

Date : April 12, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22D05-PTH04

Customer identification : May Chang - China - M30109R

Type : Essential oil

Source : *Litsea cubeba*

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 : Pamela Lavoie, M.Sc., Chimiste

Analysis date : April 12, 2022

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: yellow liquid

Refractive index: 1.4849 ± 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
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Unknown	tr	Unknown
Unknown	0.01	Unknown
2,6-Dimethyl-1,5-heptadiene	0.01	Normonoterpene
Tricyclene	0.01	Monoterpene
α -Thujene	0.03	Monoterpene
α -Pinene	1.14	Monoterpene
Camphene	0.26	Monoterpene
α -Fenchene	tr	Monoterpene
Benzaldehyde	tr	Simple phenolic
β -Pinene	0.89	Monoterpene
Sabinene	1.21	Monoterpene
6-Methyl-5-hepten-2-one	1.18	Aliphatic ketone
Dehydro-1,8-cineole	0.07	Monoterpenic ether
Myrcene	0.87	Monoterpene
6-Methyl-5-hepten-2-ol	0.04	Aliphatic alcohol
α -Phellandrene	0.01	Monoterpene
Pseudolimonene	tr	Monoterpene
Δ^3 -Carene	0.01	Monoterpene
α -Terpinene	0.02	Monoterpene
para-Cymene	0.03	Monoterpene
1,8-Cineole	0.65*	Monoterpenic ether
β -Phellandrene	0.65*	Monoterpene
Limonene	10.94	Monoterpene
(Z)- β -Ocimene	0.05	Monoterpene
Seudenone?	tr	Aliphatic ketone
(E)- β -Ocimene	0.08	Monoterpene
2,6-Dimethyl-5-heptenal (melonal)	0.01	Aliphatic aldehyde
γ -Terpinene	0.06	Monoterpene
cis-Sabinene hydrate	0.03	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.07	Monoterpene
6,7-Epoxymyrcene	0.01	Monoterpenic ether
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Rosefuran	0.03	Monoterpenic ether
Linalool	1.34	Monoterpenic alcohol
cis-Chrysanthemal?	0.03	Monoterpenic aldehyde
cis-para-Menth-2-en-1-ol	0.03	Monoterpenic alcohol
cis-Limonene oxide	0.04	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.06	Monoterpenic alcohol
trans-Limonene oxide	0.01	Monoterpenic ether
trans-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
exo-Isocitral	0.03	Monoterpenic aldehyde
trans-Chrysanthemal	0.08	Monoterpenic aldehyde

Citronellal	1.00	Monoterpenic aldehyde
Borneol	0.05	Monoterpenic alcohol
Isoneral	0.57	Monoterpenic aldehyde
δ-Terpineol	0.04	Monoterpenic alcohol
Rosefuran oxide	0.20*	Monoterpenic ether
Terpinen-4-ol	0.20*	Monoterpenic alcohol
Unknown	0.10	Oxygenated monoterpene
Isogeranial	1.03	Monoterpenic aldehyde
α-Terpineol	0.40	Monoterpenic alcohol
Methyl salicylate	0.03	Phenolic ester
Myrtenol	0.02	Monoterpenic alcohol
<i>trans</i> -Isopiperitenol	0.04	Monoterpenic alcohol
<i>trans</i> -Piperitol	0.06	Monoterpenic alcohol
<i>cis</i> -Isopiperitenol	0.02	Monoterpenic alcohol
Nerol	0.63	Monoterpenic alcohol
Neral	30.64	Monoterpenic aldehyde
Citronellol	0.43	Monoterpenic alcohol
Piperitone	0.10	Monoterpenic ketone
Geraniol	1.15	Monoterpenic alcohol
Geranial	39.01	Monoterpenic aldehyde
Unknown	0.16	Oxygenated monoterpene
Thymol	tr	Monoterpenic alcohol
Unknown	0.06	Unknown
Neric acid	0.13	Monoterpenic acid
α-Terpinyl acetate	0.03	Monoterpenic ester
Unknown	0.09	Unknown
Geranic acid	0.17	Aliphatic acid
α-Copaene	0.14	Sesquiterpene
Unknown	0.08	Unknown
Geranyl acetate	0.06	Monoterpenic ester
β-Elemene	0.10	Sesquiterpene
β-Caryophyllene	0.94	Sesquiterpene
Aromadendrene	0.02	Sesquiterpene
α-Humulene	0.09	Sesquiterpene
allo-Aromadendrene	0.02	Sesquiterpene
(<i>E</i>)-β-Farnesene	0.05	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
Bicyclogermacrene	0.07	Sesquiterpene
Viridiflorene	0.03	Sesquiterpene
β-Bisabolene	0.07	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
α-Elemol	0.01	Sesquiterpenic alcohol
Spathulenol	0.05	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Caryophyllene oxide	0.13	Sesquiterpenic ether
Humulene epoxide II	0.01	Sesquiterpenic ether
Unknown	0.01	Unknown
Unknown	0.02	Unknown
Unknown	0.04	Unknown
Unknown	0.01	Unknown

