CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22G08-PTH06
Customer identification : Lemon Eucalyptus ORGANIC - Madagascar - E10112R
Type : Essential oil
Source : *Corymbia citriodora*
Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-014 ✳ISO - 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 : July 12, 2022

Checked and approved by :

_____

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

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MÉTHODE CERTIFIÉE
✳ISO 17025:2017
CERTIFIED METHOD

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4540 ± 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
3-Methylcyclopentene	0.02	Alkene
3-Methylcyclopentane	0.01	Alkane
Isovaleral	0.03	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
2,4-Dimethyl-3-pentanone	0.01	Aliphatic ketone
3-Methylcyclopentanol	0.01	Aliphatic alcohol
Unknown	0.01	Unknown
Unknown	0.02	Unknown
Styrene	0.01	Simple phenolic
Isobutyl isobutyrate	0.04	Aliphatic ester
α-Thujene	0.03	Monoterpene
α-Pinene	0.16	Monoterpene
Unknown	0.01	Unknown
β-Pinene	0.51	Monoterpene
Sabinene	0.04	Monoterpene
Myrcene	0.12	Monoterpene
α-Phellandrene	0.02	Monoterpene
α-Terpinene	0.02	Monoterpene
Isoamyl isobutyrate	0.02	Aliphatic ester
2-Methylbutyl isobutyrate	0.02	Aliphatic ester
para-Cymene	0.03	Monoterpene
Unknown	0.01	Unknown
β-Phellandrene	0.01	Monoterpene
1,8-Cineole	0.14	Monoterpenic ether
Unknown	0.06	Unknown
Limonene	0.08	Monoterpene
(*Z*)-β-Ocimene	0.13	Monoterpene
Unknown	0.03	Unknown
(*E*)-β-Ocimene	0.02	Monoterpene
2,6-Dimethyl-5-heptenal (melonal)	0.14	Aliphatic aldehyde
γ-Terpinene	0.15	Monoterpene
para-Mentha-3,8-diene	0.19	Monoterpene
Terpinolene isomer	0.04	Monoterpene
Terpinolene	0.20	Monoterpene
para-Cymenene	0.03	Monoterpene
α-Pinene oxide	0.01	Monoterpenic ether
Unknown	0.01	Oxygenated monoterpene
Linalool	0.06	Monoterpenic alcohol
cis-Rose oxide	0.08	Monoterpenic ether
Phenylethyl alcohol	0.02	Simple phenolic
trans-Rose oxide	0.03	Monoterpenic ether
Unknown	0.09	Oxygenated normonoterpene
Isopulegol	7.44	Monoterpenic alcohol
para-Menth-3-en-8-ol	0.10	Monoterpenic alcohol
Menthone	0.11	Monoterpenic ketone

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Citronellal	71.58	Monoterpenic aldehyde
iso-Isopulegol	3.82	Monoterpenic alcohol
neoiso-Isopulegol	0.54	Monoterpenic alcohol
Isopulegol isomer	0.15	Monoterpenic alcohol
Terpinen-4-ol	0.04	Monoterpenic alcohol
α-Terpineol	0.04	Monoterpenic alcohol
Nerol	0.05	Monoterpenic alcohol
Citronellol	5.03	Monoterpenic alcohol
Pulegone	0.01	Monoterpenic ketone
Neral	0.34	Monoterpenic aldehyde
Unknown	tr	Unknown
Geraniol	0.13	Monoterpenic alcohol
Methyl citronellate	0.01	Monoterpenic ester
Isopulegyl acetate	tr	Monoterpenic ester
Geranial	0.04	Monoterpenic aldehyde
Citronellyl formate	0.01	Monoterpenic ester
Benzyl isobutyrate	0.04	Phenolic ester
Citronellic acid	0.27	Monoterpenic acid
8-Hydroxy-neo-menthol	0.89	Monoterpenic alcohol
8-Hydroxymenthol	0.03	Monoterpenic alcohol
Citronellyl acetate	0.45	Monoterpenic ester
Eugenol	0.14	Phenylpropanoid
8-Hydroxy-iso-menthol	0.02	Monoterpenic alcohol
Neryl acetate	0.04	Monoterpenic ester
Geranyl acetate	0.06	Monoterpenic ester
β-Elemene	0.03	Sesquiterpene
Benzyl isovalerate	0.06	Phenolic ester
(Z)-Jasmone	0.04	Jasmonate
Methyleugenol	0.02	Phenylpropanoid
β-Caryophyllene	1.45	Sesquiterpene
α-Humulene	0.08	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
Germacrene D	0.07	Sesquiterpene
Isoamyl phenylacetate	0.02	Phenolic ester
Bicyclogermacrene	0.08	Sesquiterpene
Germacrene A	0.01	Sesquiterpene
γ-Cadinene	0.01	Sesquiterpene
Geranyl isobutyrate	0.01	Monoterpenic ester
δ-Cadinene	0.02	Sesquiterpene
Germacrene B	0.02	Sesquiterpene
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.05	Sesquiterpenic ether
Unknown	0.04	Oxygenated diterpene
Unknown	0.04	Oxygenated diterpene
Unknown	0.03	Oxygenated diterpene
Unknown	0.65	Oxygenated diterpene
Unknown	0.03	Oxygenated diterpene
Unknown	0.03	Oxygenated diterpene
Unknown	0.04	Oxygenated diterpene
Unknown	0.05	Oxygenated diterpene
Unknown	0.05	Oxygenated diterpene
Unknown	0.14	Oxygenated diterpene

