

Date : January 27, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22A20-PTH01

Customer identification : Lavender Fine - Spain - LK0104221R

Type : Essential oil

Source : *Lavandula angustifolia*

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 : January 24, 2022

Checked and approved by :

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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: 1.4614 ± 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-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Isovaleral	tr	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
Toluene	tr	Simple phenolic
Butyl acetate	0.01	Aliphatic ester
Methyl hexyl ether	0.05	Aliphatic ether
(3Z)-Hexenol	0.03	Aliphatic alcohol
Hexanol	0.06	Aliphatic alcohol
Tricyclene	0.01	Monoterpene
α -Thujene	0.07	Monoterpene
α -Pinene	0.14	Monoterpene
Camphene	0.09	Monoterpene
Butyl isobutyrate	tr	Aliphatic ester
Sabinene	0.01	Monoterpene
β -Pinene	0.04	Monoterpene
Octen-3-ol	0.24	Aliphatic alcohol
Octan-3-one	0.76	Aliphatic ketone
Dehydro-1,8-cineole	0.01	Monoterpenic ether
Myrcene	0.36	Monoterpene
Butyl butyrate	0.07	Aliphatic ester
α -Phellandrene	0.02	Monoterpene
Octan-3-ol	0.12	Aliphatic alcohol
<i>cis</i> -Dehydroxylinalool oxide	0.01	Monoterpenic ether
Δ^3 -Carene	0.06	Monoterpene
α -Terpinene	0.03	Monoterpene
Hexyl acetate	0.22	Aliphatic ester
meta-Cymene	0.03	Monoterpene
para-Cymene	0.10	Monoterpene
Limonene	0.46	Monoterpene
1,8-Cineole	0.82	Monoterpenic ether
(Z)- β -Ocimene	3.91	Monoterpene
(E)- β -Ocimene	3.98	Monoterpene
γ -Terpinene	0.13	Monoterpene
<i>cis</i> -Sabinene hydrate	0.06	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.09	Monoterpenic alcohol
<i>trans</i> -Linalool oxide (fur.)	0.13	Monoterpenic alcohol
Terpinolene	0.09	Monoterpene
Rosefuran	0.02	Monoterpenic ether
Linalool	31.95	Monoterpenic alcohol
(Z)-6-Methyl-3,5-heptadien-2-one	0.03	Aliphatic ketone
Octen-3-yl acetate	0.58	Aliphatic ester
Unknown	0.03	Unknown
α -Campholenal	0.01	Monoterpenic aldehyde
allo-Ocimene	0.14	Monoterpene
Octan-3-yl acetate	0.06	Aliphatic ester

(Z)-Myroxide	0.02	Monoterpenic ether
Camphor	0.42	Monoterpenic ketone
(E)-Myroxide	0.01	Monoterpenic ether
Unknown	0.03	Oxygenated monoterpene
Hexyl isobutyrate	0.06	Aliphatic ester
Borneol	0.70	Monoterpenic alcohol
Lavandulol	0.65	Monoterpenic alcohol
Terpinen-4-ol	4.84	Monoterpenic alcohol
(3E,5Z)-Undeca-1,3,5-triene	0.03	Alkene
Cryptone	0.05	Normonoterpenic ketone
meta-Cymen-8-ol	0.05	Monoterpenic alcohol
para-Cymen-8-ol	0.05	Monoterpenic alcohol
α -Terpineol	0.93	Monoterpenic alcohol
Hexyl butyrate	0.25	Aliphatic ester
Verbenone	0.01	Monoterpenic ketone
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.02	Monoterpenic alcohol
Octyl acetate	0.04	Aliphatic ester
Bornyl formate	0.03	Monoterpenic ester
Nerol	0.14	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.06	Aliphatic ester
Carvone	0.04	Monoterpenic ketone
Neral	0.04	Monoterpenic aldehyde
Hexyl isovalerate	0.10	Aliphatic ester
Geraniol	0.32	Monoterpenic alcohol
Linalyl acetate	35.51	Monoterpenic ester
(trans?)-Linalool oxide acetate (fur.)?	0.03	Monoterpenic ester
Geranial	0.04	Monoterpenic aldehyde
Bornyl acetate	0.10	Monoterpenic ester
Lavandulyl acetate	2.60	Monoterpenic ester
Hexyl tiglate	0.05	Aliphatic ester
Hodiendiol derivative	0.03	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Neryl acetate	0.32	Monoterpenic ester
β -Bourbonene	0.03	Sesquiterpene
Geranyl acetate	0.55	Monoterpenic ester
Hexyl hexanoate	0.04	Aliphatic ester
7-epi-Sesquithujene	0.05	Sesquiterpene
Isocaryophyllene	0.01	Sesquiterpene
cis- α -Bergamotene	0.05	Sesquiterpene
β -Caryophyllene	2.85	Sesquiterpene
α -Santalene	0.26	Sesquiterpene
Lavandulyl isobutyrate	0.01	Monoterpenic ester
trans- α -Bergamotene	0.12	Sesquiterpene
cis- β -Bergamotene?	tr	Sesquiterpene
Sesquisabinene A	0.11	Sesquiterpene
α -Humulene	0.09	Sesquiterpene
Lavandulyl butyrate?	0.09	Monoterpenic ester
β -Santalene	tr	Sesquiterpene
(E)- β -Farnesene	1.54	Sesquiterpene
Dauca-5,8-diene?	0.03	Sesquiterpene
Germacrene D	0.34	Sesquiterpene

