

Date : September 09, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19I06-PTH24-1-SCC

Customer identification : Lemon Scented Tea Tree - Australia - LU010177R

Type : Essential oil

Source : *Leptospermum petersonii* ct. Citral

Customer : Plant Therapy

ANALYSIS

Method: PC-PA-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 : Sylvain Mercier, M. Sc., Chimiste

Analysis date : September 06, 2019

Checked and approved by :

Sylvain Mercier, M. Sc., chimiste 2014-005

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.4788 ± 0.0003 (20 °C)

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	%	Classe
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Methylcyclopentane	tr	Alkane
Isovaleral	tr	Aliphatic aldehyde
Prenol	0.01	Aliphatic alcohol
Unknown	0.01	Unknown
Unknown	0.02	Unknown
Isobutyl isobutyrate	0.03	Aliphatic ester
α -Thujene	0.01	Monoterpene
α -Pinene	0.14	Monoterpene
Camphene	0.01	Monoterpene
Sabinene	0.09	Monoterpene
Unknown	0.24*	Unknown
β -Pinene	[0.24]*	Monoterpene
Dehydro-1,8-cineole	0.01	Monoterpenic ether
6-Methyl-5-hepten-2-one	0.18	Aliphatic ketone
Myrcene	0.08	Monoterpene
6-Methyl-5-hepten-2-ol	0.02	Aliphatic alcohol
α -Phellandrene	0.02	Monoterpene
α -Terpinene	0.01	Monoterpene
para-Cymene	0.02	Monoterpene
Limonene	0.79	Monoterpene
1,8-Cineole	0.30	Monoterpenic ether
(Z)- β -Ocimene	0.05	Monoterpene
(E)- β -Ocimene	0.05	Monoterpene
Unknown	0.01	Unknown
2,6-Dimethyl-5-heptenal (melonal)	0.04	Aliphatic aldehyde
γ -Terpinene	0.05	Monoterpene
para-Cymenene	0.03	Monoterpene
Terpinolene	0.04	Monoterpene
Linalool	0.35	Monoterpenic alcohol
cis-Chrysanthemal?	0.02	Monoterpenic aldehyde
cis-Rose oxide	0.05	Monoterpenic ether
trans-Rose oxide	0.02	Monoterpenic ether
Unknown	0.03	Oxygenated normonoterpene
Isopulegol	1.45	Monoterpenic alcohol
exo-Isocitral	0.03	Monoterpenic aldehyde
iso-Isopulegol	0.78	Monoterpenic alcohol
Citronellal	18.27	Monoterpenic aldehyde
neoiso-Isopulegol	0.09	Monoterpenic alcohol
Isoneral	0.09	Monoterpenic aldehyde
Terpinen-4-ol	0.04	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Isopulegol isomer	0.04	Monoterpenic alcohol
Isogeranial	0.15	Monoterpenic aldehyde
Methyl salicylate	0.02	Phenolic ester
α -Terpineol	0.06	Monoterpenic alcohol
trans-Isopiperitenol	0.05	Monoterpenic alcohol

Unknown	0.03	Oxygenated monoterpene
Unknown	0.08	Oxygenated monoterpene
<i>cis</i> -Isopiperitenol	0.02	Monoterpenic alcohol
Nerol	0.04	Monoterpenic alcohol
Citronellol	4.21	Monoterpenic alcohol
Neral	24.96	Monoterpenic aldehyde
Piperitone	0.04	Monoterpenic ketone
Unknown	0.04	Unknown
Geraniol	1.47	Monoterpenic alcohol
Geranial	39.35	Monoterpenic aldehyde
Unknown	0.01	Oxygenated monoterpene
Geranyl formate	0.02	Monoterpenic ester
Citronellic acid	0.13	Monoterpenic acid
8-Hydroxymenthol?	0.22	Normonoterpenic alcohol
Unknown	0.07	Unknown
α -Terpinyl acetate	0.01	Monoterpenic ester
Unknown	0.12	Unknown
Citronellyl acetate	0.38	Monoterpenic ester
Unknown	0.04	Unknown
Neryl acetate	0.03	Monoterpenic ester
Geranic acid	0.08	Aliphatic acid
Geranyl acetate	0.15	Monoterpenic ester
β -Elemene	0.01	Sesquiterpene
(<i>Z</i>)-Jasmone	0.04	Jasmonate
Methyleugenol	0.02	Phenylpropanoid
β -Caryophyllene	1.08	Sesquiterpene
Aromadendrene	0.01	Sesquiterpene
α -Humulene	0.07	Sesquiterpene
δ -Cadinene	0.02	Sesquiterpene
Caryophyllene oxide isomer	0.05	Sesquiterpenic ether
Caryophyllene oxide	0.02	Sesquiterpenic ether
Unknown	0.02	Oxygenated diterpene
Unknown	0.02	Oxygenated diterpene
Unknown	0.33	Oxygenated diterpene
Unknown	0.04	Oxygenated diterpene
Unknown	0.11	Oxygenated diterpene
Unknown	0.06	Oxygenated diterpene
Unknown	0.12	Unknown
Unknown	0.05	Unknown
Unknown	0.13	Unknown
Unknown	0.12	Unknown
Unknown	0.42	Unknown
Consolidated total	98.10%	

