

Date : May 26, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20E25-PTH07

Customer identification : Thyme Thymol - France - T4010987R

Type : Essential oil

Source : *Thymus vulgaris* ct. Thymol

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-007 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Fanny Charlier, B. Sc.

Analysis date : May 26, 2020

Checked and approved by :

Alexis St-Gelais, M. Sc., chimiste 2013-174

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid

Refractive index: 1.4999 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 19817:2017 - ESSENTIAL OIL OF THYME, THYMOL TYPE

Compound	Min. %	Max. %	Observed %	Complies?
β-Caryophyllene	0.5	4.0	1.7	Yes
Carvacrol	0.5	5.5	4.0	Yes
Thymol	35.0	55.0	42.0	Yes
Carvacrol methyl ether	0.1	1.5	0.5	Yes
Terpinen-4-ol	0.1	2.5	1.6	Yes
Linalool	0.5	6.5	6.1	Yes
cis-Sabinene hydrate	tr	0.50	0.14	Yes
para-Cymene	14.0	28.0	21.9	Yes
γ-Terpinene	4.0	13.0	9.6	Yes
α-Terpinene	0.9	2.6	1.7	Yes
Myrcene	1.0	2.8	1.5	Yes
α-Pinene	0.5	2.5	1.1	Yes
α-Thujene	0.5	1.5	0.7	Yes
Refractive index	1.4940	1.5040	1.4999	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with the ISO standard for thymol type thyme oil.

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Ethanol	0.01	Aliphatic alcohol
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Methyl 2-methylbutyrate	0.01	Aliphatic ester
Octane	tr	Alkane
(3Z)-Hexenol	tr	Aliphatic alcohol
Heptan-3-one	tr	Aliphatic ketone
Hashishene	0.01	Monoterpene
Tricyclene	0.02	Monoterpene
α -Thujene	0.73	Monoterpene
α -Pinene	1.09	Monoterpene
β -Fenchene?	0.01	Monoterpene
Camphene	0.95	Monoterpene
α -Fenchene	0.02	Monoterpene
β -Pinene	0.25	Monoterpene
Sabinene	0.01	Monoterpene
Octen-3-ol	0.05	Aliphatic alcohol
Octan-3-one	0.04	Aliphatic ketone
Myrcene	1.54	Monoterpene
Octan-3-ol	0.01	Aliphatic alcohol
α -Phellandrene	0.09	Monoterpene
Pseudolimonene	0.05	Monoterpene
Δ^3 -Carene	0.11	Monoterpene
α -Terpinene	1.70	Monoterpene
para-Cymene	21.88	Monoterpene
Limonene	0.37	Monoterpene
1,8-Cineole	0.10	Monoterpenic ether
β -Phellandrene	0.17	Monoterpene
(Z)- β -Ocimene	0.02	Monoterpene
(E)- β -Ocimene	0.03	Monoterpene
γ -Terpinene	9.62	Monoterpene
cis-Sabinene hydrate	0.14	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.06	Monoterpene
trans-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
para-Cymenene	0.03	Monoterpene
trans-Sabinene hydrate	0.06	Monoterpenic alcohol
Linalool	6.08	Monoterpenic alcohol
endo-Fenchol	0.02	Monoterpenic alcohol
Unknown	0.04	Unknown
Camphor	0.05	Monoterpenic ketone
trans-para-Menth-2-en-1-ol	0.01	Monoterpenic alcohol
trans-Chrysanthemal	0.04	Monoterpenic aldehyde
Ipsdienol	0.01	Monoterpenic alcohol
Isoborneol	0.03	Monoterpenic alcohol