Unknown	0.03	Unknown
Unknown	0.06	Unknown
Unknown	0.09	Unknown
Consolidated total	97.86%	

*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered [xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total

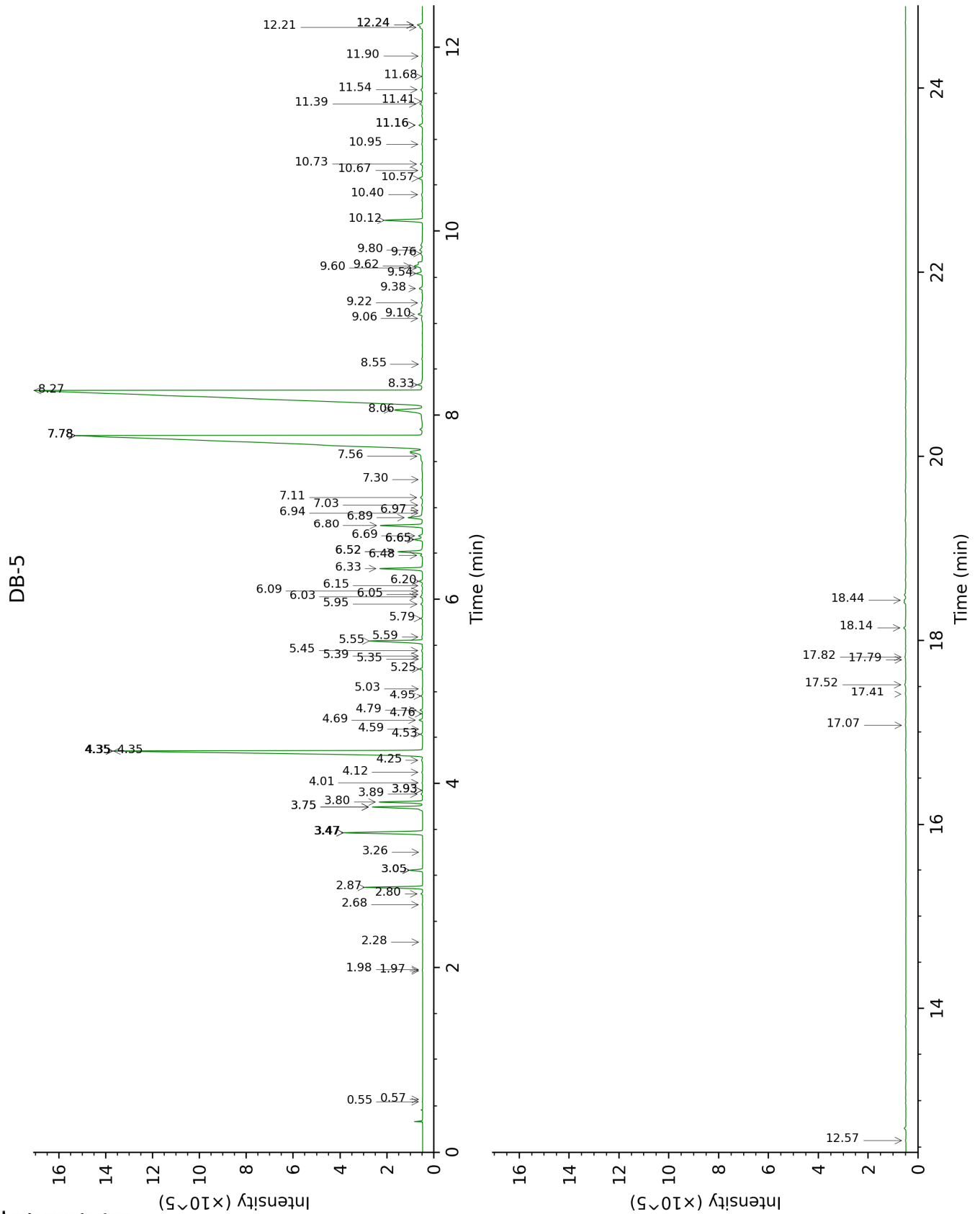
tr: The compound has been detected below 0.005% of total signal.