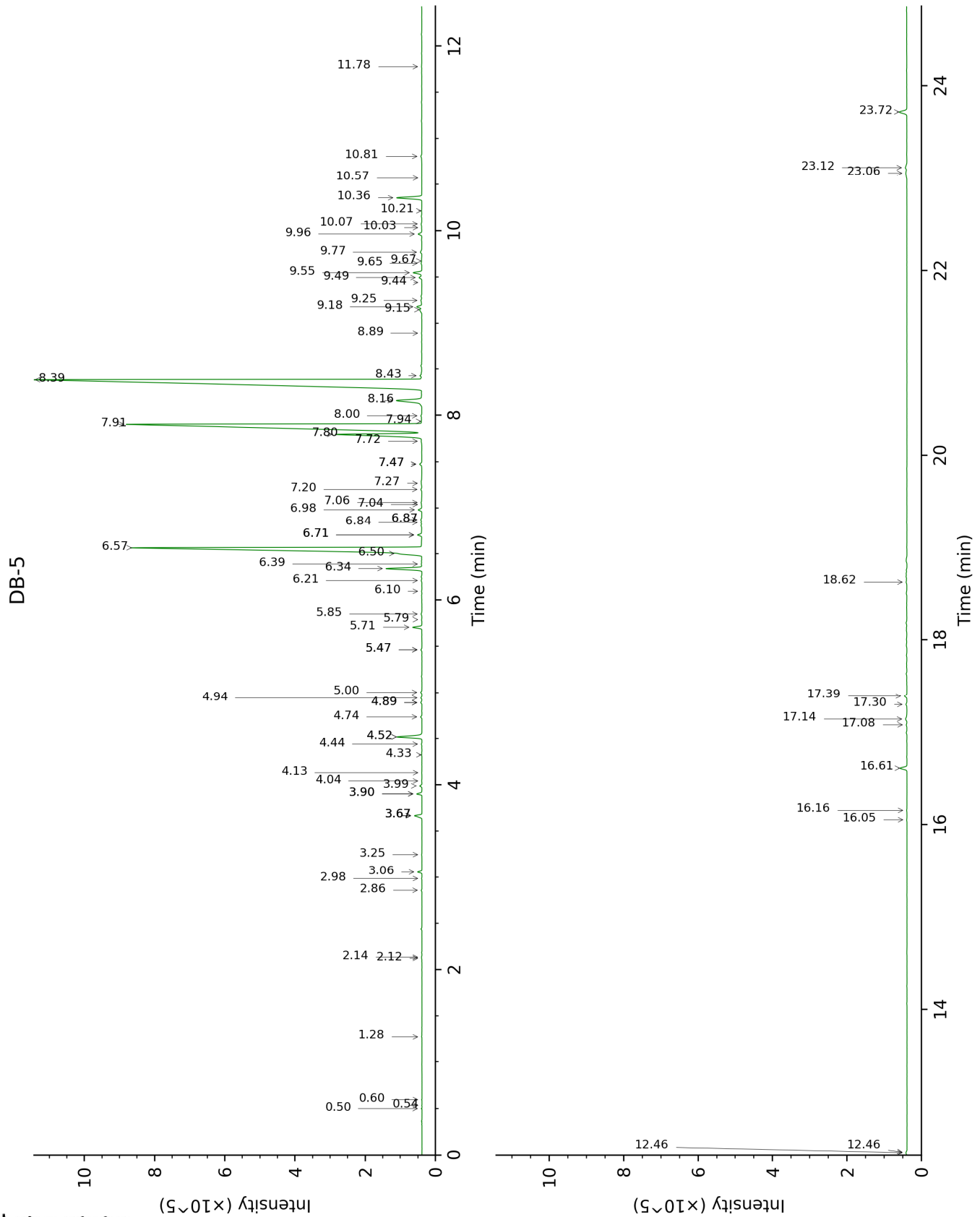
*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total
tr: The compound has been detected below 0.005% of total signal.

