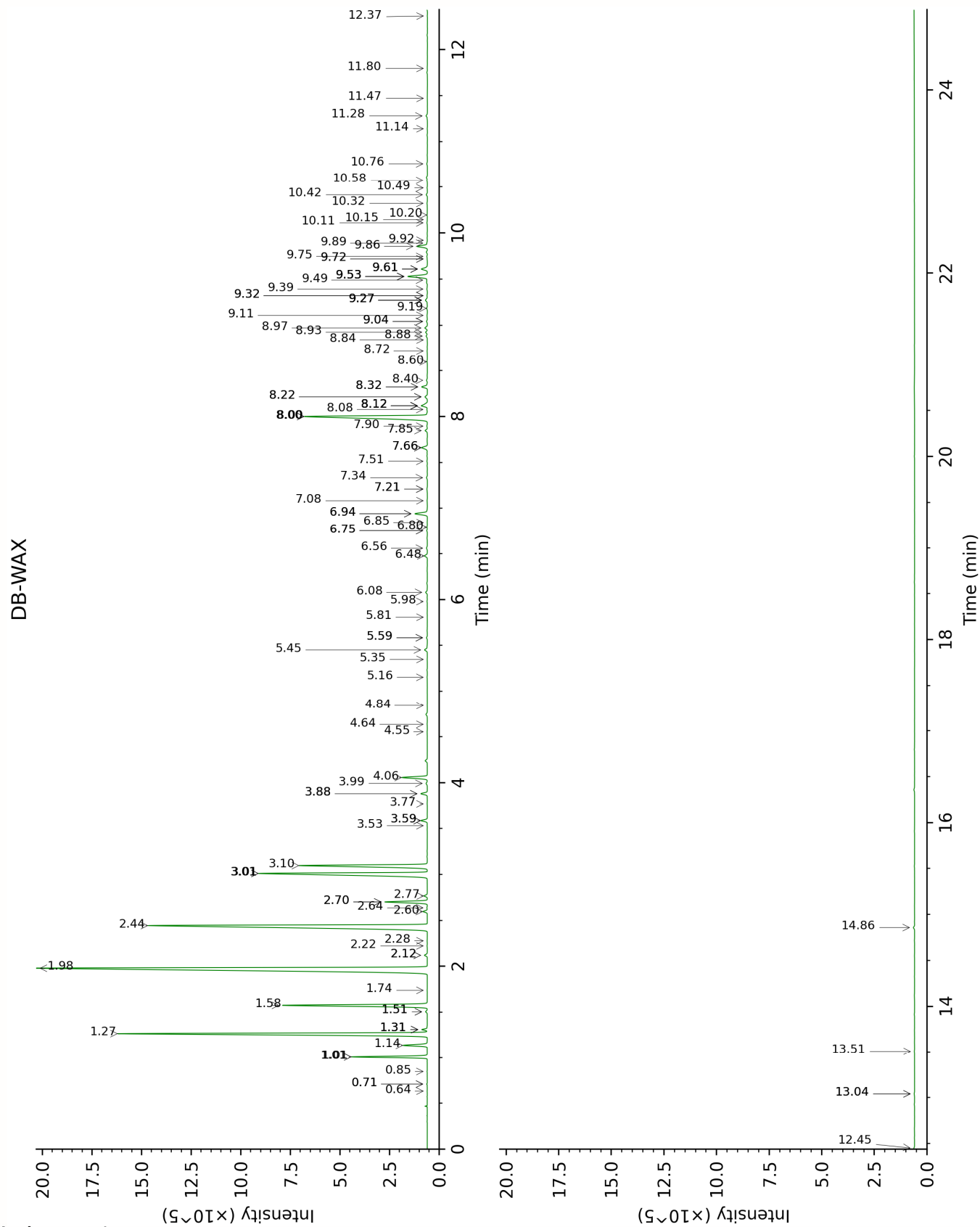
Note: no correction factor was applied

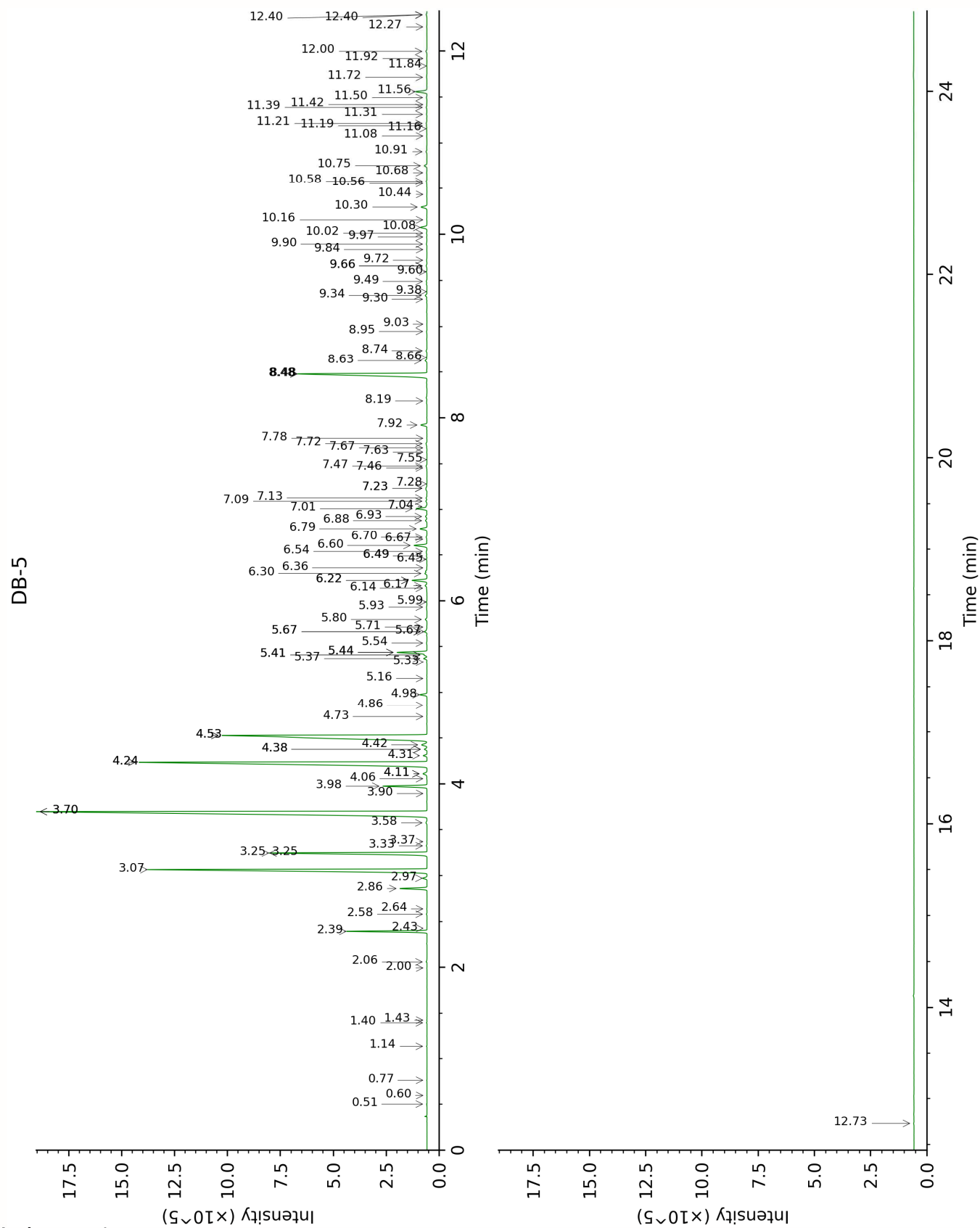
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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





FULL ANALYSIS DATA

3-Methylfuran	Column DB-WAX			Column DB-5		
	0.64	855.7	tr	0.50	604.9	tr
Isovaleral	0.71*	887.5	[0.01]	0.60	639.4	tr
2-Ethylfuran	0.85	917.5	tr	0.76	700.0	tr
Toluene	1.31*	999.7	[0.19]	1.14	757.1	0.01
Unknown ABBA IV [m/z 56, 45 (99), 41 (24), 84 (24), 69 (19), 43 (17)...]	0.71*	887.5	[0.01]	1.40	794.3	0.01
Hexanal	1.74	1044.5	0.01	1.43	798.5	tr
Ethyl 2-methylbutyrate	1.51*	1020.0	[0.07]	2.00	848.8	0.01
(3Z)-Hexenol	5.59*	1351.1	[0.04]	2.06	854.4	0.03
Santene	1.01*	946.1	[2.43]	2.39	882.6	2.43
Styrene	3.59*	1204.8	[0.27]	2.43	885.4	tr
Unknown ABBA I [m/z 79, 93 (66), 94 (52), 91 (39), 77 (37), 122 (31)]	1.31*	999.7	[0.19]	2.58	898.4	0.02
Bornylene	1.01*	946.1	[2.43]	2.64	903.3	0.01
Tricyclene	1.14	970.0	0.93	2.86	918.3	0.91
α -Thujene	1.31*	999.7	[0.19]	2.97	925.8	0.17
α -Pinene	1.27	992.9	13.37	3.07	932.1	13.40
α -Fenchene	1.51*	1020.0	[0.07]	3.25*	944.2	[6.25]
Camphene	1.58	1027.4	6.21	3.25*	944.2	[6.25]
Thuja-2,4(10)-diene	2.12*	1084.3	[0.12]	3.33	949.5	0.02
Benzaldehyde	7.08	1461.4	0.02	3.37	952.5	0.01
3,7,7-Trimethylcyclohepta-1,3,5-triene	2.70*	1134.4	[1.66]	3.58	966.3	0.05
β -Pinene	1.98	1069.6	25.90	3.70*	974.5	[26.14]
Sabinene	2.12*	1084.3	[0.12]	3.70*	974.5	[26.14]