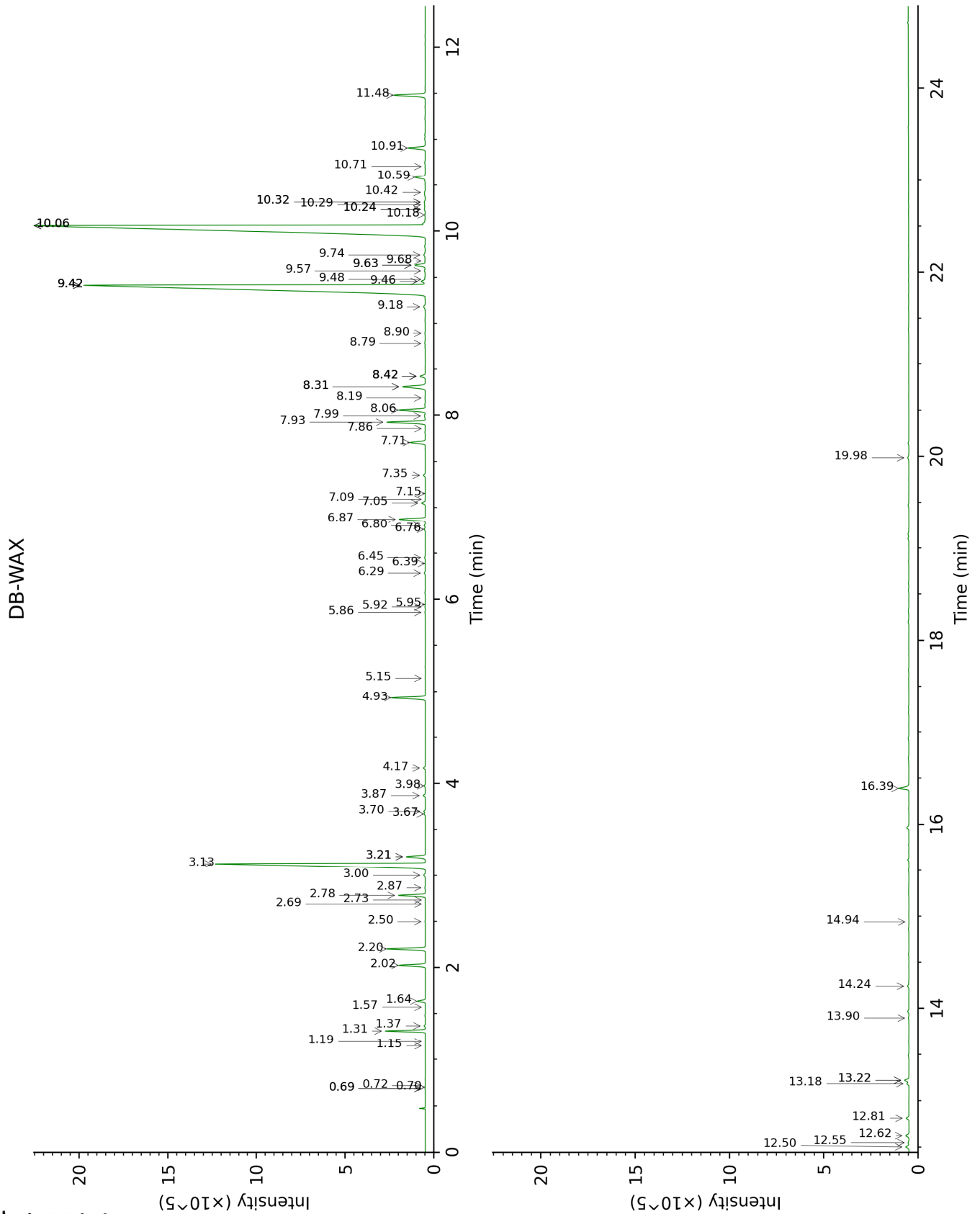
Note: no correction factor was applied

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	%
Isovaleral	0.54	642	tr	0.72	888	tr
2-Methylbutyral	0.57	652	tr	0.70	882	tr
Unknown [m/z 55, 83 (89), 82 (70), 67 (66), 41 (55), 69 (46), 111 (37)... 126 (2)]	1.96	858	tr	0.69*	876	0.01
Unknown [m/z 55, 83 (79), 67 (65), 41 (63), 82 (60), 69 (58)... 111 (27), 126 (9)]	1.98	859	0.01	0.69*	876	[0.01]
2,6-Dimethyl-1,5-heptadiene	2.28	885	0.01	1.15	967	0.01
Tricyclene	2.68	917	0.01	1.19	974	0.01
α -Thujene	2.80	924	0.03	1.37	1002	0.04
α -Pinene	2.87	929	1.14	1.31	994	1.14
Camphene	3.05*	942	0.26	1.64	1029	0.26
α -Fenchene	3.05*	942	[0.26]	1.57	1022	tr
Benzaldehyde	3.26	956	tr	7.15	1458	tr
β -Pinene	3.47*	970	2.09	2.02	1068	0.89
Sabinene	3.47*	970	[2.09]	2.20	1086	1.21
6-Methyl-5-hepten-2-one	3.75*	989	1.21	4.93	1300	1.18
Dehydro-1,8-cineole	3.75*	989	[1.21]	3.00	1152	0.07
Myrcene	3.80	992	0.87	2.78	1135	0.86
6-Methyl-5-hepten-2-ol	3.89	998	0.04	6.80	1432	0.04
α -Phellandrene	3.93*	1001	0.01	2.69	1127	0.01
Pseudolimonene	3.93*	1001	[0.01]	2.73	1131	tr
Δ 3-Carene	4.01	1006	0.01	2.50	1112	0.01
α -Terpinene	4.12	1013	0.02	2.86	1141	0.02
para-Cymene	4.25	1022	0.03	3.98	1228	0.04
1,8-Cineole	4.35*	1028	11.60	3.21*	1169	0.68
β -Phellandrene	4.35*	1028	[11.60]	3.21*	1169	[0.68]
Limonene	4.35*	1028	[11.60]	3.13	1162	10.94
(Z)- β -Ocimene	4.53	1039	0.05	3.67†	1206	0.10
Seudenone?	4.59	1043	tr	8.19	1536	0.02
(E)- β -Ocimene	4.69	1049	0.08	3.87	1220	0.07
2,6-Dimethyl-5-heptenal (melonal)	4.76	1053	0.01	5.15	1313	0.01
γ -Terpinene	4.80	1056	0.06	3.70†	1208	[0.10]
cis-Sabinene hydrate	4.95	1065	0.03	6.76	1429	0.05
cis-Linalool oxide (fur.)	5.03	1071	0.01	6.39	1402	0.01
Terpinolene	5.25	1084	0.07	4.17	1243	0.07

6,7-Epoxyterpinene	5.35	1091	0.01	5.95	1370	0.01
