

Date : April 12, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22D05-PTH05

Customer identification : Thyme Thymol (Red) - Spain - T40110R

Type : Essential oil

Source : *Thymus vulgaris* ct. Thymol

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 : Seydou Ka, Ph. D.

Analysis date : April 09, 2022

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid

Refractive index: 1.5001 ± 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
2-Ethylfuran	tr	Furan
2-Methylbutanol	0.01	Aliphatic alcohol
Methyl 2-methylbutyrate	0.01	Aliphatic ester
Octane	tr	Alkane
Unknown	0.01	Unknown
Hexanol	0.01	Aliphatic alcohol
Heptan-3-one	0.01	Aliphatic ketone
Hashishene	tr	Monoterpene
Tricyclene	0.02	Monoterpene
α -Thujene	0.63	Monoterpene
α -Pinene	1.12	Monoterpene
β -Fenchene	0.01	Monoterpene
α -Fenchene	0.02	Monoterpene
Unknown	0.01	Monoterpene
Camphene	0.98	Monoterpene
Thuja-2,4(10)-diene	tr	Monoterpene
β -Pinene	0.25	Monoterpene
Sabinene	tr	Monoterpene
Octen-3-ol	0.05	Aliphatic alcohol
Octan-3-one	0.04	Aliphatic ketone
Myrcene	1.49	Monoterpene
Octan-3-ol	0.01	Aliphatic alcohol
Pseudolimonene	0.05	Monoterpene
α -Phellandrene	0.08	Monoterpene
Δ^3 -Carene	0.10	Monoterpene
α -Terpinene	1.47	Monoterpene
Carvomenthene	0.02	Aliphatic alcohol
para-Cymene	23.50	Monoterpene
1,8-Cineole	0.29*	Monoterpenic ether
β -Phellandrene	0.29*	Monoterpene
Limonene	0.38	Monoterpene
(Z)- β -Ocimene	0.01	Monoterpene
(E)- β -Ocimene	0.02	Monoterpene
γ -Terpinene	8.44	Monoterpene
2-Methylbutyl butyrate	0.01	Aliphatic ester
cis-Sabinene hydrate	0.13	Monoterpenic alcohol
3-Methyl-3-butenyl butyrate?	0.01	Aliphatic ester
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Fenchone	0.06	Monoterpenic ketone
Terpinolene	0.05	Monoterpene
trans-Linalool oxide (fur.)	0.06	Monoterpenic alcohol
para-Cymenene	0.04	Monoterpene
Unknown	0.02	Unknown
trans-Sabinene hydrate	0.05	Monoterpenic alcohol
Linalool	6.10	Monoterpenic alcohol