<i>trans</i> -β-Bergamotene	0.04	Sesquiterpene
β-Bisabolene	0.07	Sesquiterpene
γ-Cadinene	0.13	Sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Isocaryophyllene epoxide B	0.01	Sesquiterpenic ether
(<i>E</i>)-Nerolidol	0.03	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.14	Sesquiterpenic ether
τ-Cadinol	0.02	Sesquiterpenic alcohol
Consolidated total	99.31%	

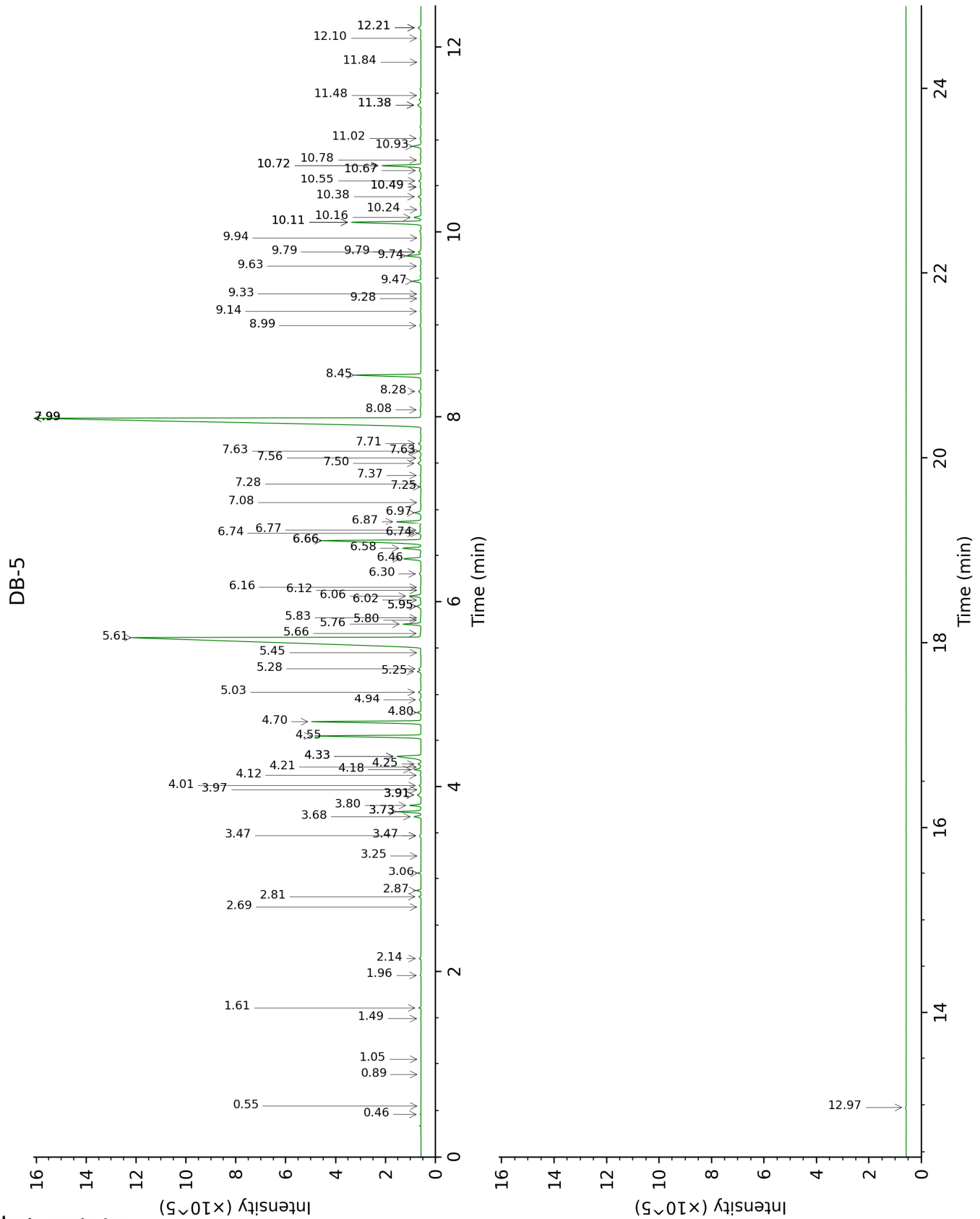
tr: The compound has been detected below 0.005% of total signal.