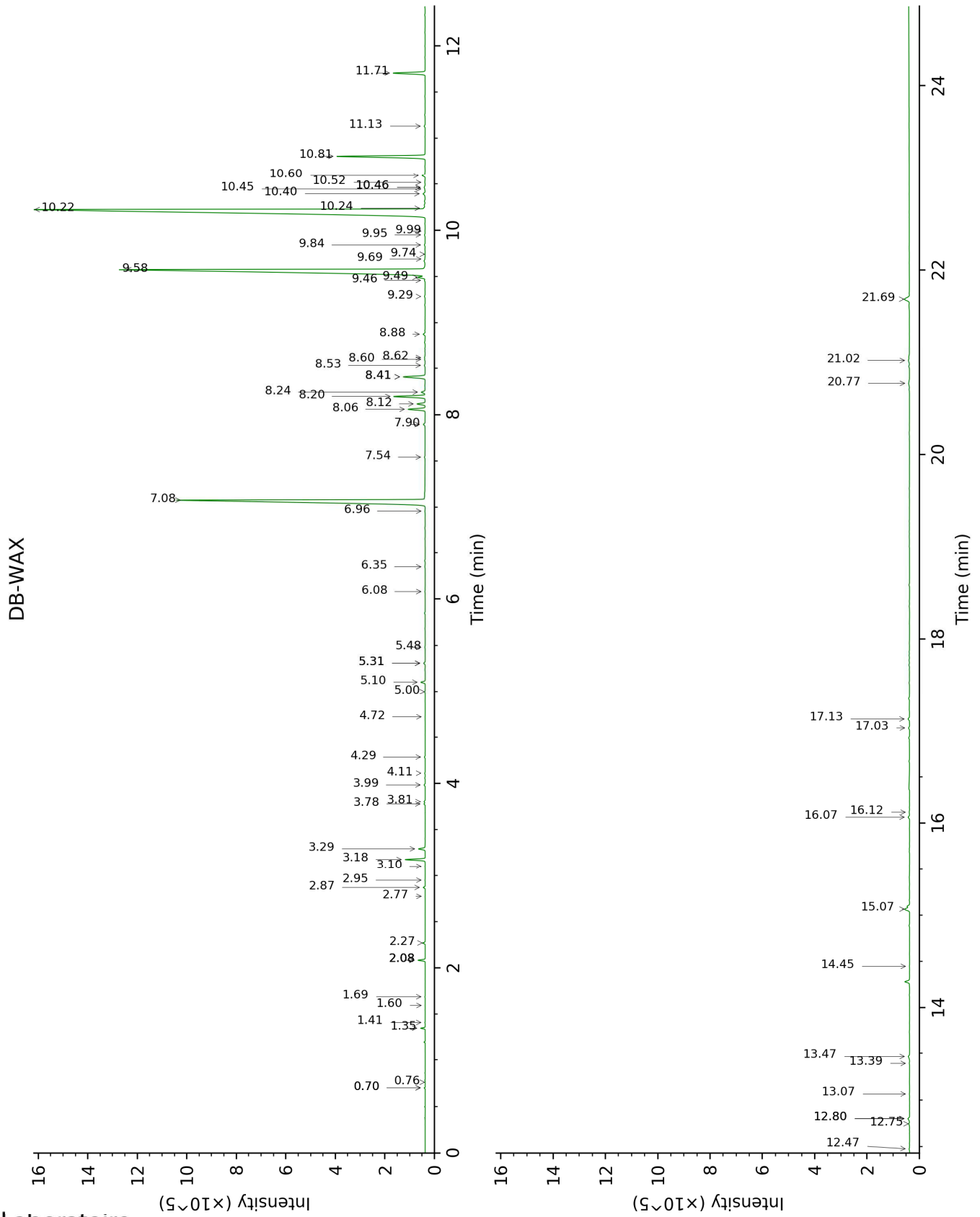
Note: no correction factor was applied

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	%
2-Methyl-3-buten-2-ol	0.50	592	0.01	1.60	1016	tr
Methylcyclopentane	0.54	617	tr			
Isovaleral	0.60	640	tr	0.76	888	tr
Prenol	1.28	778	0.01	5.00	1290	0.02
Unknown [m/z 55, 83 (89), 82 (70), 67 (66), 41 (55), 69 (46), 111 (37)... 126 (2)]	2.12	859	0.01	0.70*	866	0.02
Unknown [m/z 55, 83 (79), 67 (65), 41 (63), 82 (60), 69 (58)... 111 (27), 126 (9)]	2.14	860	0.02	0.70*	866	[0.02]
Isobutyl isobutyrate	2.86	917	0.03	2.08*	1064	0.25
α -Thujene	2.98	925	0.01	1.41	998	0.01
α -Pinene	3.06	930	0.14	1.35	989	0.13
Camphene	3.25	942	0.01	1.69	1026	0.01
Sabinene	3.67*	970	0.33	2.27	1083	0.09
Unknown [m/z 99, 81 (96), 43 (58), 55 (56), 41 (43)...]	3.67*	970	[0.33]	2.08*	1064	[0.25]
β -Pinene	3.67*	970	[0.33]	2.08*	1064	[0.25]
Dehydro-1,8-cineole	3.90*	985	0.19	3.10	1150	0.01
6-Methyl-5-hepten-2-one	3.90*	985	[0.19]	5.10	1299	0.18
Myrcene	3.99	991	0.08	2.87	1132	0.08
6-Methyl-5-hepten-2-ol	4.04	995	0.02	6.96	1432	0.02
α -Phellandrene	4.13	1000	0.02	2.78	1125	0.01
α -Terpinene	4.32	1013	0.01	2.95	1138	0.01
para-Cymene	4.44	1020	0.02	4.11	1226	0.03
Limonene	4.52*	1025	1.10	3.18	1156	0.79
1,8-Cineole	4.52*	1025	[1.10]	3.30	1165	0.30
(Z)- β -Ocimene	4.74	1038	0.05	3.80†	1204	[0.11]
(E)- β -Ocimene	4.89*	1048	0.05	3.99	1217	0.05
Unknown [m/z 125, 69 (75), 41 (34), 55 (25), 93 (22)... 140 (3)]	4.89*	1048	[0.05]	4.72	1270	0.01
2,6-Dimethyl-5-heptenal (melonal)	4.94	1052	0.04	5.31*	1314	0.07
γ -Terpinene	5.00	1056	0.05	3.78†	1202	0.11
para-Cymenene	5.47*	1085	0.04	6.35	1388	0.03
Terpinolene	5.47*	1085	[0.04]	4.29	1239	0.04
Linalool	5.71	1100	0.35	8.12	1518	0.35
cis-Chrysanthemal?	5.79	1105	0.02	6.08	1369	0.02
cis-Rose oxide	5.85	1109	0.05	5.31*	1314	[0.07]