Hotrienol	0.03	Monoterpenic alcohol
endo-Fenchol	0.01	Monoterpenic alcohol
Unknown	0.03	Unknown
<i>trans</i> -Pinocarveol	0.03	Monoterpenic alcohol
Camphor	0.03	Monoterpenic ketone
<i>trans</i> -para-Menth-2-en-1-ol	0.01	Monoterpenic alcohol
Camphene hydrate	0.01	Monoterpenic alcohol
<i>trans</i> -Chrysanthemal	0.03	Monoterpenic aldehyde
Unknown	0.01	Oxygenated monoterpene
Isoborneol	0.04	Monoterpenic alcohol
Borneol	1.80	Monoterpenic alcohol
Lavandulol	0.02	Monoterpenic alcohol
Terpinen-4-ol	1.55	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α -Terpineol	0.86	Monoterpenic alcohol
<i>cis</i> -Dihydrocarvone	0.07	Monoterpenic ketone
<i>trans</i> -Dihydrocarvone	0.03	Monoterpenic ketone
Bornyl formate	0.03	Monoterpenic ester
Thymol methyl ether	0.01	Monoterpenic ether
Neral	0.05	Monoterpenic aldehyde
Carvacrol methyl ether	0.48	Monoterpenic ether
Thymol analogue I (isothymol?)	0.12	Monoterpenic alcohol
Thymol	42.08	Monoterpenic alcohol
Carvacrol	3.99	Monoterpenic alcohol
Thymyl acetate	tr	Monoterpenic ester
Eugenol	0.01	Phenylpropanoid
Isodauca-4,7(14)-diene?	0.01	Sesquiterpene
α -Copaene	0.02	Sesquiterpene
β -Bourbonene	tr	Sesquiterpene
Unknown	0.01	Unknown
Isocaryophyllene	0.02	Sesquiterpene
β -Caryophyllene	1.42	Sesquiterpene
Aromadendrene	0.04	Sesquiterpene
Unknown	0.05	Oxygenated monoterpene
α -Humulene	0.01	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.15	Sesquiterpene
γ -Muurolene	0.02	Sesquiterpene
Viridiflorene	0.03	Sesquiterpene
α -Muurolene	0.02	Sesquiterpene
γ -Cadinene	0.04	Sesquiterpene
δ -Cadinene	0.05	Sesquiterpene
α -Cadinene	tr	Sesquiterpene
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Caryophyllene oxide	0.29	Sesquiterpenic ether
Unknown	0.01	Oxygenated sesquiterpene
Humulene epoxide II	tr	Sesquiterpenic ether
Isospathulenol	tr	Sesquiterpenic alcohol
α -Cadinol	tr	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.02	Sesquiterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.03	Unknown

Unknown	0.04	Unknown
Unknown	tr	Unknown
meta-Camphorene	0.02	Diterpene
Unknown	tr	Unknown
Unknown	0.01	Unknown
Unknown	0.03	Unknown
Unknown	tr	Unknown
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Unknown	tr	Unknown
Unknown	0.01	Unknown
Consolidated total	99.36%	

*: 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

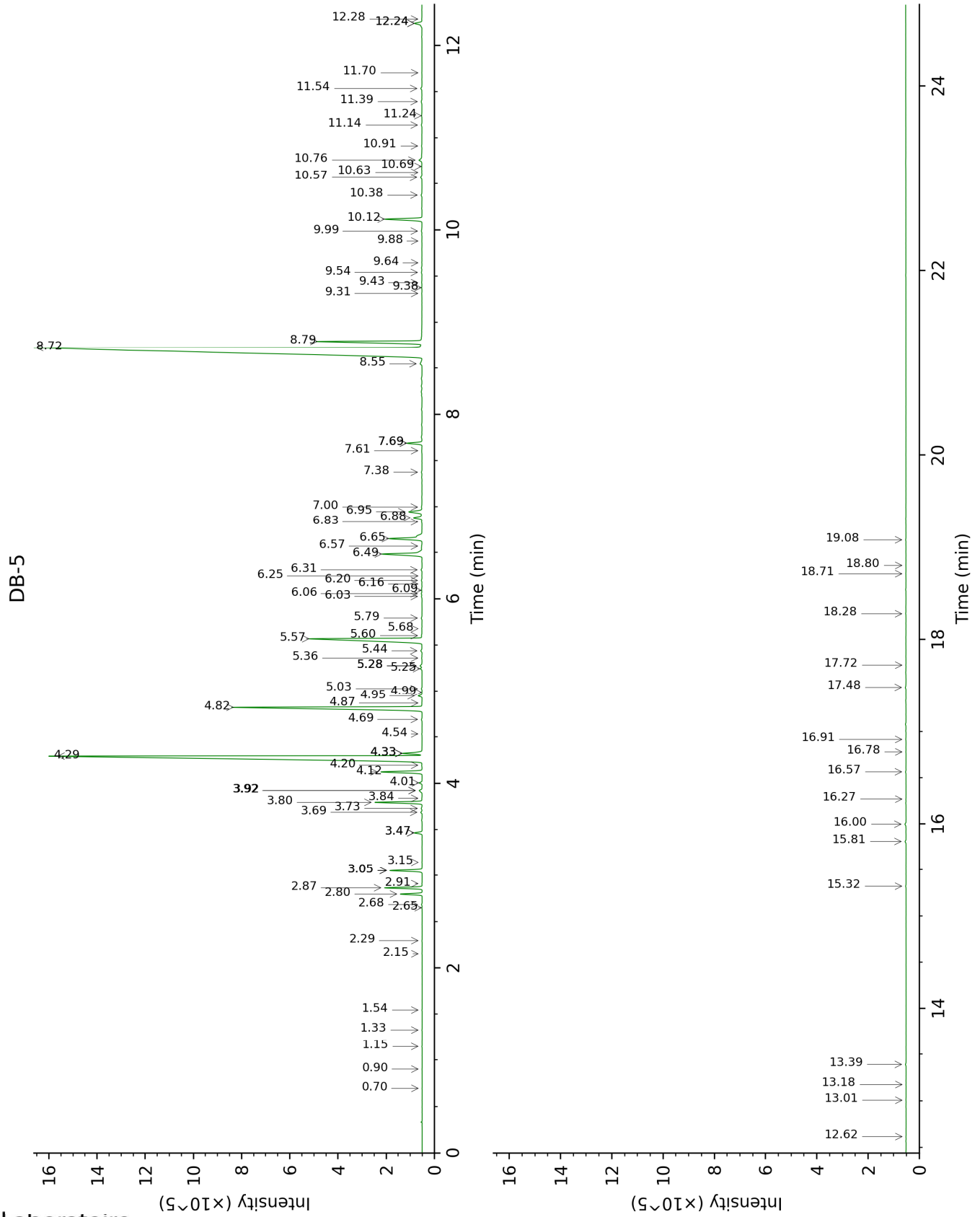
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

