

Date : 2024-02-27

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24B13-PTH02

Customer Identification : Balsam Fir - Canada - BN0111R

Type : Essential Oil

Source : *Abies balsamea*

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 : Benoit Roger, Ph. D.

Date : 2024-02-27

PHYSICOCHEMICAL DATA

Refractive index : 1.4744 ± 0.0003 (20 °C)

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

Analyst : Cindy Caron B. Sc.

Date : 2024-02-15

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
Isovaleral	tr	Aliphatic aldehyde
Toluene	0.01	Simple phenolic
Hexanal	tr	Aliphatic aldehyde
Octane	tr	Alkane
Santene	1.81	Normonoterpene
Unknown	0.01	Normonoterpene
Bornylene	0.01	Monoterpene
Tricyclene	0.83	Monoterpene
α -Thujene	0.15	Monoterpene
α -Pinene	14.01	Monoterpene
α -Fenchene	0.07	Monoterpene
Camphene	5.63	Monoterpene
Thuja-2,4(10)-diene	0.04	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.03	Monoterpene
β -Pinene	34.60	Monoterpene
Sabinene	0.14	Monoterpene
Unknown	0.02	Monoterpene
Myrcene	1.53	Monoterpene
2-Carene	0.01	Monoterpene
Pseudolimonene	0.02	Monoterpene
α -Phellandrene	0.19	Monoterpene
Δ^3 -Carene	14.04	Monoterpene
α -Terpinene	0.16	Monoterpene
Carvomenthene	0.03	Aliphatic alcohol
<i>para</i> -Cymene	0.14	Monoterpene
Limonene	6.87	Monoterpene
β -Phellandrene	6.34	Monoterpene
(<i>Z</i>)- β -Ocimene	0.01	Monoterpene
(<i>E</i>)- β -Ocimene	0.01	Monoterpene
γ -Terpinene	0.27	Monoterpene
Unknown	0.01	Oxygenated monoterpene
Fenchone	0.09	Monoterpenic ketone
Isoterpinolene	0.07	Monoterpene
Terpinolene	1.04	Monoterpene
<i>para</i> -Cymenene	0.06	Monoterpene
Linalool	0.05	Monoterpenic alcohol
endo-Fenchol	0.07	Monoterpenic alcohol
<i>cis-para</i> -Menth-2-en-1-ol	0.03	Monoterpenic alcohol
α -Campholenal	0.02	Monoterpenic aldehyde
<i>trans</i> -Pinocarveol	0.08	Monoterpenic alcohol

Camphor	0.15	Monoterpenic ketone
Camphene hydrate	0.07	Monoterpenic alcohol
<i>meta</i> -Mentha-4,6-dien-8-ol	0.02	Monoterpenic alcohol
Isoborneol	0.03	Monoterpenic alcohol
Pinocarvone	0.04	Monoterpenic ketone
Borneol	0.23	Monoterpenic alcohol
α -Phellandren-8-ol	0.02	Monoterpenic alcohol
Isopinocampone	0.05	Monoterpenic ketone
Terpinen-4-ol	0.19	Monoterpenic alcohol
Cryptone	0.02	Normonoterpenic ketone
<i>para</i> -Cymen-8-ol	0.02	Monoterpenic alcohol
Myrtenal	0.05	Monoterpenic aldehyde
α -Terpineol	0.52	Monoterpenic alcohol
Myrtenol	0.05	Monoterpenic alcohol
Methylchavicol	0.04	Phenylpropanoid
Verbenone	0.04	Monoterpenic ketone
<i>endo</i> -Fenchyl acetate	0.03	Monoterpenic ester
Citronellol	0.01	Monoterpenic alcohol
Thymol methyl ether	0.04	Monoterpenic ether
Carvone	0.01	Monoterpenic ketone
Piperitone	0.15	Monoterpenic ketone
Phellandral	0.04	Monoterpenic aldehyde
Bornyl acetate	7.43	Monoterpenic ester
Thymol	0.09	Monoterpenic alcohol
Myrtenyl acetate	0.01	Monoterpenic ester
α -Longipinene	0.05	Sesquiterpene
Citronellyl acetate	0.03	Monoterpenic ester
Longicyclene	0.01	Sesquiterpene
α -Ylangene	0.01	Sesquiterpene
α -Copaene	0.01	Sesquiterpene
Geranyl acetate	0.03	Monoterpenic ester
β -Longipinene	0.01	Sesquiterpene
Longifolene	0.18	Sesquiterpene
Methyleugenol	0.02	Phenylpropanoid
β -Caryophyllene	0.27	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.02	Sesquiterpene
α -Humulene	0.13	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.03	Sesquiterpene
γ -Muurolene	0.01	Sesquiterpene
β -Selinene	0.02	Sesquiterpene
α -Selinene	0.03	Sesquiterpene
β -Himachalene	0.04	Sesquiterpene
α -Muurolene	0.02	Sesquiterpene
β -Bisabolene	0.38	Sesquiterpene
δ -Cadinene	0.04	Sesquiterpene

