

Date : April 25, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22D19-PTH01

Customer identification : Lavender - Bulgaria - L40118209R

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

Analysis date : April 26, 2022

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4617 ± 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
β-Isoamylene	0.01	Alkene
Isobutyral	tr	Aliphatic aldehyde
Isovaleral	0.02	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
Isoamyl alcohol	0.01	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	tr	Simple phenolic
Butyl acetate	0.02	Aliphatic ester
Methyl hexyl ether	0.13	Aliphatic ether
(3Z)-Hexenol	0.01	Aliphatic alcohol
Hexanol	0.07	Aliphatic alcohol
Hashishene	0.01	Monoterpene
Tricyclene	0.02	Monoterpene
α-Thujene	0.13	Monoterpene
α-Pinene	0.24	Monoterpene
Camphene	0.13	Monoterpene
α-Fenchene	0.01	Monoterpene
Butyl isobutyrate	0.02	Aliphatic ester
β-Pinene	0.03	Monoterpene
Sabinene	0.04	Monoterpene
Octen-3-ol	0.21	Aliphatic alcohol
Octan-3-one	1.23	Aliphatic ketone
Myrcene	0.67	Monoterpene
Butyl butyrate	0.11	Aliphatic ester
α-Phellandrene	0.05	Monoterpene
Octan-3-ol	0.27	Aliphatic alcohol
Δ ³ -Carene	0.10	Monoterpene
(3Z)-Hexenyl acetate	0.01	Aliphatic ester
α-Terpinene	0.06	Monoterpene
Hexyl acetate	0.58	Aliphatic ester
meta-Cymene	0.04	Monoterpene
para-Cymene	0.14	Monoterpene
Limonene	0.31	Monoterpene
1,8-Cineole	0.61	Monoterpenic ether
β-Phellandrene	0.18	Monoterpene
(Z)-β-Ocimene	6.01	Monoterpene
(E)-β-Ocimene	3.25	Monoterpene
γ-Terpinene	0.20	Monoterpene
cis-Sabinene hydrate	0.07	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.14	Monoterpenic alcohol
para-Cymenene	0.02	Monoterpene
Terpinolene	0.02	Monoterpene
trans-Linalool oxide (fur.)	0.10	Monoterpenic alcohol
Rosefuran	0.03	Monoterpenic ether
Linalool	29.19	Monoterpenic alcohol

(Z)-6-Methyl-3,5-heptadien-2-one	0.05	Aliphatic ketone
Hotrienol	0.06	Monoterpenic alcohol
Octen-3-yl acetate	0.97	Aliphatic ester
α -Campholenal	0.03	Monoterpenic aldehyde
allo-Ocimene	0.10	Monoterpene
Octan-3-yl acetate	0.06	Aliphatic ester
<i>cis</i> -Limonene oxide	0.02	Monoterpenic ether
(Z)-Myroxide	0.02	Monoterpenic ether
Camphor	0.18	Monoterpenic ketone
<i>trans</i> -Limonene oxide	tr	Monoterpenic ether
(E)-Myroxide	0.03	Monoterpenic ether
Hexyl isobutyrate	0.08	Aliphatic ester
Nerol oxide	0.02	Aliphatic ether
Borneol	0.47	Monoterpenic alcohol
Lavandulol	0.85	Monoterpenic alcohol
Terpinen-4-ol	4.80	Monoterpenic alcohol
(3E,5Z)-Undeca-1,3,5-triene	0.06	Alkene
meta-Cymen-8-ol	0.05	Monoterpenic alcohol
Cryptone	0.08	Normonoterpenic ketone
para-Cymen-8-ol	0.06	Monoterpenic alcohol
Butyl hexanoate	0.05	Aliphatic ester
α -Terpineol	0.99	Monoterpenic alcohol
Hexyl butyrate	0.39	Aliphatic ester
Hodiendiol	0.02	Monoterpenic alcohol
Unknown	0.02	Unknown
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.03	Monoterpenic alcohol
<i>trans</i> -Carveol	0.02	Monoterpenic alcohol
Octyl acetate	0.01	Aliphatic ester
Bornyl formate	0.05	Monoterpenic ester
Nerol	0.16	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.07	Aliphatic ester
Neral	0.03	Monoterpenic aldehyde
Carvone	0.03	Monoterpenic ketone
Hexyl isovalerate	0.02	Aliphatic ester
Linalyl acetate	29.88	Monoterpenic ester
Geraniol	0.37	Monoterpenic alcohol
Geranial	0.02	Monoterpenic aldehyde
2,6-Dimethyl-1,7-octadiene-3,6-diol	0.02	Monoterpenic alcohol
Bornyl acetate	0.15	Monoterpenic ester
Lavandulyl acetate	3.38	Monoterpenic ester
Hexyl tiglate	0.06	Aliphatic ester
Unknown	0.03	Oxygenated monoterpene
Unknown	0.03	Oxygenated monoterpene
Neryl acetate	0.29	Monoterpenic ester
α -Copaene	0.03	Sesquiterpene
β -Bourbonene	0.05	Sesquiterpene
Geranyl acetate	0.48	Monoterpenic ester
Hexyl hexanoate	0.20	Aliphatic ester
Isocaryophyllene	0.01	Sesquiterpene
Sesquithujene	0.04	Sesquiterpene
<i>cis</i> - α -Bergamotene	0.06	Sesquiterpene
β -Caryophyllene	3.71	Sesquiterpene