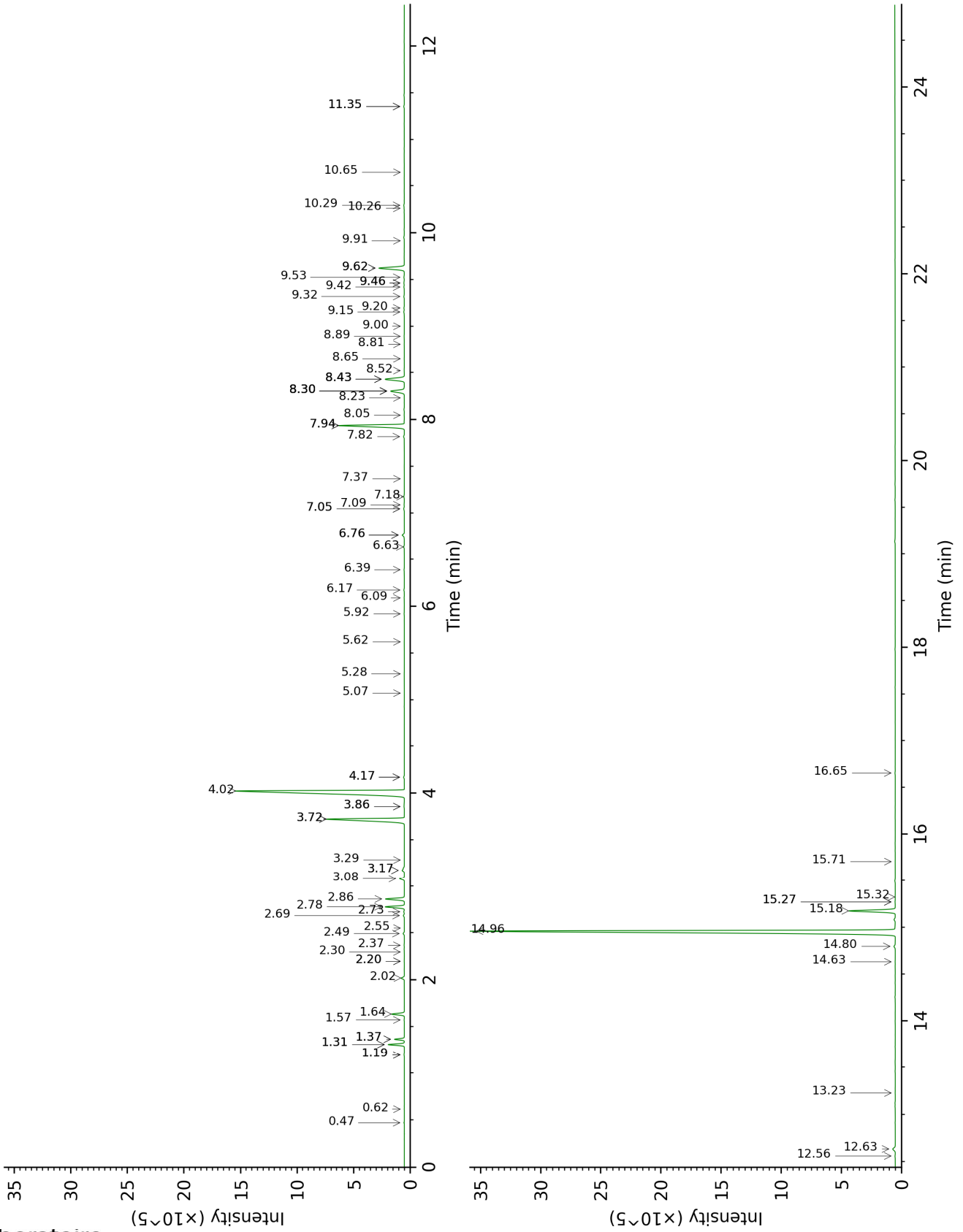
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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



DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
2-Ethylfuran	0.70	702	tr			
2-Methylbutanol	0.90	735	0.01	3.28	1175	0.01
Methyl 2-methylbutyrate	1.15	774	0.01	1.19*	974	0.02
Octane	1.33	802	tr	0.47	785	0.01
Unknown [m/z 81, 69 (80), 41 (65), 83 (52), 109 (48), 55 (47)...]	1.54	821	0.01	0.62	850	tr
Hexanol	2.15	874	0.01	5.28	1322	0.01
Heptan-3-one	2.30	887	0.01	2.55	1116	tr
Hashishene	2.65	914	tr	1.31*	993	1.12
Tricyclene	2.68	917	0.02	1.19*	974	[0.02]
α -Thujene	2.80	924	0.63	1.37*	1002	0.64
α -Pinene	2.87	929	1.12	1.31*	993	[1.12]
β -Fenchene	2.91	932	0.01	1.37*	1002	[0.64]
α -Fenchene	3.05*	942	1.01	1.57	1022	0.02
Unknown [m/z 91, 92 (47), 65 (11)... 134 (1)]	3.05*	942	[1.01]	2.30	1095	0.01
Camphene	3.05*	942	[1.01]	1.64	1029	0.98
Thuja-2,4(10)-diene	3.15	948	tr	2.20*	1085	0.01
β -Pinene	3.47*	970	0.26	2.02	1067	0.25
Sabinene	3.47*	970	[0.26]	2.20*	1085	[0.01]
Octen-3-ol	3.69	985	0.05	6.63	1420	0.05
Octan-3-one	3.73	988	0.04	3.86*	1220	0.06
Myrcene	3.80	992	1.49	2.78	1134	1.50
Octan-3-ol	3.84	995	0.01	5.92	1368	0.02
Pseudolimonene	3.92*	1001	0.14	2.73	1130	0.05
α -Phellandrene	3.92*	1001	[0.14]	2.69	1127	0.08
Δ^3 -Carene	4.01	1006	0.10	2.49	1112	0.10
α -Terpinene	4.12	1014	1.47	2.86	1141	1.48
Carvomenthene	4.20	1018	0.02	2.37	1102	0.02
para-Cymene	4.30	1024	23.50	4.02	1232	23.48
1,8-Cineole	4.32*	1026	0.67	3.17*	1166	0.27
β -Phellandrene	4.32*	1026	[0.67]	3.17*	1166	[0.27]
Limonene	4.32*	1026	[0.67]	3.08	1159	0.38
(Z)- β -Ocimene	4.54	1039	0.01	3.72*	1210	8.46
(E)- β -Ocimene	4.69	1049	0.02	3.86*	1220	[0.06]
γ -Terpinene	4.82	1058	8.44	3.72*	1210	[8.46]
2-Methylbutyl butyrate	4.87	1060	0.01	4.17*	1243	0.06
cis-Sabinene hydrate	4.95	1066	0.13	6.76*	1429	0.19
3-Methyl-3-butenyl butyrate?	4.99	1068	0.01	5.07	1308	0.01