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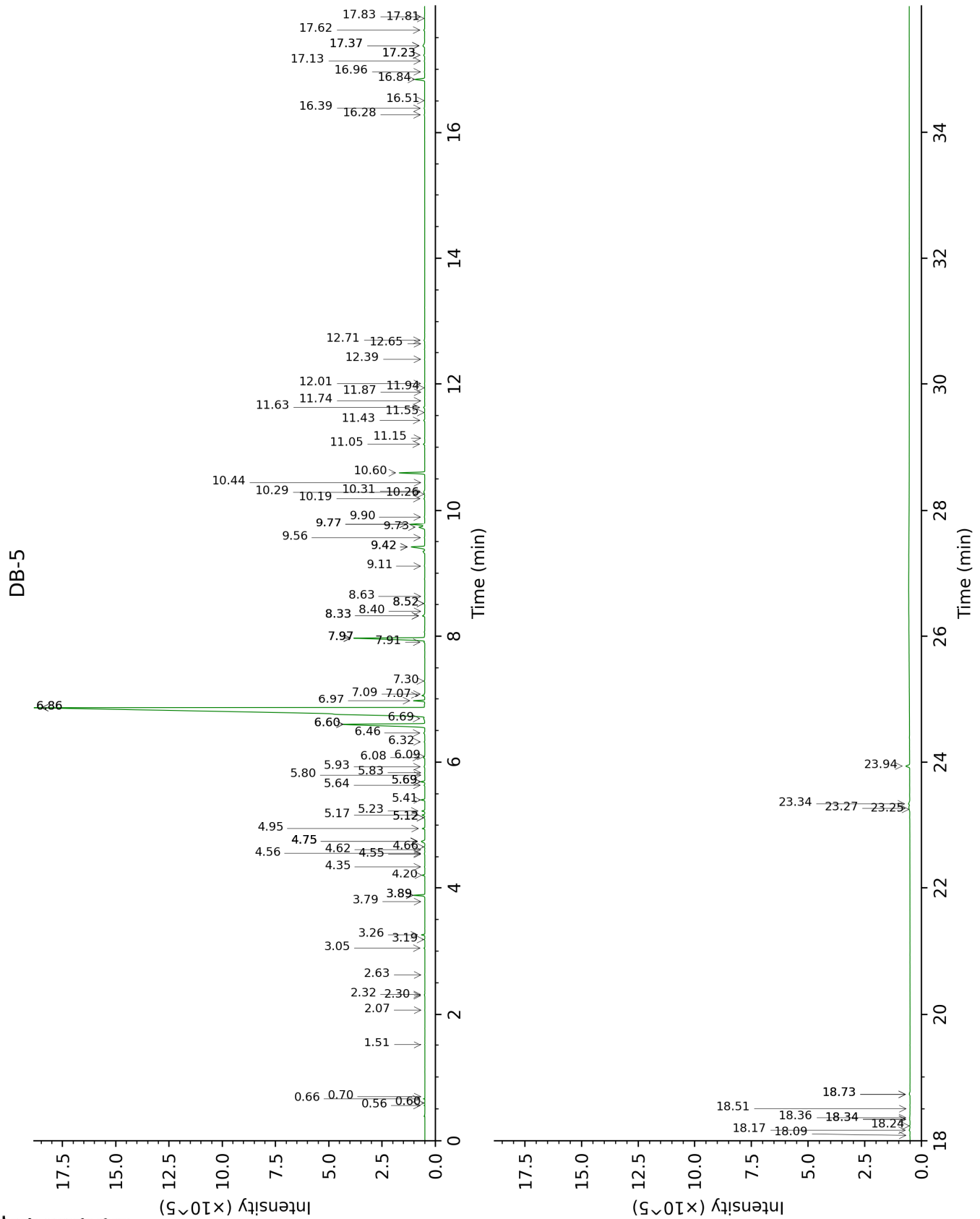|		
Unknown	0.07	Oxygenated diterpene
Unknown	0.02	Unknown
Unknown	0.01	Unknown
Unknown	0.02	Oxygenated diterpene
Unknown	0.06	Oxygenated diterpene
Unknown	0.03	Unknown
Unknown	0.02	Unknown
Unknown	0.02	Unknown
Unknown	0.04	Unknown
Unknown	0.01	Oxygenated diterpene
Unknown	0.01	Unknown
Unknown	0.03	Oxygenated diterpene
Unknown	0.04	Unknown
Unknown	0.03	Unknown
Unknown	0.13	Unknown
Unknown	0.30	Unknown
Consolidated total	**97.96%**	