<i>trans</i> -Sabinene hydrate	5.39	1093	0.01	7.86	1510	0.01
Rosefuran	5.45	1097	0.03	5.86	1364	0.02
Linalool	5.55	1104	1.34	7.93	1516	1.36
<i>cis</i> -Chrysanthemal?	5.59	1106	0.03	5.92	1368	0.01
<i>cis</i> -para-Menth-2-en-1-ol	5.80	1119	0.03	7.99	1521	0.05
<i>cis</i> -Limonene oxide	5.95	1129	0.04	6.28	1394	0.04
<i>cis</i> -para-Mentha-2,8-dien-1-ol	6.03	1134	0.06	9.42*	1633	30.77
<i>trans</i> -Limonene oxide	6.05	1136	0.01	6.45	1406	0.03
<i>trans</i> -para-Menth-2-en-1-ol	6.09	1138	0.02	8.79	1582	0.02
exo-Isocitral	6.15	1142	0.03	7.35	1473	0.08
<i>trans</i> -Chrysanthemal	6.20	1145	0.08	7.09	1454	0.01
Citronellal	6.33	1154	1.00	6.87	1437	0.98
Borneol	6.48	1163	0.05	9.63*	1650	0.42
Isoneral	6.52*	1165	0.61	7.71	1499	0.57
δ -Terpineol	6.52*	1165	[0.61]	9.42*	1633	[30.77]
Rosefuran oxide	6.65*	1174	0.20	8.42*	1554	0.21
Terpinen-4-ol	6.65*	1174	[0.20]	8.42*	1554	[0.21]
Unknown [m/z 84, 83 (74), 137 (56), 41 (47), 93 (43), 108 (40)... 152 (2)]	6.69	1176	0.10	9.46	1636	0.17
Isogeranial	6.80	1184	1.03	8.06	1526	1.02
α -Terpineol	6.89	1189	0.40	9.63*	1650	[0.42]
Methyl salicylate	6.94	1192	0.03	10.32*	1706	0.05
Myrtenol	6.97	1194	0.02	10.71	1740	0.02
<i>trans</i> -Isopiperitenol	7.03	1198	0.04	10.24*	1700	0.06
<i>trans</i> -Piperitol	7.11	1203	0.06	10.24*	1700	[0.06]
<i>cis</i> -Isopiperitenol	7.30	1216	0.02	10.18	1695	0.03
Nerol	7.56	1233	0.63	10.91	1757	0.65
Neral	7.78*	1248	31.16	9.42*	1633	[30.77]
Citronellol	7.78*	1248	[31.16]	10.59	1729	0.43
Piperitone	7.78*	1248	[31.16]	9.74	1659	0.10
Geraniol	8.06	1267	1.15	11.48	1806	1.20
Geranial	8.27	1281	39.01	10.06*†	1685	39.17
Unknown [m/z 43, 69 (77), 41 (70), 109 (54)... 152 (6)]	8.33	1285	0.16	12.81	1926	0.10
Thymol	8.55	1300	tr	14.94	2131	tr
Unknown [m/z 82, 59 (44), 41 (43), 95 (31), 43 (29), 81 (24)...]	9.06	1335	0.06	12.50	1897	0.12