Unknown	0.01	Unknown
Borneol	1.84	Monoterpenic alcohol
Terpinen-4-ol	1.59	Monoterpenic alcohol
para-Cymen-8-ol	0.05	Monoterpenic alcohol
α -Terpineol	0.92	Monoterpenic alcohol
<i>cis</i> -Dihydrocarvone	0.04	Monoterpenic ketone
<i>trans</i> -Piperitol	0.01	Monoterpenic alcohol
Bornyl formate	0.02	Monoterpenic ester
Thymol methyl ether	0.02	Monoterpenic ether
Neral	0.04	Monoterpenic aldehyde
Carvacrol methyl ether	0.52	Monoterpenic ether
Geraniol	0.04	Monoterpenic alcohol
Geranial	0.03	Monoterpenic aldehyde
Thymol analogue I	0.11	Monoterpenic alcohol
Thymol	42.00	Monoterpenic alcohol
Carvacrol	4.00	Monoterpenic alcohol
α -Copaene	0.04	Sesquiterpene
Unknown	0.01	Unknown
Isocaryophyllene	0.01	Sesquiterpene
α -Gurjunene	0.02	Sesquiterpene
β -Caryophyllene	1.71	Sesquiterpene
Aromadendrene	0.05	Sesquiterpene
α -Humulene	0.05	Sesquiterpene
Unknown	0.07	Oxygenated monoterpene
allo-Aromadendrene	0.02	Sesquiterpene
Thymohydroquinone isomer?	0.03	Simple phenolic
Viridiflorene	0.03	Sesquiterpene
α -Muurolene	0.01	Sesquiterpene
γ -Cadinene	0.04	Sesquiterpene
δ -Cadinene	0.06	Sesquiterpene
Geranyl butyrate	0.02	Monoterpenic ester
Spathulenol	0.03	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.12	Sesquiterpenic ether
Unknown	0.01	Oxygenated sesquiterpene
Humulene epoxide II	0.01	Sesquiterpenic ether
τ -Cadinol	0.01	Sesquiterpenic alcohol
(3Z)-Caryophylla-3,8(13)-dien-5 β -ol	0.01	Sesquiterpenic alcohol
Unknown	0.02	Unknown
Unknown	0.03	Unknown
Unknown	0.04	Unknown
meta-Camphorene	0.02	Diterpene
Unknown	0.01	Unknown
Unknown	0.03	Unknown
Consolidated total	99.28%	

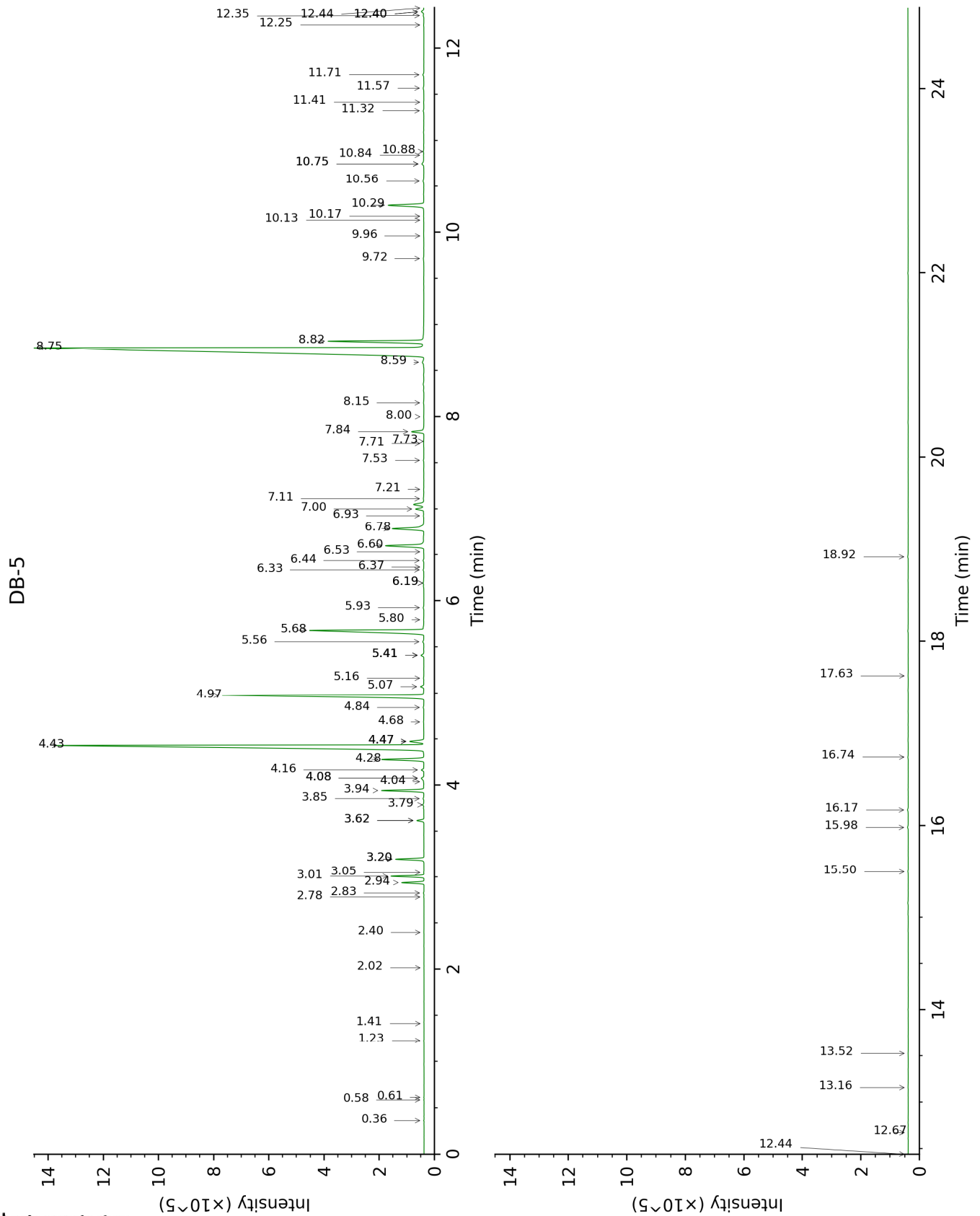
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