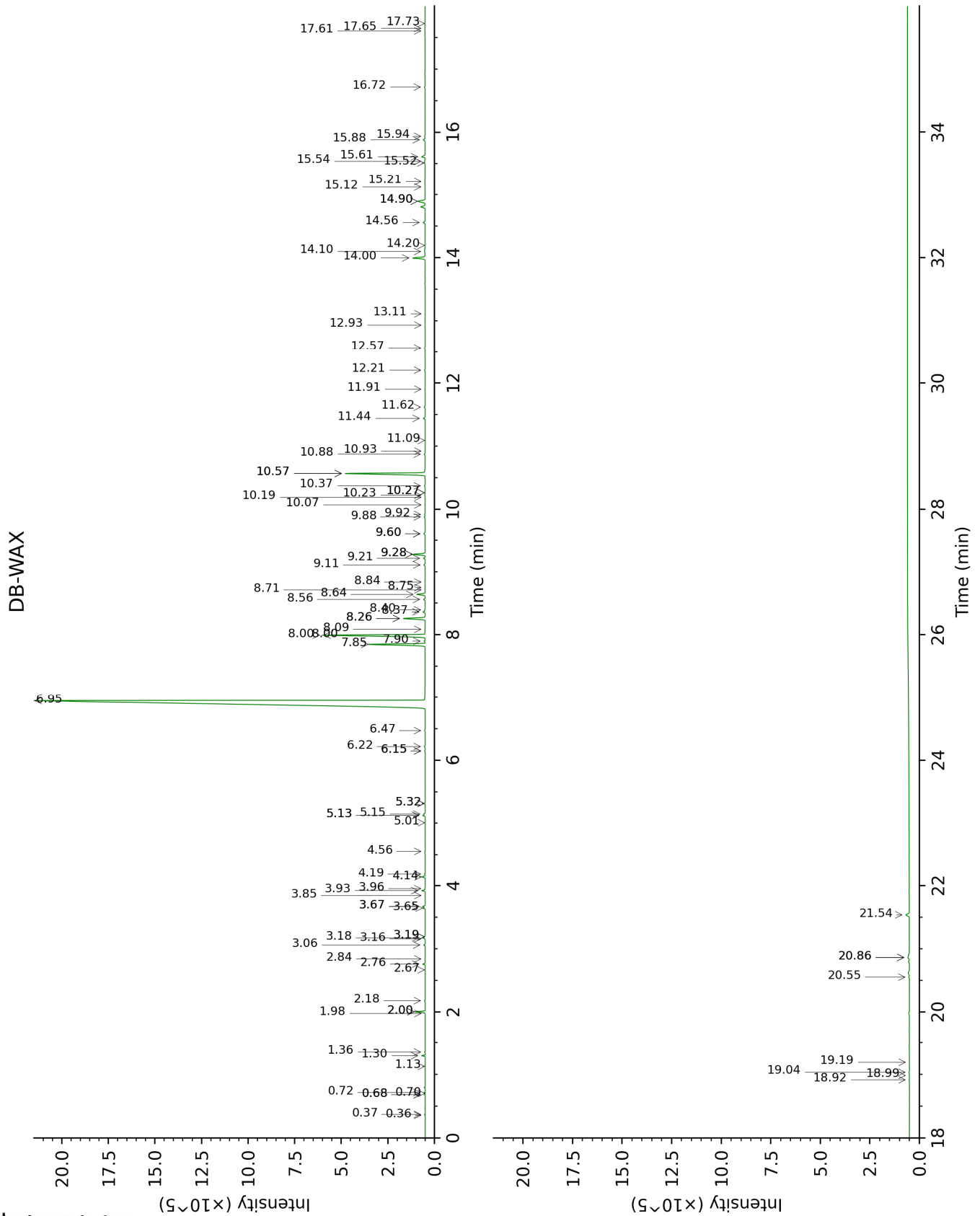tr: The compound has been detected below 0.005% of total signal.

