

Date : July 14, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22G08-PTH04


Customer identification : Fir Needle - Russia - F20110R

Type : Essential oil

Source : *Abies sibirica*

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-014  - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.

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

Analysis date : July 14, 2022

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.4696 ± 0.0003 (20 °C; method PC-MAT-016)

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
Toluene	tr	Simple phenolic
Santene	3.02	Normonoterpene
Unknown	0.03	Normonoterpene
Tricyclene	2.44	Monoterpene
α -Thujene	0.07	Monoterpene
α -Pinene	12.09	Monoterpene
Camphene	24.60	Monoterpene
α -Fenchene	0.03	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.02	Monoterpene
Sabinene	0.01	Monoterpene
β -Pinene	1.52	Monoterpene
Myrcene	0.59	Monoterpene
2-Carene	0.01	Monoterpene
α -Phellandrene	0.12	Monoterpene
Δ^3 -Carene	10.65	Monoterpene
α -Terpinene	0.07	Monoterpene
Carvomenthene	0.02	Aliphatic alcohol
meta-Cymene	tr	Monoterpene
para-Cymene	0.10	Monoterpene
Limonene	4.57	Monoterpene
β -Phellandrene	2.33	Monoterpene
γ -Terpinene	0.12	Monoterpene
Octanol	0.01	Aliphatic alcohol
meta-Cymenene	0.01	Monoterpene
Isoterpinolene	0.04	Monoterpene
γ -Campholenal	0.02	Aliphatic alcohol
Terpinolene	0.95	Monoterpene
para-Cymenene	0.03	Monoterpene
<i>trans</i> -Sabinene hydrate	0.02	Monoterpenic alcohol
α -Thujone	0.01	Monoterpenic ketone
Linalool	0.03	Monoterpenic alcohol
endo-Fenchol	0.02	Monoterpenic alcohol
<i>cis</i> -para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
α -Campholenal	0.02	Monoterpenic aldehyde
<i>trans</i> -Pinocarveol	0.02	Monoterpenic alcohol
Camphor	0.21	Monoterpenic ketone
Camphene hydrate	0.04	Monoterpenic alcohol
meta-Mentha-4,6-dien-8-ol	0.02	Monoterpenic alcohol
Isoborneol	0.02	Monoterpenic alcohol
Pinocarvone	0.01	Monoterpenic ketone
Borneol	1.64	Monoterpenic alcohol
Isopinocampone	0.02	Monoterpenic ketone
Terpinen-4-ol	0.09	Monoterpenic alcohol
Cryptone	0.04	Normonoterpenic ketone

para-Cymen-8-ol	0.04	Monoterpenic alcohol
α -Terpineol	0.15	Monoterpenic alcohol
Myrtenol	0.01	Monoterpenic alcohol
Verbenone	0.04	Monoterpenic ketone
endo-Fenchyl acetate	0.03	Monoterpenic ester
Thymol methyl ether	0.02	Monoterpenic ether
Carvone	0.02	Monoterpenic ketone
Phellandral	0.01	Monoterpenic aldehyde
Isopulegyl acetate	0.02	Monoterpenic ester
Bornyl acetate	29.82	Monoterpenic ester
Isobornyl acetate	0.07	Monoterpenic ester
2-Undecanone	0.05	Aliphatic ketone
Thymol	0.01	Monoterpenic alcohol
Isohexyl isocaproate	0.03	Aliphatic ester
Unknown	0.01	Unknown
Unknown	0.02	Unknown
α -Longipinene	0.02	Sesquiterpene
α -Terpinyl acetate	0.01	Monoterpenic ester
Neryl acetate	0.05	Monoterpenic ester
α -Ylangene	0.02	Sesquiterpene
α -Copaene	0.01	Sesquiterpene
Geranyl acetate	0.19	Monoterpenic ester
β -Longipinene	0.01	Sesquiterpene
Sibirene	0.04	Sesquiterpene
Longifolene	0.07	Sesquiterpene
Methyleugenol	0.01	Phenylpropanoid
Dodecanal	0.18	Aliphatic aldehyde
β -Caryophyllene	0.95	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.01	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.01	Sesquiterpene
α -Humulene	0.54	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.02	Sesquiterpene
γ -Himachalene	0.02	Sesquiterpene
Dodecanol	0.04	Aliphatic alcohol
Unknown	0.04	Sesquiterpene
Unknown	0.05	Unknown
β -Alaskene	0.02	Sesquiterpene
β -Himachalene	0.03	Sesquiterpene
α -Muurolene	0.02	Sesquiterpene
(<i>Z</i>)- α -Bisabolene	0.02	Sesquiterpene
β -Bisabolene	0.17	Sesquiterpene
δ -Cadinene	0.02	Sesquiterpene
(<i>E</i>)- γ -Bisabolene	0.08	Sesquiterpene
(<i>E</i>)-Nerolidol	0.04	Sesquiterpenic alcohol
Caryophyllene oxide	0.04	Sesquiterpenic ether
Humulene epoxide II	0.02	Sesquiterpenic ether
Selin-6-en-4 α -ol isomer	0.04	Sesquiterpenic alcohol
α -Bisabolol	0.28	Sesquiterpenic alcohol
Manoyl oxide	0.02	Diterpenic ether
13-epi-Manoyl oxide	0.01	Diterpenic ether
Manool	0.02	Diterpenic alcohol
Consolidated total	99.21%	