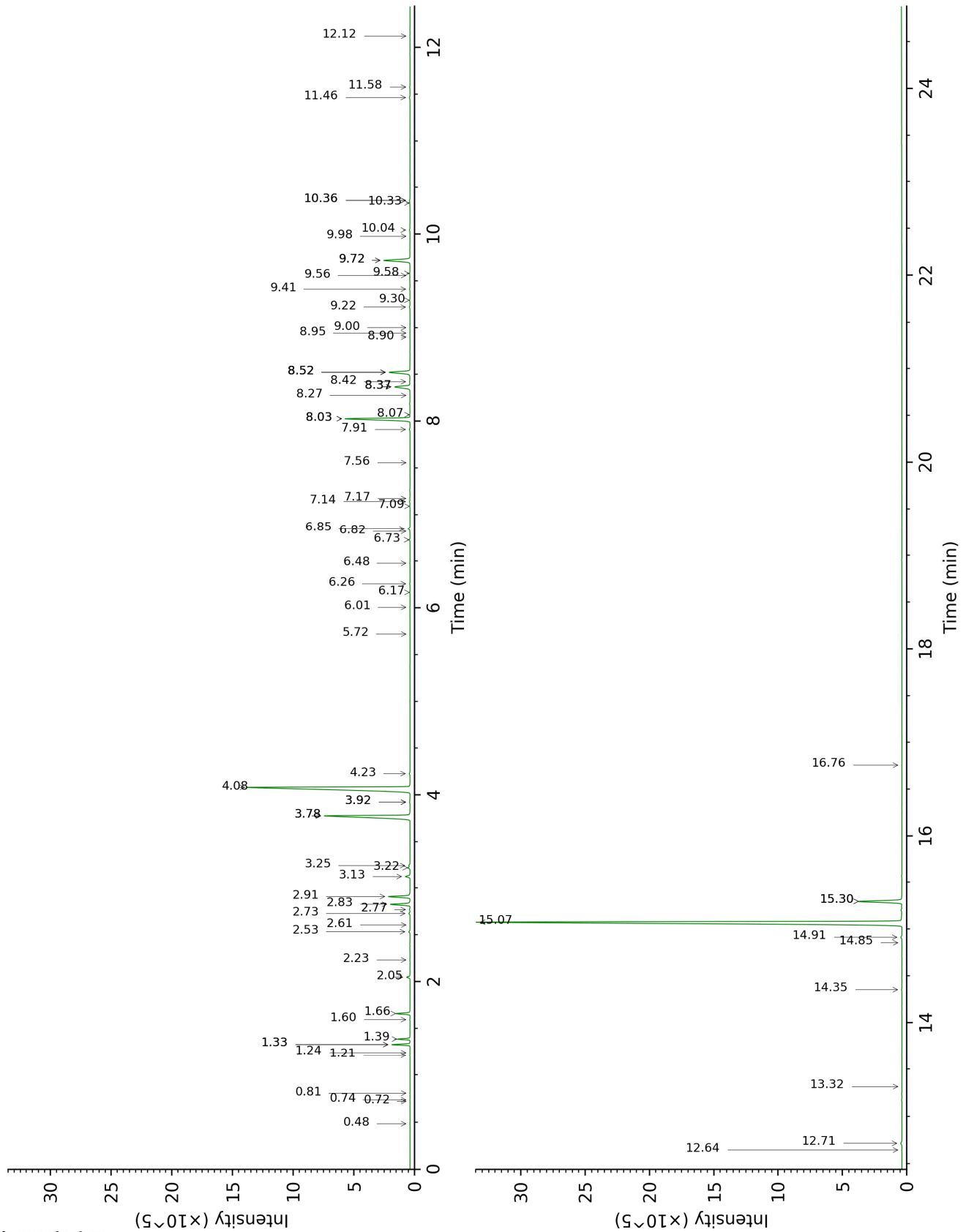
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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	%
Ethanol	0.36	522	0.01	0.81	907	tr
Isovaleral	0.58	640	tr	0.74	888	tr
2-Methylbutyral	0.61	651	tr	0.72	882	tr
Methyl 2-methylbutyrate	1.23	777	0.01	1.24	978	tr
Octane	1.41	803	tr	0.48	785	tr
(3Z)-Hexenol	2.02	854	tr	5.72	1347	0.01
Heptan-3-one	2.40	886	tr	2.61	1117	tr
Hashishene	2.78	915	0.01	1.33*	992	1.08
Tricyclene	2.83	918	0.02	1.21	973	0.02
α -Thujene	2.94	925	0.73	1.39	1001	0.73
α -Pinene	3.01	930	1.09	1.33*	992	[1.08]
β -Fenchene?	3.05	932	0.01			
Camphene	3.20*	942	0.99	1.66	1028	0.95
α -Fenchene	3.20*	942	[0.99]	1.60	1022	0.02
β -Pinene	3.62*	970	0.26	2.05	1066	0.25
Sabinene	3.62*	970	[0.26]	2.23	1085	0.01
Octen-3-ol	3.79	981	0.05	6.73	1420	0.06
Octan-3-one	3.85	986	0.04	3.92*	1220	0.06
Myrcene	3.94	991	1.54	2.83	1134	1.53
Octan-3-ol	4.04	998	0.01	6.01	1368	0.02
α -Phellandrene	4.08*	1000	0.14	2.73	1127	0.09