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.

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

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DB-5

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DB-WAX

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
3-Methylcyclopentene	0.56	609	0.02	0.37	666	0.01
3-Methylcyclopentane	0.60	622	0.01	0.36	636	0.01
Isovaleral	0.66	643	0.03	0.72	883	0.03
2-Methylbutyral	0.70	653	tr	0.70	877	tr
2,4-Dimethyl-3-pentanone	1.52	792	0.01	1.13	961	0.01
3-Methylcyclopentanol	2.07	841	0.01	5.01	1303	0.01
Unknown [m/z 55, 83 (89), 82 (70), 67 (66), 41 (55), 69 (46), 111 (37)... 126 (2)]	2.30	859	0.01	0.68*	870	0.03
Unknown [m/z 55, 83 (79), 67 (65), 41 (63), 82 (60), 69 (58)... 111 (27), 126 (9)]	2.32	861	0.02	0.68*	870	[0.03]
Styrene	2.63	886	0.01	3.67*	1204	0.15
Isobutyl isobutyrate	3.05	917	0.04	2.00*	1064	0.55
α-Thujene	3.19	926	0.03	1.36	999	0.03
α-Pinene	3.26	931	0.16	1.30	989	0.15
Unknown [m/z 99, 81 (98), 55 (51), 43 (42), 41 (34)... 109? (2)]	3.78	965	0.01	1.98	1061	0.01
β-Pinene	3.89*	972	0.55	2.00*	1064	[0.55]
Sabinene	3.89*	972	[0.55]	2.18	1082	0.04
Myrcene	4.20	993	0.12	2.76	1132	0.13
α-Phellandrene	4.35	1002	0.02	2.67	1124	0.02
α-Terpinene	4.55	1015	0.02	2.84	1138	0.02
Isoamyl isobutyrate	4.56	1015	0.02	3.19*	1166	0.03
2-Methylbutyl isobutyrate	4.62	1019	0.02	3.19*	1166	[0.03]
para-Cymene	4.66	1022	0.03	3.96	1225	0.03
Unknown [m/z 59, 43 (11), 109 (10), 41 (10), 127 (8)...]	4.75*	1027	0.31	6.15*	1382	0.04
β-Phellandrene	4.75*	1027	[0.31]	3.16	1163	0.01
1,8-Cineole	4.75*	1027	[0.31]	3.18	1164	0.14
Unknown [m/z 59, 43 (12), 109 (11), 41 (10), 127 (8)...]	4.75*	1027	[0.31]	6.22	1388	0.06
Limonene	4.75*	1027	[0.31]	3.06	1156	0.08
(*Z*)-β-Ocimene	4.95	1040	0.13	3.65	1202	0.13
Unknown [m/z 125, 69 (75), 41 (34), 55 (25), 93 (22)... 140 (3)]	5.12*	1051	0.04	4.56	1269	0.03