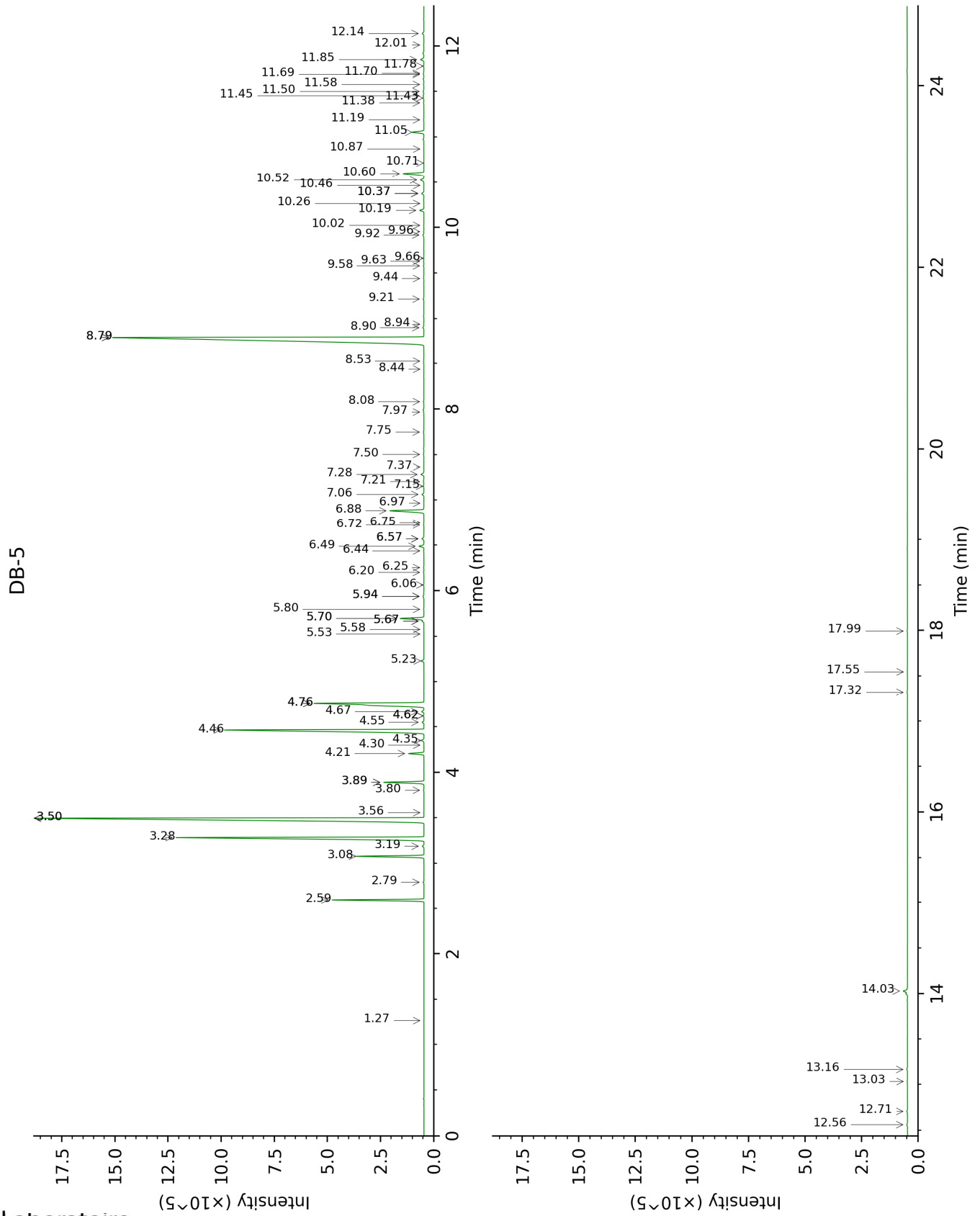
tr: The compound has been detected below 0.005% of total signal.