Pseudolimonene	4.08*	1000	[0.14]	2.77	1130	0.05
Δ^3 -Carene	4.16	1006	0.11	2.53	1111	0.09
α -Terpinene	4.28	1013	1.70	2.91	1141	1.69
para-Cymene	4.43	1023	21.88	4.08	1232	21.81
Limonene	4.47*	1025	0.68	3.13	1158	0.37
1,8-Cineole	4.47*	1025	[0.68]	3.25	1168	0.10
β -Phellandrene	4.47*	1025	[0.68]	3.22	1166	0.17
(Z)- β -Ocimene	4.68	1039	0.02	3.78*	1209	9.58
(E)- β -Ocimene	4.84	1048	0.03	3.92*	1220	[0.06]
γ -Terpinene	4.98	1057	9.62	3.78*	1209	[9.58]
cis-Sabinene hydrate	5.07	1063	0.14	6.85	1430	0.18
cis-Linalool oxide (fur.)	5.16	1069	0.01	6.48	1402	0.02
Terpinolene	5.41*	1085	0.13	4.23	1242	0.06
trans-Linalool oxide (fur.)	5.41*	1085	[0.13]	6.82	1427	0.02
para-Cymenene	5.41*	1085	[0.13]	6.26	1386	0.03
trans-Sabinene hydrate	5.56	1094	0.06	7.91	1509	0.06
Linalool	5.68	1102	6.08	8.03*	1518	6.12
endo-Fenchol	5.80	1109	0.02	8.27	1538	0.01
Unknown [m/z 81, 79 (19), 41 (12), 92 (8), 77 (8)...]	5.93	1118	0.04	6.17	1379	0.02
Camphor	6.19*	1135	0.06	7.14	1451	0.05
trans-para-Menth-2-	6.19*	1135	[0.06]	8.95	1590	0.01