<i>cis</i> -Linalool oxide (fur.)	5.03	1070	0.02	6.39	1402	0.02
Fenchone	5.25	1084	0.06	5.62	1347	0.01
Terpinolene	5.28*	1086	0.08	4.17*	1243	[0.06]
<i>trans</i> -Linalool oxide (fur.)	5.28*	1086	[0.08]	6.76*	1429	[0.19]
para-Cymenene	5.28*	1086	[0.08]	6.17	1386	0.04
Unknown [m/z 123, 81 (78), 79 (39), 41 (31), 67 (28), 150 (27)...]	5.36	1092	0.02			
<i>trans</i> -Sabinene hydrate	5.44	1096	0.05	7.82	1507	0.07
Linalool	5.57	1105	6.10	7.94*	1516	6.11
Hotrienol	5.60	1107	0.03	8.65	1572	0.01
endo-Fenchol	5.68	1112	0.01	8.23	1539	0.01
Unknown [m/z 81, 79 (19), 41 (12), 92 (8), 77 (8)...]	5.79	1119	0.03	6.09	1380	0.02
<i>trans</i> -Pinocarveol	6.03	1134	0.03	9.00	1599	0.01
Camphor	6.06	1136	0.03	7.05*	1450	0.06
<i>trans</i> -para-Menth-2-en-1-ol	6.09	1138	0.01	8.81	1584	0.01
Camphene hydrate	6.16	1143	0.01	8.30*	1545	1.44
<i>trans</i> -Chrysanthemal	6.20	1145	0.03	7.09	1453	0.02
Unknown [m/z 123, 81 (60), 67 (49), 95 (36), 41 (29), 68 (25)... 152 (2)]	6.25	1148	0.01	7.18	1460	0.05
Isoborneol	6.31	1152	0.04	9.20	1615	0.04
Borneol	6.48	1163	1.80	9.62*	1650	2.66
Lavandulol	6.57	1169	0.02	9.46*	1637	0.05
Terpinen-4-ol	6.65	1174	1.55	8.43*	1555	2.10
para-Cymen-8-ol	6.84	1186	0.02	11.35*	1795	0.05
α -Terpineol	6.88†	1189	0.93	9.62*	1650	[2.66]
<i>cis</i> -Dihydrocarvone	6.95†	1193	[0.93]	8.30*	1545	[1.44]
<i>trans</i> -Dihydrocarvone	7.00	1196	0.03	8.52	1562	0.01
Bornyl formate	7.38	1221	0.03	7.94*	1516	[6.11]
Thymol methyl ether	7.61	1237	0.01	8.30*	1545	[1.44]
Neral	7.69*	1242	0.52	9.32	1625	0.05
Carvacrol methyl ether	7.69*	1242	[0.52]	8.43*	1555	[2.10]