<i>trans</i> -Rose oxide	6.10	1125	0.02	5.48	1326	0.02
Unknown [m/z 41, 69 (87), 82 (66), 67 (55), 109 (46)... 142 (18)]	6.21	1133	0.03	9.46	1622	0.03
Isopulegol	6.34	1141	1.45	8.20	1524	1.47
exo-Isocitral	6.39	1144	0.03	7.54	1475	0.03
iso-Isopulegol	6.50†	1152	19.30	8.06	1513	0.78
Citronellal	6.57†	1156	[19.30]	7.08	1441	18.27
neoiso-Isopulegol	6.70*	1165	0.19	8.88	1576	0.09
Isoneral	6.70*	1165	[0.19]	7.90	1501	0.09
Terpinen-4-ol	6.84	1174	0.04	8.62	1556	0.04
Unknown [m/z 84, 83 (74), 137 (56), 41 (47), 93 (43), 108 (40)... 152 (2)]	6.87*	1176	0.06	9.69	1640	0.02
Isopulegol isomer	6.87*	1176	[0.06]	8.53	1550	0.04
Isogeranial	6.98	1183	0.15	8.24	1528	0.19
Methyl salicylate	7.04	1187	0.02	10.52	1707	0.03
α-Terpineol	7.06	1188	0.06	9.84	1652	0.04
<i>trans</i> -Isopiperitenol	7.20	1197	0.05	10.46*	1702	0.06
Unknown [m/z 84, 41 (83), 83 (79), 91 (76), 93 (67), 119 (64), 137 (63), 109 (54), 108 (54)... 152 (4)]	7.27	1202	0.03			
Unknown [m/z 69, 55 (65), 43 (47), 41 (44), 83 (42), 75 (37), 125 (36)... 154 (1)]	7.48*	1216	0.10			
<i>cis</i> -Isopiperitenol	7.48*	1216	[0.10]	10.45	1701	0.02
Nerol	7.72	1233	0.04	11.13	1759	0.05
Citronellol	7.80	1238	4.21	10.81	1731	4.34
Neral	7.90†	1245	24.93	9.58	1631	24.96
Piperitone	7.94†	1247	[24.93]	9.95	1661	0.04
Unknown [m/z 59, 41 (68), 43 (53), 97 (44), 69 (35)...]	8.00	1252	0.04	10.40	1697	0.13
Geraniol	8.16	1263	1.47	11.71	1808	1.49
Geranial	8.39†	1278	39.37	10.22	1683	39.35
Unknown [m/z 43, 69 (77), 41 (70), 109 (54)... 152 (6)]	8.43†	1281	[39.37]	13.07	1928	0.01
Geranyl formate	8.90	1308	0.02	9.99	1664	0.01
Citronellic acid	9.15	1326	0.13	16.07	2219	0.07
8-Hydroxymenthol?	9.18	1329	0.22			
Unknown [m/z 82, 59 (44), 41 (43), 95 (31), 43 (29), 81 (24)...]	9.25	1333	0.07	12.80*	1904	0.10
α-Terpinyl acetate	9.44	1347	0.01	9.74	1644	0.01