Unknown ABBA II [m/z 91, 119 (65), 109 (51), 134 (47)]	3.01*	1159.2	[9.31]	3.90	987.7	0.01
Myrcene	2.70*	1134.4	[1.66]	3.98	993.1	1.63
2-Carene	2.22	1095.0	0.01	4.06	998.6	0.01
α -Phellandrene	2.60	1125.9	0.17	4.11*	1002.2	[0.20]
Pseudolimonene	2.64	1129.2	0.02	4.11*	1002.2	[0.20]
Δ 3-Carene	2.44	1113.7	17.53	4.24*	1010.2	[17.59]
(3Z)-Hexenyl acetate	4.64	1281.4	0.01	4.24*	1010.2	[17.59]
α -Terpinene	2.77	1139.6	0.13	4.31	1014.8	0.14
meta-Cymene	3.88*	1226.2	[0.28]	4.38*	1019.2	[0.10]
Carvomenthene	2.28	1100.4	0.01	4.38*	1019.2	[0.10]

<i>para</i> -Cymene	3.88*	1226.2	[0.28]	4.42*†	1022.2	[0.28]
β-Phellandrene	3.10	1166.1	6.05	4.53*†	1028.7	[15.44]
Limonene	3.01*	1159.2	[9.31]	4.53*†	1028.7	[15.44]
(Z)-β-Ocimene	3.53	1200.7	0.01	4.73	1041.8	0.01
(E)-β-Ocimene	3.77	1218.1	0.01	4.86	1049.8	0.01
γ-Terpinene	3.59*	1204.8	[0.27]	4.98	1057.3	0.27
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	4.56	1275.5	0.01	5.16	1068.5	0.01
<i>meta</i> -Cymenene	5.98	1379.6	0.02	5.33	1079.9	0.01
Fenchone	5.45	1341.5	0.14	5.37	1082.3	0.13
Isoterpinolene	3.99	1234.4	0.06	5.41*	1084.8	[0.09]
γ-Campholenal	4.84	1296.5	0.01	5.41*	1084.8	[0.09]
<i>para</i> -Cymenene	6.08	1386.8	0.09	5.44*	1086.6	[1.18]
Terpinolene	4.06	1239.1	1.07	5.44*	1086.6	[1.18]
α-Pinene oxide	5.16	1319.9	0.01	5.54	1093.0	0.03
Unknown PIMA 3 [m/z 79, 94 (87), 77 (25), 91 (21), 93 (16), 95 (12), 138 (8)]				5.66*	1100.9	[0.13]
α-Thujone	5.81	1367.2	0.01	5.66*	1100.9	[0.13]
Linalool	7.85	1519.2	0.10	5.66*	1100.9	[0.13]