Thymol analogue I (isothymol?)	8.55	1299	0.12	14.80	2116	0.13
Thymol	8.72	1312	42.08	14.96	2133	41.94
Carvacrol	8.80	1317	3.99	15.18	2155	4.00
Thymyl acetate	9.31	1353	tr	11.35*	1795	[0.05]
Eugenol	9.38	1358	0.01	14.63	2100	0.02
Isodauc-4,7(14)-diene?	9.43	1361	0.01			
α-Copaene	9.54	1369	0.02	7.05*	1450	[0.06]
β-Bourbonene	9.64	1376	tr	7.37	1474	tr
Unknown [m/z 148, 133 (66), 105 (46), 43 (33), 77 (15)...]	9.88	1393	0.01			
Isocaryophyllene	9.99	1401	0.02	8.05	1525	0.02
β-Caryophyllene	10.12	1410	1.42	8.30*	1545	[1.44]
Aromadendrene	10.38	1429	0.04	8.43*	1555	[2.10]
Unknown [m/z 151, 166 (40), 105 (26)...]	10.57	1444	0.05			
α-Humulene	10.63	1448	0.01	9.16	1612	0.05
allo-Aromadendrene	10.69	1453	0.01	8.90	1591	0.03
(E)-β-Farnesene	10.76	1458	0.15	9.42	1633	0.04
γ-Murolene	10.91	1469	0.02	9.46*	1637	[0.05]
Viridiflorene	11.14	1486	0.03	9.52	1642	0.04
α-Murolene	11.24	1494	0.02	9.91	1673	0.01
γ-Cadinene	11.39	1505	0.04	10.29	1704	0.05
δ-Cadinene	11.54	1516	0.05	10.26	1702	0.02
α-Cadinene	11.70	1529	tr	10.65	1735	tr
Caryophyllene oxide isomer	12.24*	1571	0.34	12.56	1902	0.03
Caryophyllene oxide	12.24*	1571	[0.34]	12.63	1909	0.29
Unknown [m/z 161, 187 (29), 105 (24), 91 (23), 93 (23)... 205 (19), 220? (2)]	12.28	1575	0.01			
Humulene epoxide II	12.62	1601	tr	13.23	1964	0.01
Isospathulenol	13.01	1633	tr	15.27*	2165	0.03
α-Cadinol	13.18	1647	tr	15.32	2170	0.01
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.39	1665	0.02	16.65	2310	0.02
Unknown [m/z 81, 136 (68), 135 (58), 150 (44), 93 (34), 121 (30)...]	15.32	1832	0.01			

Unknown [m/z 81, 136 (62), 135 (56), 150 (39), 93 (33), 121 (24)...]	15.81	1876	0.03			
Unknown [m/z 136, 81 (96), 135 (76), 93 (48), 150 (47), 121 (43), 137 (28)...]	16.00	1893	0.04			
Unknown [m/z 136, 81 (81), 150 (74), 135 (52), 93 (46), 121 (42)...]	16.27	1918	tr	15.71	2209	0.01
meta- Camphorene	16.56	1946	0.02	15.27*	2165	[0.03]
Unknown [m/z 201, 159 (37), 148 (27), 173 (22), 41 (20)... 284 (16)]	16.78	1967	tr			
Unknown [m/z 135, 150 (61), 81 (45), 69 (37), 41 (24), 136 (21), 93 (19)...]	16.92	1980	0.01			
Unknown [m/z 135, 43 (51), 150 (36), 109 (30), 93 (27), 95 (21)...]	17.48	2035	0.03			
Unknown [m/z 173, 159 (29), 216 (27), 286 (15)]	17.72	2059	tr			
Unknown [m/z 69, 41 (81), 91 (37), 166 (35), 105 (33), 43 (30)...]	18.28	2115	0.01			
Unknown [m/z 163, 175 (91), 173 (83), 161 (82), 41 (66), 286 (66)]	18.71	2160	0.01			
Unknown [m/z 267, 282 (24), 268 (21), 117 (16), 126 (11)...]	18.80	2169	tr			
Unknown [m/z 175, 163 (78), 161 (33), 41 (32)... 286 (18)]	19.08	2198	0.01			
Total identified		99.02%			98.77%	

Total reported	99.33%	98.86%
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*: 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