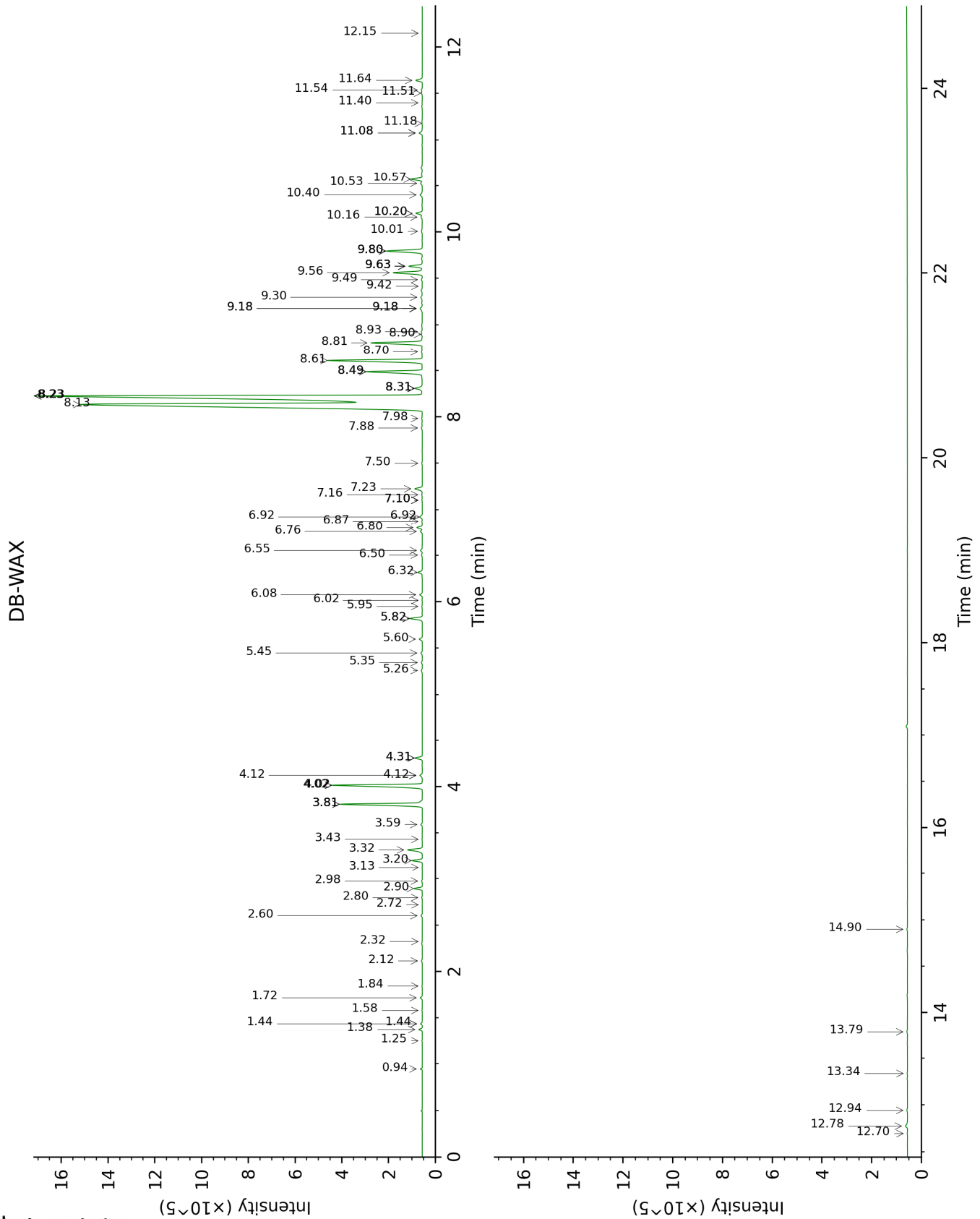
Note: no correction factor was applied

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	0.46	605	0.01	1.58	1013	0.02
Isovaleral	0.55	640	tr			
Isoamyl alcohol	0.89	732	tr	3.43	1176	0.02
Toluene	1.05	757	tr	1.44*	999	0.07
Butyl acetate	1.49	817	0.01	1.84	1039	0.01
Methyl hexyl ether	1.61	827	0.05	0.94	921	0.05
(3Z)-Hexenol	1.96	857	0.03	5.82*	1349	0.61
Hexanol	2.14	873	0.06	5.45	1322	0.07
Tricyclene	2.70	918	0.01	1.25	971	0.01
α -Thujene	2.81	925	0.07	1.44*	999	[0.07]
α -Pinene	2.87	930	0.14	1.38	991	0.14
Camphene	3.06	943	0.09	1.72	1026	0.09
Butyl isobutyrate	3.25	956	tr	2.72	1120	tr
Sabinene	3.47*	971	0.06	2.32	1086	0.01
β -Pinene	3.47*	971	[0.06]	2.12	1066	0.04
Octen-3-ol	3.68	984	0.24	6.80	1420	0.25
Octan-3-one	3.73*	988	0.77	4.02*	1221	4.74
Dehydro-1,8-cineole	3.73*	988	[0.77]	3.13	1152	0.01
Myrcene	3.80	993	0.36	2.90	1133	0.35
Butyl butyrate	3.91*	1000	0.20	3.59	1189	0.07