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Compound						
(E)-β-Ocimene	5.12*	1051	[0.04]	3.85	1217	0.02
2,6-Dimethyl-5-heptenal (melonal)	5.16	1054	0.14	5.13*	1308	0.15
γ-Terpinene	5.23	1058	0.15	3.67*	1204	[0.15]
para-Mentha-3,8-diene	5.40	1069	0.19	3.93	1222	0.19
Terpinolene isomer	5.64	1083	0.04	4.19	1242	0.04
Terpinolene	5.69*	1087	0.20	4.14	1238	0.20
para-Cymenene	5.69*	1087	[0.20]	6.15*	1382	[0.04]
α-Pinene oxide	5.80	1093	0.01	5.32*	1322	0.03
Unknown [m/z 67, 82 (79), 81 (34), 41 (32), 55 (16)... 152 (5)]	5.83	1096	0.01	5.13*	1308	[0.15]
Linalool	5.93	1102	0.06	7.90	1513	0.08
cis-Rose oxide	6.08	1111	0.08	5.15	1310	0.07
Phenylethyl alcohol	6.09	1112	0.02	11.91	1844	0.02
trans-Rose oxide	6.32	1127	0.03	5.32*	1322	[0.03]
Unknown [m/z 41, 69 (87), 82 (66), 67 (55), 109 (46)... 142 (18)]	6.46	1136	0.09	9.22	1616	0.10
Isopulegol	6.60*	1145	7.55	8.00*	1521	7.56
para-Menth-3-en-8-ol	6.60*	1145	[7.55]	8.56	1565	0.10
Menthone	6.69	1151	0.11	6.47	1406	0.05
Citronellal	6.86*†	1162	75.97	6.95	1442	71.58
iso-Isopulegol	6.86*†	1162	[75.97]	7.85	1509	3.82
neoiso-Isopulegol	6.97	1169	0.54	8.64	1571	0.53
Isopulegol isomer	7.07	1175	0.15	8.36	1550	0.14
Terpinen-4-ol	7.09	1177	0.04	8.40	1552	0.04
α-Terpineol	7.30	1190	0.04	9.60*	1648	0.10
Nerol	7.91	1231	0.05	10.88	1754	0.06
Citronellol	7.97*	1235	5.38	10.57*	1728	5.50
Pulegone	7.97*	1235	[5.38]	8.75	1580	0.01
Neral	7.97*	1235	[5.38]	9.28*	1622	0.79
Unknown [m/z 59, 41 (62), 43 (51), 97 (42), 69 (37)...]	8.33*	1259	0.17	10.26*	1702	0.02
Geraniol	8.33*	1259	[0.17]	11.44	1803	0.13
Methyl citronellate	8.40	1264	0.01	8.09	1528	0.03
Isopulegyl acetate	8.52*	1273	0.04	8.00*	1521	[7.56]
Geranial	8.52*	1273	[0.04]	9.92	1674	0.04
Citronellyl formate	8.63	1280	0.01	8.71	1577	0.02
Benzyl isobutyrate	9.11	1309	0.04	10.57*	1728	[5.50]
Citronellic acid	9.42*	1330	1.01	15.61	2197	0.27
8-Hydroxy-neo-menthol	9.42*	1330	[1.01]	14.00	2037	0.89
8-Hydroxymenthol	9.56	1341	0.03			
Citronellyl acetate	9.73	1352	0.45	9.28*	1622	[0.79]
Eugenol	9.77*	1356	0.79	14.56	2091	0.14
8-Hydroxy-iso-menthol	9.77*	1356	[0.79]	14.90*	2125	0.68