en-1-ol						
<i>trans</i> -Chrysanthemal	6.34	1144	0.04	7.18	1454	0.03
Ipsdienol	6.37	1146	0.01	9.56	1639	0.01
Isoborneol	6.44	1151	0.03	9.30	1618	0.04
Unknown [m/z 123, 81 (46), 43 (45), 95 (34), 166 (30)]	6.53	1157	0.01	8.90	1586	0.01
Borneol	6.60	1161	1.84	9.72*	1653	2.70
Terpinen-4-ol	6.78	1173	1.59	8.52*	1557	2.15
para-Cymen-8-ol	6.93	1183	0.05	11.46	1799	0.06
α -Terpineol	7.00	1188	0.92	9.72*	1653	[2.70]
<i>cis</i> -Dihydrocarvone	7.11	1195	0.04	8.42	1549	0.06
<i>trans</i> -Piperitol	7.21	1202	0.01	10.36*†	1705	0.06
Bornyl formate	7.53	1223	0.02	8.03*	1518	[6.12]
Thymol methyl ether	7.71	1236	0.02	8.37*	1545	1.68
Neral	7.73†	1237	0.57	9.42	1628	0.04
Carvacrol methyl ether	7.84†	1244	[0.57]	8.52*	1557	[2.15]
Geraniol	8.00	1256	0.04	11.58	1808	0.03
Geranial	8.15	1266	0.03	10.04	1679	0.05
Thymol analogue I	8.59	1296	0.11	14.91	2119	0.10
Thymol	8.75	1308	42.00	15.07	2135	42.03
Carvacrol	8.82	1308	4.00	15.30*	2157	3.94
α -Copaene	9.72	1371	0.04	7.09	1448	0.02
Unknown [m/z 148, 133 (66), 105 (46), 43 (33), 77 (15)...]	9.96	1389	0.01			
Isocaryophyllene	10.13	1401	0.01	8.07	1522	0.03
α -Gurjunene	10.17	1404	0.02	7.56	1482	0.01
β -Caryophyllene	10.29	1412	1.71	8.37*	1545	[1.68]
Aromadendrene	10.56	1432	0.05	8.52*	1557	[2.15]
α -Humulene	10.75*	1446	0.13	9.22	1612	0.05
Unknown [m/z 151, 166 (40), 105 (26)...]	10.75*	1446	[0.13]			
allo-Aromadendrene	10.84	1453	0.02	9.00	1594	0.02
Thymohydroquinone isomer?	10.88	1456	0.03			
Viridiflorene	11.32	1489	0.03	9.58	1641	0.04
α -Muurolene	11.42	1496	0.01	9.98	1674	0.01
γ -Cadinene	11.57	1508	0.04	10.33	1702	0.04
δ -Cadinene	11.71	1519	0.06	10.36*†	1705	[0.06]
Geranyl butyrate	12.25	1561	0.02	12.12	1857	0.02
Spathulenol	12.35	1569	0.03	14.35	2064	0.03
Caryophyllene oxide isomer	12.40*	1573	0.13	12.64	1904	0.02
Caryophyllene oxide	12.40*	1573	[0.13]	12.72	1910	0.12
Unknown [m/z 161, 187 (29), 105 (24), 91 (23), 93 (23)... 205 (19), 220? (2)]	12.44	1576	0.01			
Humulene epoxide II	12.67	1594	0.01	13.32	1966	0.01
τ -Cadinol	13.16	1634	0.01	14.85	2113	0.01

(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.52	1664	0.01	16.76	2308	0.02
Unknown [m/z 81, 136 (68), 135 (58), 150 (44), 93 (34), 121 (30)...]	15.50	1835	0.02			
Unknown [m/z 81, 136 (62), 135 (56), 150 (39), 93 (33), 121 (24)...]	15.98	1879	0.03			
Unknown [m/z 136, 81 (96), 135 (76), 93 (48), 150 (47), 121 (43), 137 (28)...]	16.17	1896	0.04			
meta-Camphorene	16.74	1950	0.02	15.30*	2157	[3.94]
Unknown [m/z 135, 43 (51), 150 (36), 109 (30), 93 (27), 95 (21)...]	17.63	2036	0.01			
Unknown [m/z 267, 282 (24), 268 (21), 117 (16), 126 (11)...]	18.92	2168	0.03			
Total identified		99.17%			98.68%	
Total reported		99.36%			98.71%	

*: 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