α -Phellandrene	3.91*	1000	[0.20]	2.80	1126	0.02
Octan-3-ol	3.91*	1000	[0.20]	6.08	1367	0.12
<i>cis</i> -Dehydroxylinalool oxide	3.97	1004	0.01	3.81*	1206	4.05
Δ 3-Carene	4.01	1007	0.06	2.60	1110	0.06
α -Terpinene	4.12	1014	0.03	2.98	1140	0.03
Hexyl acetate	4.18	1018	0.22	4.31*	1242	0.35
meta-Cymene	4.21	1020	0.03	4.12*	1229	0.13
para-Cymene	4.24	1022	0.10	4.12*	1229	[0.13]
Limonene	4.33*	1027	1.28	3.20	1158	0.46
1,8-Cineole	4.33*	1027	[1.28]	3.32	1167	0.82
(Z)- β -Ocimene	4.55	1041	3.91	3.81*	1206	[4.05]
(E)- β -Ocimene	4.70	1051	3.98	4.02*	1221	[4.74]
γ -Terpinene	4.80	1057	0.13	3.81*	1206	[4.05]
<i>cis</i> -Sabinene hydrate	4.94	1066	0.06	6.92*	1429	0.14
<i>cis</i> -Linalool oxide (fur.)	5.03	1071	0.09	6.55	1402	0.09
<i>trans</i> -Linalool oxide (fur.)	5.25	1085	0.13	6.92*	1429	[0.14]
Terpinolene	5.28	1087	0.09	4.31*	1242	[0.35]
Rosefuran	5.45	1098	0.02	6.02	1363	0.01
Linalool	5.61	1109	31.95	8.14†	1520	67.50