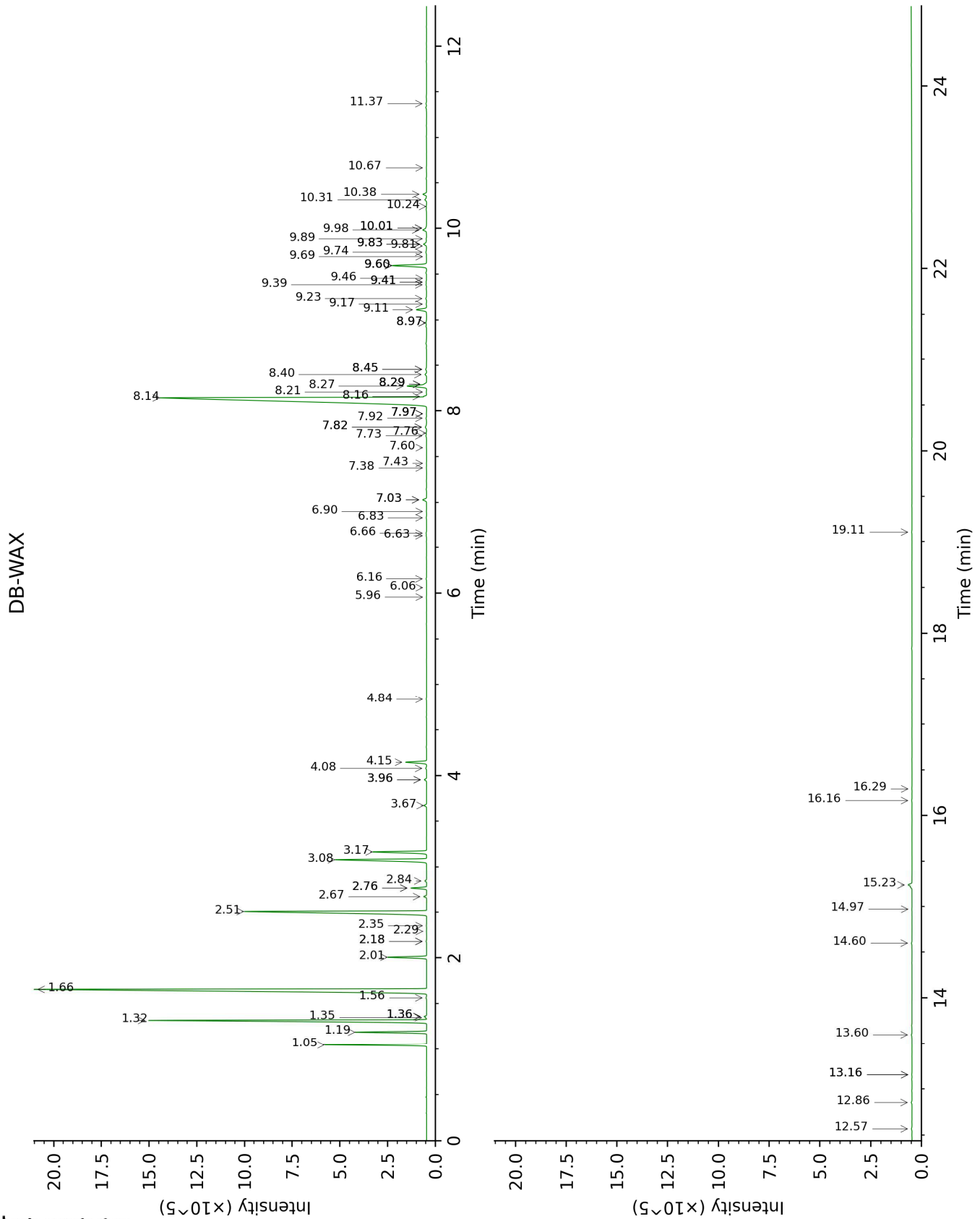
Note: no correction factor was applied

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.