Nonanal	5.59*	1351.1	[0.04]	5.72	1104.1	0.01
endo-Fenchol	8.12*	1540.3	[0.36]	5.80	1109.5	0.08
<i>cis-para</i> -Menth-2-en- 1-ol	7.90	1523.0	0.03	5.93	1118.1	0.03
α-Campholenal	6.75*	1436.6	[0.03]	5.99	1121.7	0.02
Nopinone	8.00*	1531.2	[7.31]	6.14	1131.4	0.04
<i>trans</i> -Pinocarveol	8.93	1603.4	0.08	6.17	1133.2	0.09
Camphor	6.94*	1450.9	[0.62]	6.22*	1136.9	[0.62]
<i>trans-para</i> -Menth-2- en-1-ol	8.72	1587.3	0.03	6.22*	1136.9	[0.62]
Camphene hydrate	8.22*	1547.9	[0.14]	6.30	1141.8	0.09
<i>meta</i> -Mentha-4,6- dien-8-ol	9.04*	1612.9	[0.04]	6.36	1145.8	0.01
Isoborneol	9.11	1618.2	0.03	6.45	1151.8	0.02
Pinocamphone	6.94*	1450.9	[0.62]	6.49*	1154.1	[0.02]
Myrtenyl methyl ether	5.35	1334.0	0.01	6.49*	1154.1	[0.02]
Pinocarvone	7.66*	1504.8	[0.31]	6.54	1157.4	0.05
Borneol	9.53*	1652.6	[0.99]	6.60	1161.6	0.55
α-Phellandren-8-ol	9.89	1682.0	0.02	6.67	1166.0	0.01
Isopinocamphone	7.34	1480.1	0.04	6.70	1167.4	0.04

Terpinen-4-ol	8.32*	1556.3	[0.27]	6.79	1173.8	0.30
Cryptone	8.88	1600.0	0.06	6.88	1179.5	0.07
<i>para</i> -Cymen-8-ol	11.28	1799.8	0.06	6.93	1182.4	0.07
α -Terpineol	9.53*	1652.6	[0.99]	7.01	1188.0	0.45
Myrtenal	8.40	1561.9	0.04	7.04	1189.5	0.03
Myrtenol	10.58	1739.7	0.03	7.09	1193.2	0.05
Methylchavicol	9.04*	1612.9	[0.04]	7.13	1195.5	0.04
Unknown ABBA V [m/z 93, 121 (98), 79 (64), 91 (41), 77 (35), 124 (24)...]	10.76	1755.2	0.04	7.23*	1202.4	[0.09]
Verbenone	9.32*	1635.7	[0.02]	7.23*	1202.4	[0.09]
<i>trans</i> -Piperitol	10.15	1703.1	0.01	7.28	1205.4	0.01