Unknown [m/z 110, 95 (98), 109 (40), 43 (35), 111 (32)... 153 (13)...]	9.50	1351	0.12	13.47	1965	0.08
Citronellyl acetate	9.55	1355	0.38	9.49	1624	0.34
Unknown [m/z 81, 59 (99), 41 (82), 85 (79), 43 (74), 71 (60)...]	9.65	1362	0.04			
Neryl acetate	9.67	1364	0.03	10.24	1684	0.05
Geranic acid	9.77	1370	0.08	17.13	2331	0.08
Geranyl acetate	9.96	1384	0.15	10.60	1714	0.15
β-Elemene	10.03	1389	0.01	8.41*	1540	1.10
(Z)-Jasmone	10.07	1392	0.04	12.48	1875	0.03
Methyleugenol	10.21	1402	0.02	13.39	1958	0.01
β-Caryophyllene	10.36	1412	1.08	8.41*	1540	[1.10]
Aromadendrene	10.57	1429	0.01	8.60	1554	0.02
α-Humulene	10.81	1446	0.07	9.29	1608	0.04
δ-Cadinene	11.78	1520	0.02	10.46*	1702	[0.06]
Caryophyllene oxide isomer	12.46*	1573	0.07	12.75	1899	0.05
Caryophyllene oxide	12.46*	1573	[0.07]	12.80*	1904	[0.10]
Unknown [m/z 81, 69 (87), 93 (74), 121 (71), 41 (70), 205 (47)... 290 (18)]	16.05	1881	0.02			
Unknown [m/z 81, 93 (70), 121 (64), 69 (64), 41 (56), 205 (50)... 290 (19)]	16.16	1890	0.02	14.45	2058	0.01
Unknown [m/z 81, 137 (85), 95 (48), 69 (44)... 308? (t)]	16.61	1933	0.33	15.07	2118	0.32
Unknown [m/z 81, 137 (60), 69 (47), 95 (41), 41 (39), 55 (25)... 308? (t)]	17.08	1978	0.04	16.12	2225	0.02
Unknown [m/z 81, 137 (94), 95 (46), 69 (38), 41 (36)...]	17.14	1984	0.11			
Unknown [m/z 41, 69 (98), 55 (55), 81 (46), 109 (46)... 290 (8)]	17.30	1999	0.06	17.03	2320	0.05
Unknown [m/z 81, 137 (99), 69 (73), 95 (63), 41 (35), 55 (26)...]	17.39	2007	0.12			
Unknown [m/z 69, 41 (38), 151 (36), 123 (34), 82 (24), 43	18.62	2131	0.05			

(23), 109 (21)...						
Unknown [m/z 81, 69 (83), 137 (61), 95 (50), 83 (45)...	23.06	2630	0.13	20.77	2753	0.09
Unknown [m/z 81, 69 (67), 137 (56), 95 (40), 83 (38)...	23.12	2637	0.12	21.02	2784	0.08
Unknown [m/z 69, 83 (59), 81 (56), 137 (48), 41 (29), 139 (28)...	23.72	2712	0.42	21.69	2870	0.41
Total identified	96.47%			96.11%		
Total reported	98.26%			97.37%		

*: 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