This page was intentionally left blank. The following pages present the complete data of the analysis.





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Toluene	1.27	759	tr	1.36*	999	0.08
Santene	2.59	883	3.02	1.05	947	3.03
Unknown [m/z 79, 93 (66), 94 (52), 91 (39), 77 (37), 122 (31)]	2.79	899	0.03	1.35	997	0.03
Tricyclene	3.08	919	2.44	1.19	971	2.44
α -Thujene	3.19	926	0.07	1.36*	999	[0.08]
α -Pinene	3.28	932	12.09	1.32	992	12.10
Camphene	3.50*	946	24.64	1.66	1029	24.60
α -Fenchene	3.50*	946	[24.64]	1.56	1020	0.03
Thuja-2,4(10)-diene	3.56	950	0.01	2.18*	1082	0.02
3,7,7-Trimethylcyclohepta-1,3,5-triene	3.80	966	0.02	2.76*	1132	0.61
Sabinene	3.89*	972	1.53	2.18*	1082	[0.02]
β -Pinene	3.89*	972	[1.53]	2.01	1064	1.52
Myrcene	4.21	993	0.59	2.76*	1132	[0.61]
2-Carene	4.30	999	0.01	2.29	1093	0.01
α -Phellandrene	4.35	1002	0.12	2.67	1124	0.11
Δ^3 -Carene	4.46	1009	10.65	2.51	1112	10.65
α -Terpinene	4.55	1015	0.07	2.84	1138	0.07
Carvomenthene	4.62*	1019	0.03	2.35	1099	0.02
meta-Cymene	4.62*	1019	[0.03]	3.96*	1225	0.11
para-Cymene	4.67	1022	0.10	3.96*	1225	[0.11]
Limonene	4.76*	1028	6.88	3.08	1157	4.57
β -Phellandrene	4.76*	1028	[6.88]	3.17	1164	2.33
γ -Terpinene	5.23	1058	0.12	3.67	1204	0.12
Octanol	5.52	1076	0.01	7.97*	1519	0.02
meta-Cymenene	5.58	1079	0.01	6.06	1376	0.01
Isoterpinolene	5.67*	1085	0.07	4.08	1234	0.04
γ -Campholenal	5.67*	1085	[0.07]	4.84	1290	0.02
Terpinolene	5.70*	1087	0.98	4.15	1239	0.95
para-Cymenene	5.70*	1087	[0.98]	6.16	1383	0.03
<i>trans</i> -Sabinene hydrate	5.80	1093	0.02	7.82*	1507	0.09
α -Thujone	5.94*	1102	0.06	5.96	1369	0.01
Linalool	5.94*	1102	[0.06]	7.92	1515	0.03
endo-Fenchol	6.06	1110	0.02	8.21	1537	0.02
<i>cis</i> -para-Menth-2-en-1-ol	6.20	1119	0.02	7.97*	1519	[0.02]
α -Campholenal	6.25	1123	0.02	6.83	1433	0.02
<i>trans</i> -Pinocarveol	6.44	1134	0.02	8.97*	1597	0.05
Camphor	6.49	1138	0.21	7.03*	1448	0.21
Camphene hydrate	6.57*	1143	0.10	8.29*	1544	0.07
meta-Mentha-4,6-dien-8-ol	6.57*	1143	[0.10]	9.17	1613	0.02
Isoborneol	6.72	1153	0.02	9.24	1618	0.04
Pinocarvone	6.75	1154	0.01	7.76	1502	0.02