<i>trans</i> -Carveol	11.14	1787.8	0.01	7.46	1217.2	0.01
endo-Fenchyl acetate	6.56	1422.3	0.04	7.48	1218.5	0.04
3-Methyl-3-butenyl 4-methylvalerate				7.55	1223.3	0.01
<i>cis</i> -Carveol	11.47	1816.9	0.01	7.63	1228.9	0.01
Citronellol	10.49	1732.5	0.02	7.67	1232.0	0.01
Thymol methyl ether	8.22*	1547.9	[0.14]	7.72	1235.2	0.05
Carvone	9.72*	1668.1	[0.01]	7.78	1239.1	0.01
Piperitone	9.61*	1659.2	[0.32]	7.92	1248.9	0.26
Phellandral	9.72*	1668.1	[0.01]	8.18	1266.6	0.01
Bornyl acetate	8.00*	1531.2	[7.31]	8.48*	1286.6	[7.12]
Isobornyl acetate	8.08	1537.2	0.02	8.48*	1286.6	[7.12]
Methyl myrtenate	9.27*	1631.6	[0.13]	8.63	1296.5	0.09
<i>trans</i> -Pinocarvyl acetate	8.84	1596.6	0.01	8.66	1299.0	0.01
Thymol	14.86	2135.3	0.06	8.74	1304.1	0.05
Isohexyl isocaproate	7.21*	1470.9	[0.03]	8.95	1315.7	0.03
Myrtenyl acetate	9.32*	1635.7	[0.02]	9.03	1321.4	0.01
Unknown ABBA III [m/z 121, 93 (84), 43 (81), 79 (48), 117 (40), 56 (37)...]				9.30	1340.6	0.02
α -Longipinene	6.48	1416.0	0.14	9.34	1343.5	0.08
α -Terpinyl acetate	9.39	1641.5	0.04	9.38	1346.5	0.01
Citronellyl acetate	9.18	1624.5	0.03	9.49	1354.4	0.03
Longicyclene	6.80	1439.9	0.02	9.60	1361.9	0.02
α -Ylangene	6.75*	1436.6	[0.03]	9.66*	1366.5	[0.05]
Neryl acetate	9.92	1684.6	tr	9.66*	1366.5	[0.05]
α -Copaene	6.85	1443.6	0.01	9.72	1370.8	0.03
β -Bourbonene	7.21*	1470.9	[0.03]	9.84	1379.0	0.01
Geranyl acetate	10.32	1718.1	0.03	9.90	1383.3	0.04

β-Elemene	8.12*	1540.3	[0.36]	9.97	1388.7	0.02