(E)- γ -Bisabolene	0.01	Sesquiterpene
α -Calacorene	0.01	Sesquiterpene
(E)- α -Bisabolene	0.05	Sesquiterpene
(E)-Nerolidol	0.03	Sesquiterpenic alcohol
Caryophyllene oxide	0.03	Sesquiterpenic ether
Humulene epoxide II	0.01	Sesquiterpenic ether
Consolidated total	99.32	

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

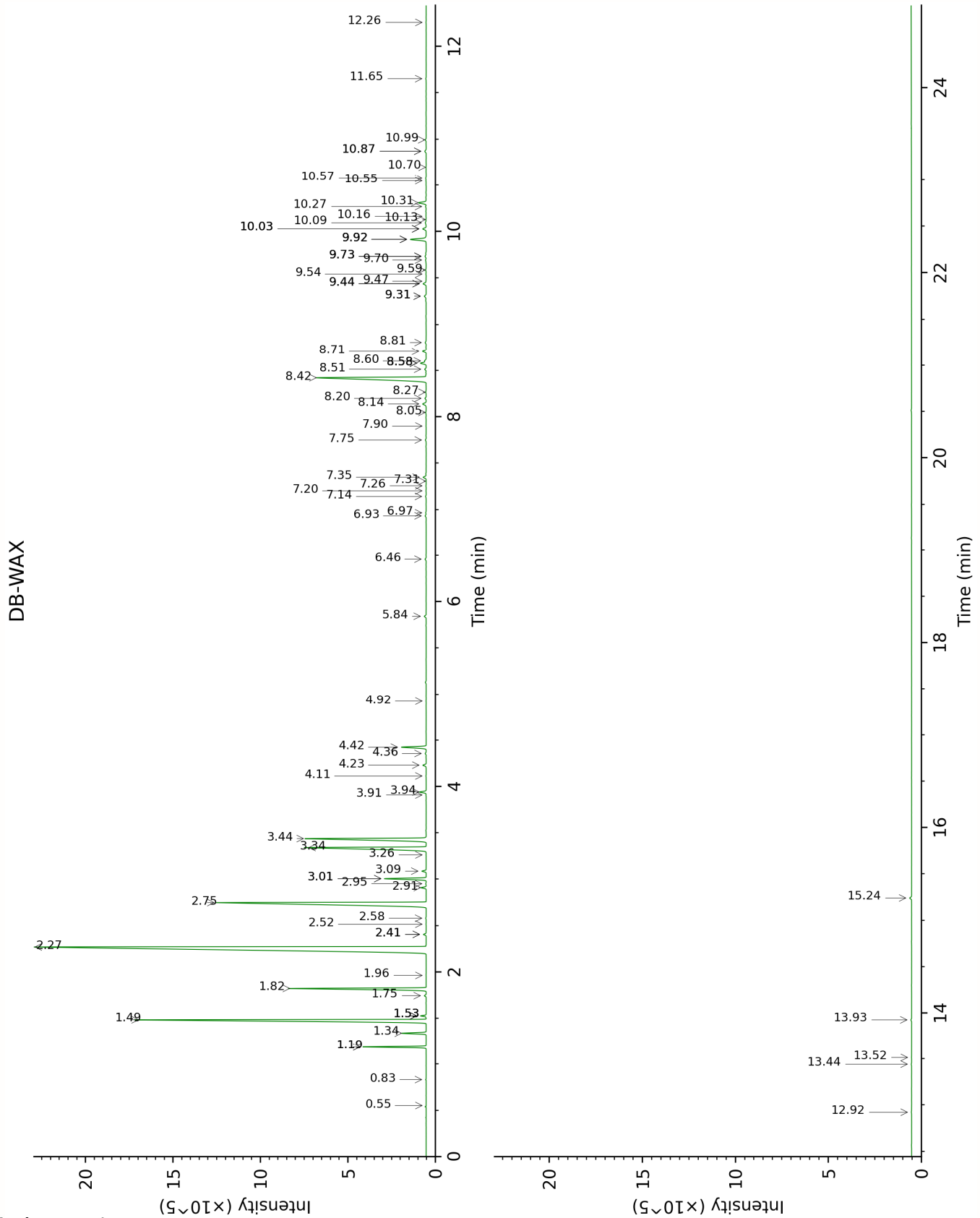
Note: no correction factor was applied

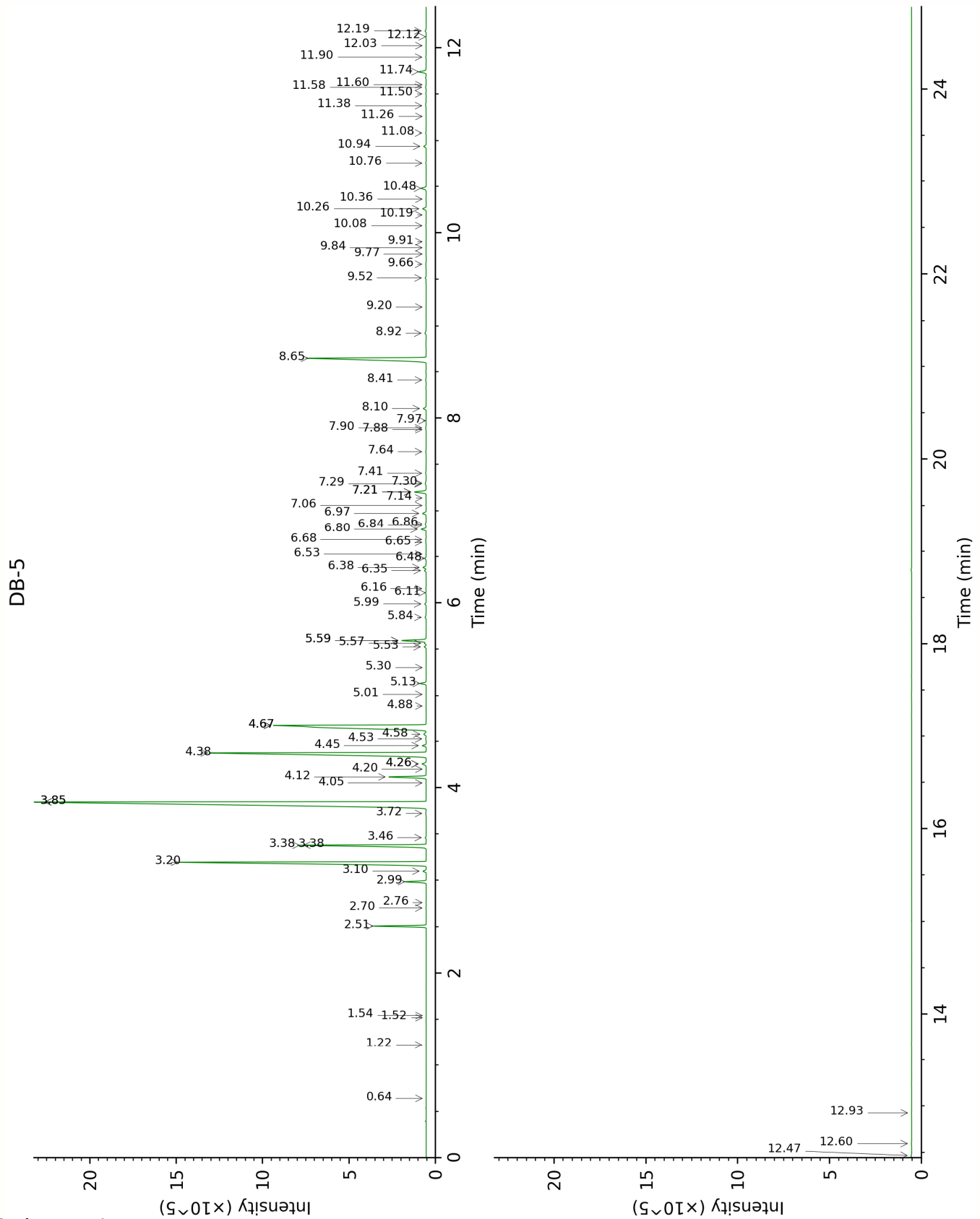
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