Neric acid	9.10	1338	0.13			
α -Terpinyl acetate	9.22	1347	0.03	9.57	1645	0.05
Unknown [m/z 110, 95 (98), 109 (40), 43 (35), 111 (32)... 153 (13)...]	9.38	1358	0.09	13.22*	1964	0.17
Geranic acid	9.54	1369	0.17	16.39	2282	0.39
α -Copaene	9.60†	1374	0.37	7.05	1450	0.14
Unknown [m/z 81, 59 (94), 41 (74), 85 (40), 43 (55)...]	9.62†	1375	[0.37]	13.22*	1964	[0.17]
Geranyl acetate	9.76	1385	0.06	10.42	1715	0.04
β -Elemene	9.80	1387	0.10	8.31*	1546	1.02
β -Caryophyllene	10.12	1410	0.94	8.31*	1546	[1.02]
Aromadendrene	10.40	1431	0.02	8.42*	1554	[0.21]
α -Humulene	10.57	1444	0.09	9.18	1614	0.09
allo-Aromadendrene	10.67	1451	0.02	8.90	1591	0.03
(<i>E</i>)- β -Farnesene	10.74	1456	0.05	9.42*	1633	[30.77]
Germacrene D	10.95	1472	0.02	9.68	1654	0.02
Bicyclogermacrene	11.16*	1487	0.10	10.06*†	1685	[39.17]
Viridiflorene	11.16*	1487	[0.10]	9.48	1638	0.03
β -Bisabolene	11.39	1504	0.07	10.06*†	1685	[39.17]
γ -Cadinene	11.42	1507	0.03	10.29	1704	0.03
δ -Cadinene	11.54	1517	0.04	10.32*	1706	[0.05]
Unknown [m/z 69, 41 (80), 82 (63), 43 (57), 98 (54)... 220 (t)]	11.68	1528	0.02			
α -Elemol	11.90	1545	0.01	13.90	2028	0.02
Spathulenol	12.21†	1569	0.21	14.24	2062	0.05
Caryophyllene oxide isomer	12.24*†	1572	[0.21]	12.55	1901	0.03
Caryophyllene oxide	12.24*†	1572	[0.21]	12.62	1908	0.13
Humulene epoxide II	12.57	1598	0.01	13.18	1960	0.08
Unknown [m/z 41, 69 (95), 109 (41), 95 (39), 55 (36), 121 (36)...]	17.07	1995	0.01			
Unknown [m/z 69, 41 (90), 95 (49), 109 (43), 219 (43), 55 (30)...]	17.42	2028	0.02			
Unknown [m/z 69, 41 (94), 81 (42), 109 (39), 107 (33), 43 (31)...]	17.52	2039	0.04			
Unknown [m/z 69, 41 (73), 81 (55),	17.79	2066	0.01			

109 (26), 95 (25), 94 (20)...						
Unknown [m/z 69, 41 (73), 55 (46), 95 (40), 109 (39), 91 (39)...	17.82	2069	0.03			
Unknown [m/z 69, 41 (64), 81 (32), 109 (23), 94 (19), 95 (18)...	18.14	2100	0.06			
Unknown [m/z 69, 41 (38), 151 (36), 123 (34), 82 (24), 43 (23), 109 (21)...	18.44	2131	0.09	19.98	2697	0.06
Total identified		97.24%			97.40%	
Total reported		97.96%			97.84%	

*: 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