Neryl acetate	9.90	1364	0.04	10.07	1686	0.02
Geranyl acetate	10.19	1385	0.06	10.37	1712	0.05
β-Elemene	10.26	1390	0.03	8.26*	1541	1.50
Benzyl isovalerate	10.29	1392	0.06	11.62	1819	0.06
(*Z*)-Jasmone	10.31	1393	0.04	12.21	1871	0.04
Methyleugenol	10.44	1403	0.02	13.11	1954	0.01
β-Caryophyllene	10.60	1414	1.45	8.26*	1541	[1.50]
α-Humulene	11.05	1448	0.08	9.11	1608	0.08
allo-Aromadendrene	11.15	1455	0.01	8.84	1586	0.01
Germacrene D	11.43	1476	0.07	9.60*	1648	[0.10]
Isoamyl phenylacetate	11.55	1485	0.02	12.93	1937	0.01
Bicyclogermacrene	11.63	1492	0.08	9.88	1671	0.06
Germacrene A	11.74	1499	0.01	10.19	1696	0.01
γ-Cadinene	11.87	1510	0.01	10.23	1699	0.04
Geranyl isobutyrate	11.94	1515	0.01	11.09	1773	0.01
δ-Cadinene	12.01	1520	0.02	10.26*	1702	[0.02]
Germacrene B	12.39	1551	0.02	10.92	1758	0.02
Spathulenol	12.65	1571	0.01	14.20	2056	0.02
Caryophyllene oxide	12.71	1575	0.05	12.57	1903	0.04
Unknown [m/z 69, 41 (48), 81 (36), 121 (34), 83 (32), 55 (30)... 290 (t)]	16.28	1881	0.04			
Unknown [m/z 81, 93 (70), 121 (64), 69 (64), 41 (56), 205 (50)... 290 (19)]	16.38	1891	0.04	14.10	2047	0.06
Unknown [m/z 165, 205 (96), 69 (72), 41 (61), 81 (49)... 290 (6)]	16.51	1902	0.03			
Unknown [m/z 81, 137 (85), 95 (48), 69 (44)... 308? (t)]	16.84	1934	0.65	14.90*	2125	[0.68]
Unknown [m/z 137, 81 (81), 95 (41), 183 (38)...]	16.96	1945	0.03	15.21	2157	0.02
Unknown [m/z 69, 81 (53), 41 (51), 137 (39), 121 (33)...]	17.13	1961	0.03	15.12	2148	0.02
Unknown [m/z 81, 93 (59), 205 (55), 121 (50), 41 (43)... 290 (8)]	17.23*	1970	0.08	15.52	2187	0.04
Unknown [m/z 81, 205 (66), 69 (58), 41 (56), 93 (56), 121 (47)... 290 (9)]	17.23*	1970	[0.08]	15.54	2190	0.05
Unknown [m/z 81, 137 (94), 95 (46), 69 (38), 41 (36)...]	17.37*	1984	0.23	15.94	2231	0.05
Unknown [m/z 81, 137 (60), 69 (47), 95	17.37*	1984	[0.23]	15.88	2225	0.14

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Compound						
(41), 41 (39), 55 (25)... 308? (t)]						
Unknown [m/z 41, 69 (98), 55 (55), 81 (46), 109 (46)... 290 (8)]	17.62	2008	0.07	16.72	2313	0.05
Unknown [m/z 69, 41 (95), 55 (57), 109 (46), 95 (45), 67 (34)...]	17.81	2026	0.02			
Unknown [m/z 69, 41 (96), 55 (53), 109 (48), 95 (43), 67 (35)...]	17.83	2029	0.01			
Unknown [m/z 69, 81 (88), 43 (85), 95 (60)... 308 (t)]	18.09	2054	0.02	18.99	2567	0.02
Unknown [m/z 81, 95 (49), 69 (48), 137 (47), 43 (36)... 308 (1)]	18.17	2062	0.06			
Unknown [m/z 81, 137 (48), 95 (39), 69 (34), 41 (26)...]	18.24	2069	0.03	17.65	2414	0.02
Unknown [m/z 69, 81 (56), 83 (52), 41 (39), 95 (42), 55 (27)...]	18.34*	2079	0.03	17.61	2410	0.02
Unknown [m/z 69, 81 (63), 83 (56), 41 (39), 95 (31)...]	18.34*	2079	[0.03]	17.72	2423	0.02
Unknown [m/z 81, 137 (55), 69 (50), 95 (41), 41 (40), 59 (31)... 306? (t)]	18.36	2082	0.04			
Unknown [m/z 223, 69 (83), 43 (82), 81 (62), 139 (54), 41 (51)... 293 (7), 308 (t)]	18.51	2096	0.01	18.92	2559	0.02
Unknown [m/z 69, 81 (71), 41 (47), 83 (44), 95 (43), 43 (41)... 293 (2)...]	18.73*	2119	0.08	19.19	2591	0.01
Unknown [m/z 81, 43 (94), 69 (68), 95 (55), 41 (55), 55 (46)... 293 (8), 308 (1)]	18.73*	2119	[0.08]	19.04	2573	0.03
Unknown [m/z 81, 69 (83), 137 (61), 95 (50), 83 (45)...]	23.26	2629	0.04	20.55	2756	0.04
Unknown [m/z 81, 69 (70), 137 (56), 95 (43), 83 (36)...]	23.27	2631	0.03	20.86*	2794	0.16

Unknown [m/z 81, 69 (67), 137 (56), 95 (40), 83 (38)...]	23.34	2640	0.13	20.86*	2794	[0.16]
Unknown [m/z 69, 83 (59), 81 (56), 137 (48), 41 (29), 139 (28)...]	23.94	2716	0.30	21.54	2881	0.34
Total identified		**97.36%**			**97.10%**	
Total reported		**99.08%**			**98.25%**	

*: 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

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