Isovaleral	Column DB-WAX			Column DB-5		
	0.83	889.7	0.01	0.64	641.2	tr
Toluene	1.53*	1002.0	[0.17]	1.22	759.3	0.01
Hexanal	1.96	1043.5	0.01	1.52	800.1	tr
Octane	0.55	786.0	tr	1.54	803.3	tr
Santene	1.19*	950.9	[1.81]	2.51	883.4	1.81
Unknown ABBA I [m/z 79, 93 (66), 94 (52), 91 (39), 77 (37), 122 (31)]	1.53*	1002.0	[0.17]	2.70	899.3	0.01
Bornylene	1.19*	950.9	[1.81]	2.76	904.1	0.01
Tricyclene	1.34	973.9	0.83	2.99	919.2	0.83
α -Thujene	1.53*	1002.0	[0.17]	3.10	926.7	0.15
α -Pinene	1.49	995.6	13.98	3.20	933.1	14.01
α -Fenchene	1.75	1022.9	0.07	3.38*	945.1	[5.71]
Camphene	1.82	1030.3	5.63	3.38*	945.1	[5.71]
Thuja-2,4(10)-diene	2.41*	1085.3	[0.10]	3.46	950.5	0.04
3,7,7- Trimethylcyclohepta- 1,3,5-triene	3.01*	1134.4	[1.57]	3.72	967.7	0.03
β -Pinene	2.27	1072.5	34.60	3.85*	975.8	[34.75]
Sabinene	2.41*	1085.3	[0.10]	3.85*	975.8	[34.75]
Unknown ABBA II [m/z 91, 119 (65), 109 (51), 134 (47)]	3.26	1153.9	0.01	4.05	989.3	0.02
Myrcene	3.01*	1134.4	[1.57]	4.12	993.6	1.53
2-Carene	2.52	1095.7	0.01	4.20	999.1	0.01
Pseudolimonene	2.95	1130.2	0.02	4.26*	1002.8	[0.22]
α -Phellandrene	2.91	1127.0	0.19	4.26*	1002.8	[0.22]
Δ^3 -Carene	2.75	1114.7	14.00	4.38	1010.3	14.04
α -Terpinene	3.09	1140.6	0.16	4.45	1015.3	0.16
Carvomenthene	2.58	1101.8	0.02	4.53	1019.8	0.03
<i>para</i> -Cymene	4.23	1226.3	0.14	4.58	1023.0	0.14
Limonene	3.34	1160.0	6.87	4.67*	1028.9	[13.20]
β -Phellandrene	3.44	1167.3	6.34	4.67*	1028.9	[13.20]
(Z)- β -Ocimene	3.91	1203.2	0.01	4.88	1042.0	0.01
(E)- β -Ocimene	4.11	1217.9	0.01	5.01	1050.3	0.01
γ -Terpinene	3.94	1205.5	0.27	5.13	1057.7	0.27
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	4.92	1276.0	0.01	5.30	1068.4	0.01
Fenchone	5.84	1340.8	0.09	5.53	1082.4	0.09