β-Longipinene	7.51	1493.5	0.02	10.02	1391.7	0.02
Longifolene	7.66*	1504.8	[0.31]	10.08	1396.1	0.30
Methyleugenol	13.04*	1959.3	[0.02]	10.16	1402.0	0.02
β-Caryophyllene	8.12*	1540.3	[0.36]	10.30	1412.3	0.27
β-Copaene	8.12*	1540.3	[0.36]	10.44	1422.7	0.01
Aromadendrene	8.32*	1556.3	[0.27]	10.56	1431.7	0.01
trans-α-Bergamotene	8.12*	1540.3	[0.36]	10.58	1433.5	0.04
α-Himachalene	8.60	1577.6	0.02	10.68	1440.7	0.02
α-Humulene	8.97	1607.1	0.13	10.75	1446.5	0.13
(E)-β-Farnesene	9.27*	1631.6	[0.13]	10.91	1458.0	0.04
γ-Murolene	9.27*	1631.6	[0.13]	11.08	1470.8	0.01
Germacrene D	9.49	1649.4	0.03	11.16	1476.7	0.02
β-Selinene	9.53*	1652.6	[0.99]	11.19	1479.1	0.03
trans-β-Bergamotene	9.27*	1631.6	[0.13]	11.22	1481.1	0.04
α-Selinene	9.61*	1659.2	[0.32]	11.31	1488.5	0.03
β-Himachalene	9.53*	1652.6	[0.99]	11.39	1494.2	0.04
α-Murolene	9.75	1670.3	0.03	11.42	1496.5	0.01
δ-Amorphene	9.61*	1659.2	[0.32]	11.50	1502.2	0.03
β-Bisabolene	9.86	1679.2	0.50	11.56	1507.2	0.49
δ-Cadinene	10.11	1700.1	0.03	11.72	1519.5	0.03
(E)-γ-Bisabolene	10.20	1707.3	0.02	11.84	1529.3	0.01
α-Calacorene	11.80	1845.9	0.02	11.92	1535.7	0.01
(E)-α-Bisabolene	10.42	1726.1	0.05	12.00	1541.9	0.06
(E)-Nerolidol	13.51	2003.1	0.01	12.27	1562.9	0.02
Caryophyllene oxide isomer	12.37	1896.9	0.01	12.40*	1573.5	[0.05]
Caryophyllene oxide	12.45	1904.0	0.04	12.40*	1573.5	[0.05]
Humulene epoxide II	13.04*	1959.3	[0.02]	12.73	1599.6	0.02
Total reported		98.71%			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