Borneol	6.88	1163	1.64	9.60*	1648	1.80
Isopinocampone	6.97	1169	0.02	7.43	1477	0.01
Terpinen-4-ol	7.06	1175	0.09	8.40	1552	0.08
Cryptone	7.15	1181	0.04	8.97*	1597	[0.05]
para-Cymen-8-ol	7.21	1184	0.04	11.37	1797	0.03
α-Terpineol	7.28	1189	0.15	9.60*	1648	[1.80]
Myrtenol	7.36	1194	0.01	10.67	1737	0.01
Verbenone	7.50	1203	0.04	9.42*	1633	0.03
endo-Fenchyl acetate	7.75	1220	0.03	6.66	1420	0.03
Thymol methyl ether	7.97	1235	0.02	8.29*	1544	[0.07]
Carvone	8.08	1243	0.02	9.83*	1667	0.18
Phellandral	8.44	1267	0.01	9.81	1665	0.01
Isopulegyl acetate	8.53	1273	0.02	7.97*	1519	[0.02]
Bornyl acetate	8.79*	1291	29.91	8.14	1532	29.82
Isobornyl acetate	8.79*	1291	[29.91]	8.16	1533	0.07
2-Undecanone	8.90	1299	0.05	8.45*	1556	0.06
Thymol	8.94	1301	0.01	14.97	2132	0.01
Isohexyl isocaproate	9.22	1316	0.03	7.38	1474	0.02
Unknown [m/z 135, 91 (76), 43 (59), 77 (39), 93 (33)...]	9.44	1332	0.01			
Unknown [m/z 121, 93 (84), 43 (81), 79 (48), 117 (40), 56 (37)...]	9.58	1342	0.02			
α-Longipinene	9.63	1345	0.02	6.63	1418	0.02
α-Terpinyl acetate	9.66	1348	0.01	9.60*	1648	[1.80]
Neryl acetate	9.92	1366	0.05	10.00*†	1681	[0.26]
α-Ylangene	9.96	1368	0.02	6.90	1438	0.01
α-Copaene	10.02	1373	0.01	7.03*	1448	[0.21]
Geranyl acetate	10.19	1385	0.19	10.38	1712	0.19
β-Longipinene	10.26	1390	0.01	7.60	1490	0.01
Sibirene	10.37*	1398	0.11	7.73	1500	0.04
Longifolene	10.37*	1398	[0.11]	7.82*	1507	[0.09]
Methyleugenol	10.46	1404	0.01	13.16*	1958	0.02
Dodecanal	10.52	1409	0.18	9.83*	1667	[0.18]
β-Caryophyllene	10.60	1414	0.95	8.27	1542	1.00
Caryophylla-4(12),8(13)-diene	10.72	1423	0.01	8.45*	1556	[0.06]
trans-α-Bergamotene	10.87	1434	0.01	8.29*	1544	[0.07]
α-Humulene	11.05	1448	0.54	9.11	1608	0.56
(E)-β-Farnesene	11.19	1458	0.02	9.39	1630	0.03
γ-Himachalene	11.38	1472	0.02	9.42*	1633	[0.03]
Dodecanol	11.43	1476	0.04	12.86	1930	0.04
Unknown [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	11.45	1478	0.04	9.74	1660	0.06

Unknown [m/z 43, 58 (75), 57 (58), 71 (55), 41 (41), 59 (31)...]	11.50	1482	0.05			
β-Alaskene	11.58	1487	0.02	9.46	1636	0.01
β-Himachalene	11.69	1496	0.03	9.69	1656	0.01
α-Muurolene	11.70	1496	0.02	9.89	1672	0.03
(Z)-α-Bisabolene	11.78	1502	0.02	10.00*†	1681	[0.26]
β-Bisabolene	11.85	1508	0.17	9.98†	1679	0.26
δ-Cadinene	12.01	1520	0.02	10.24	1700	0.02
(E)-γ-Bisabolene	12.14	1530	0.08	10.32	1706	0.10
(E)-Nerolidol	12.56	1564	0.04	13.60	1999	0.04
Caryophyllene oxide	12.71	1575	0.04	12.57	1903	0.04
Humulene epoxide II	13.03	1601	0.02	13.16*	1958	[0.02]
Selin-6-en-4α-ol isomer	13.16	1612	0.04	14.60	2095	0.04
α-Bisabolol	14.03	1683	0.28	15.24	2159	0.28
Manoyl oxide	17.32	1979	0.02	16.29	2268	0.01
13-epi-Manoyl oxide	17.55	2001	0.01	16.16	2255	0.02
Manool	17.99	2045	0.02	19.10	2581	0.02
Total identified		99.13%			99.03%	
Total reported		99.29%			99.11%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not 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