Isoterpinolene	4.36	1235.3	0.05	5.57	1084.8	0.07
Terpinolene	4.42	1240.2	1.04	5.60*	1086.6	[1.11]
<i>para</i> -Cymenene	6.46	1385.2	0.06	5.60*	1086.6	[1.11]
Linalool	8.20	1515.0	0.05	5.84	1102.3	0.05
endo-Fenchol	8.51	1539.4	0.07	5.99	1111.4	0.07
<i>cis-para</i> -Menth-2-en-1-ol	8.27	1520.1	0.03	6.11	1119.1	0.03
α -Campholenal	7.14	1435.6	0.03	6.16	1122.0	0.02
<i>trans</i> -Pinocarveol	9.31*	1601.0	[0.11]	6.35	1134.3	0.08
Camphor	7.35	1451.1	0.15	6.38	1136.5	0.15
Camphene hydrate	8.60	1546.4	0.08	6.48	1142.7	0.07
<i>meta</i> -Mentha-4,6-dien-8-ol	9.47	1614.0	0.01	6.53	1145.7	0.02
Isoborneol	9.54	1620.3	0.01	6.65	1153.8	0.03
Pinocarvone	8.05	1503.2	0.03	6.68	1155.8	0.04
Borneol	9.92*	1650.6	[0.82]	6.80	1162.9	0.23
α -Phellandren-8-ol	10.27	1679.3	0.03	6.84	1165.7	0.02
Isopinocampone	7.75	1481.0	0.04	6.86	1167.0	0.05
Terpinen-4-ol	8.71	1554.6	0.16	6.97	1174.2	0.19
Cryptone	9.31*	1601.0	[0.11]	7.06	1179.6	0.02
<i>para</i> -Cymen-8-ol	11.65	1795.8	0.02	7.14	1184.7	0.02
Myrtenal	8.81	1562.3	0.05	7.20*	1188.9	[0.57]
α -Terpineol	9.92*	1650.6	[0.82]	7.20*	1188.9	[0.57]
Myrtenol	10.99	1739.8	0.04	7.29	1194.5	0.05
Methylchavicol	9.44*	1611.9	[0.16]	7.30	1195.1	0.04
Verbenone	9.74*	1635.8	[0.07]	7.41	1201.7	0.04
endo-Fenchyl acetate	6.97	1422.4	0.02	7.64	1217.2	0.03
Citronellol	10.87*	1729.3	[0.08]	7.88	1233.0	0.01
Thymol methyl ether	8.58*	1544.5	[0.28]	7.90	1234.3	0.04
Carvone	10.13	1667.9	0.01	7.97	1239.5	0.01
Piperitone	10.03*	1659.7	[0.18]	8.10	1248.2	0.15
Phellandral	10.09	1665.0	0.06	8.41	1268.8	0.04
Bornyl acetate	8.42	1532.3	7.40	8.65	1284.5	7.43
Thymol	15.24	2128.9	0.09	8.92	1303.0	0.09
Myrtenyl acetate	9.74*	1635.8	[0.07]	9.20	1322.7	0.01
α -Longipinene	6.93	1420.0	0.05	9.52	1344.7	0.05
Citronellyl acetate	9.59	1623.8	0.03	9.66	1355.1	0.03
Longicyclene	7.26	1444.2	0.01	9.77	1362.8	0.01
α -Ylangene	7.20	1440.1	0.01	9.84	1367.6	0.01
α -Copaene	7.31	1447.9	0.01	9.91	1372.1	0.01
Geranyl acetate	10.70	1714.7	0.02	10.08	1384.3	0.03
β -Longipinene	7.90	1492.2	0.01	10.19	1392.4	0.01
Longifolene	8.14	1510.3	0.20	10.26	1397.1	0.18
Methyleugenol	13.44	1956.5	0.02	10.36	1404.4	0.02

β -Caryophyllene	8.58*	1544.5	[0.28]	10.48	1413.0	0.27
<i>trans</i> - α -Bergamotene	8.58*	1544.5	[0.28]	10.76	1433.6	0.02
α -Humulene	9.44*	1611.9	[0.16]	10.94	1447.1	0.13
(<i>E</i>)- β -Farnesene	9.70	1632.6	0.04	11.08	1457.8	0.03
γ -Muurolene	9.74*	1635.8	[0.07]	11.26	1471.1	0.01
β -Selinene	10.03*	1659.7	[0.18]	11.38	1479.7	0.02
α -Selinene	10.03*	1659.7	[0.18]	11.50	1489.2	0.03
β -Himachalene	9.92*	1650.6	[0.82]	11.58	1494.5	0.04
α -Muurolene	10.16	1670.7	0.01	11.60	1496.6	0.02
β -Bisabolene	10.31	1682.6	0.39	11.74	1507.0	0.38
δ -Cadinene	10.58	1704.2	0.03	11.90	1519.4	0.04
(<i>E</i>)- γ -Bisabolene	10.55	1702.0	0.02	12.02	1529.1	0.01
α -Calacorene	12.26	1849.4	0.01	12.12	1536.6	0.01
(<i>E</i>)- α -Bisabolene	10.87*	1729.3	[0.08]	12.18	1541.7	0.05
(<i>E</i>)-Nerolidol	13.93	2001.3	0.03	12.47	1563.7	0.03
Caryophyllene oxide	12.92	1908.4	0.02	12.60	1573.9	0.03
Humulene epoxide II	13.52	1963.2	0.01	12.93	1599.9	0.01
Total reported		99.10%			99.35%	

*: 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