(Z)-6-Methyl-3,5-heptadien-2-one	5.66	1112	0.03	8.23*†	1527	[67.50]
Octen-3-yl acetate	5.76	1118	0.58	5.82*	1349	[0.61]
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	5.80	1121	0.03	9.63*	1638	0.67
α-Campholenal	5.83	1122	0.01	7.10*	1442	0.02
allo-Ocimene	5.95*	1130	0.19	5.60	1333	0.14
Octan-3-yl acetate	5.95*	1130	[0.19]	5.26	1308	0.06
(Z)-Myroxide	6.02	1135	0.02	6.87	1425	0.02
Camphor	6.06	1138	0.42	7.23	1452	0.42
(E)-Myroxide	6.12	1142	0.01	7.16	1447	0.03
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.16	1144	0.03	7.10*	1442	[0.02]
Hexyl isobutyrate	6.30	1153	0.06	5.35	1314	0.05
Borneol	6.46	1163	0.70	9.80*	1651	1.95
Lavandulol	6.58	1171	0.65	9.63*	1638	[0.67]
Terpinen-4-ol	6.66*	1176	4.87	8.61	1557	4.84
(3E,5Z)-Undeca-1,3,5-triene	6.66*	1176	[4.87]	5.95	1358	0.03
Cryptone	6.74*	1181	0.10	9.18*	1601	0.15
meta-Cymen-8-ol	6.74*	1181	[0.10]	11.51	1794	0.05
para-Cymen-8-ol	6.77	1183	0.05	11.54	1797	0.05
α-Terpineol	6.87	1190	0.93	9.80*	1651	[1.95]
Hexyl butyrate	6.97	1196	0.25	6.32	1384	0.22
Verbenone	7.08	1203	0.01	9.63*	1638	[0.67]
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.25	1214	0.02	11.40	1785	0.02
Octyl acetate	7.28	1216	0.04	7.10*	1442	[0.02]
Bornyl formate	7.37	1222	0.03	7.98	1508	0.03
Nerol	7.50	1231	0.14	11.08*	1758	0.17
Hexyl 2-methylbutyrate	7.56	1235	0.06	6.50	1398	0.05
Carvone	7.63*	1240	0.08	10.01	1668	0.04
Neral	7.63*	1240	[0.08]	9.49	1626	0.04
Hexyl isovalerate	7.71	1245	0.10	6.76	1417	0.10
Geraniol	7.99*	1264	35.86	11.64	1806	0.32
Linalyl acetate	7.99*	1264	[35.86]	8.23*†	1527	[67.50]
(trans?)-Linalool oxide acetate (fur.)?	7.99*	1264	[35.86]	8.70	1564	0.03
Geranial	8.08	1270	0.04	10.16	1681	0.06
Bornyl acetate	8.28	1283	0.10	8.31*	1534	0.41
Lavandulyl acetate	8.45	1295	2.60	8.81	1572	2.63
Hexyl tiglate	8.99	1333	0.05	8.93	1582	0.04
Hodiendiol derivative	9.14	1344	0.03	12.94	1923	0.04

Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.28	1353	0.02	11.08*	1758	[0.17]
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.33	1357	0.02	11.18	1767	0.02
Neryl acetate	9.47	1366	0.32	10.20*	1684	0.32
β-Bourbonene	9.63	1378	0.03	7.50	1472	0.03
Geranyl acetate	9.74	1386	0.55	10.57	1715	0.56
Hexyl hexanoate	9.79*	1389	0.10	8.90	1579	0.04
7-epi-Sesquithujene	9.79*	1389	[0.10]	7.88	1500	0.05
Isocaryophyllene	9.94	1400	0.01	8.23*†	1527	[67.50]
cis-α-Bergamotene	10.11*	1412	2.91	8.31*	1534	[0.41]
β-Caryophyllene	10.11*	1412	[2.91]	8.49*	1548	2.97
α-Santalene	10.16	1416	0.26	8.31*	1534	[0.41]
Lavandulyl isobutyrate	10.24	1422	0.01	9.42	1621	0.01
trans-α-Bergamotene	10.38	1433	0.12	8.49*	1548	[2.97]
cis-β-Bergamotene?	10.49*	1440	0.06			
Sesquisabinene A	10.49*	1440	[0.06]	9.18*	1601	[0.15]
α-Humulene	10.55	1445	0.09	9.30	1611	0.10
Lavandulyl butyrate?	10.67	1454	0.09	10.53	1711	0.09
β-Santalene	10.72*	1458	1.50	9.18*	1601	[0.15]
(E)-β-Farnesene	10.72*	1458	[1.50]	9.56	1632	1.54
Dauca-5,8-diene?	10.78	1463	0.03	9.18*	1601	[0.15]
Germacrene D	10.93	1474	0.34	9.80*	1651	[1.95]
trans-β-Bergamotene	11.02	1480	0.04	9.63*	1638	[0.67]
β-Bisabolene	11.38*	1507	0.20	10.20*	1684	[0.32]
γ-Cadinene	11.38*	1507	[0.20]	10.40	1701	0.13
Unknown [m/z 121, 93 (56), 91 (12), 94 (11), 122 (10)...220]	11.48	1515	0.03	13.34	1959	0.02
Isocaryophyllene epoxide B	11.84	1543	0.01	12.15	1852	0.01
(E)-Nerolidol	12.10	1564	0.03	13.79	2002	0.03
Caryophyllene oxide isomer	12.21*	1573	0.14	12.70	1900	0.02
Caryophyllene oxide	12.21*	1573	[0.14]	12.78	1907	0.14
τ-Cadinol	12.98	1634	0.02	14.90	2109	0.03
Total identified		99.08%			99.09%	
Total reported		99.19%			99.13%	

*: 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