α -Santalene	0.47	Sesquiterpene
Coumarin	0.01	Coumarin
Lavandulyl isobutyrate	0.01	Monoterpenic ester
<i>trans</i> - α -Bergamotene	0.16	Sesquiterpene
epi- β -Santalene	0.06	Sesquiterpene
α -Humulene	0.12	Sesquiterpene
β -Santalene	0.10	Sesquiterpene
Lavandulyl butyrate?	0.03	Monoterpenic ester
(<i>E</i>)- β -Farnesene	3.85	Sesquiterpene
Dauca-5,8-diene?	0.01	Sesquiterpene
Germacrene D	0.49	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.06	Sesquiterpene
Isodaucene	0.02	Sesquiterpene
γ -Cadinene	0.10	Sesquiterpene
β -Bisabolene	0.01	Sesquiterpene
Lavandulyl isovalerate	0.03	Monoterpenic ester
Unknown	0.04	Oxygenated sesquiterpene
δ -Cadinene	0.01	Sesquiterpene
<i>trans</i> -Calamenene	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.02	Sesquiterpenic ether
(<i>E</i>)-Nerolidol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.21	Sesquiterpenic ether
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Cubenol	0.02	Sesquiterpenic alcohol
τ -Cadinol	0.05	Sesquiterpenic alcohol
Consolidated total	99.17%	

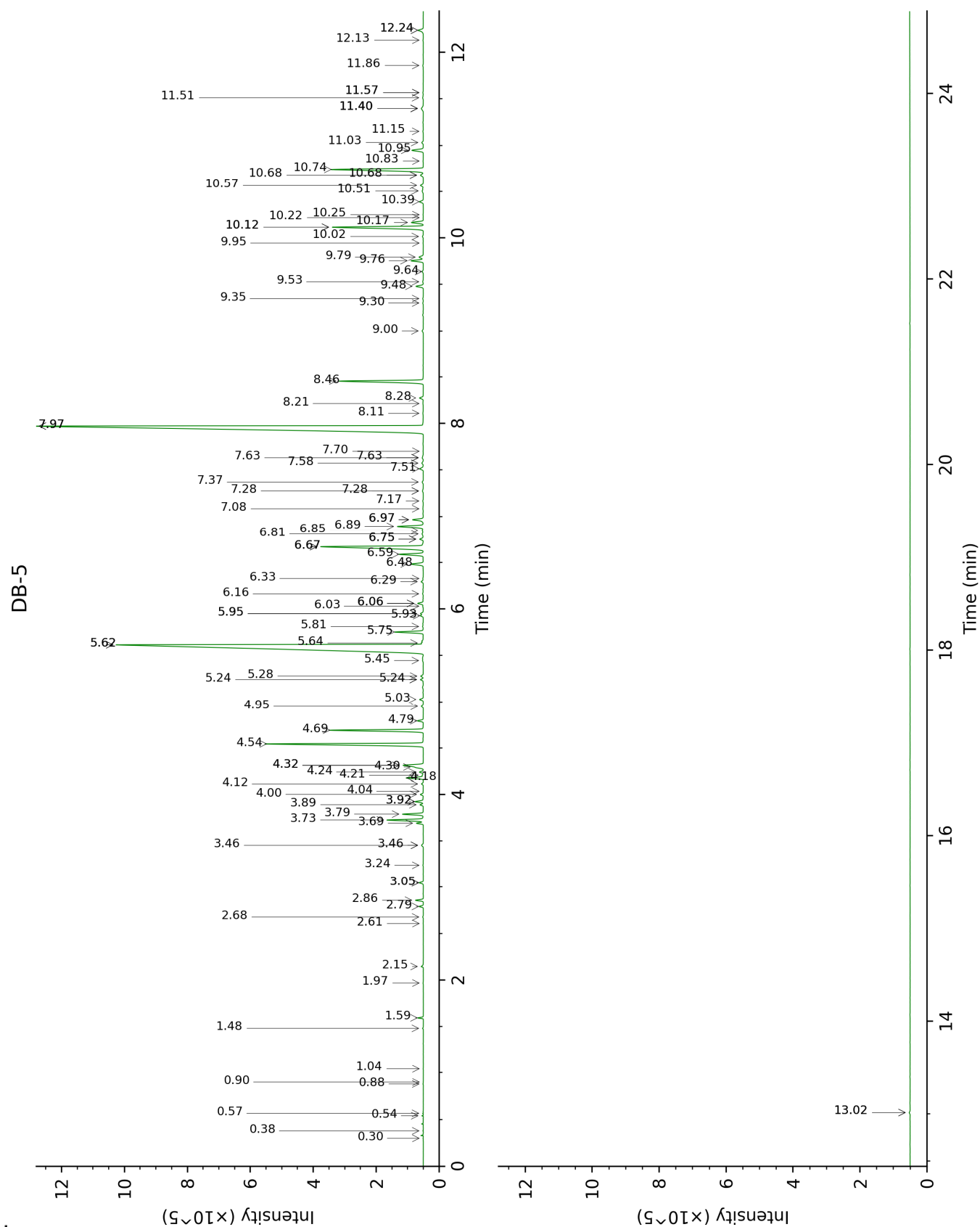
tr: The compound has been detected below 0.005% of total signal.

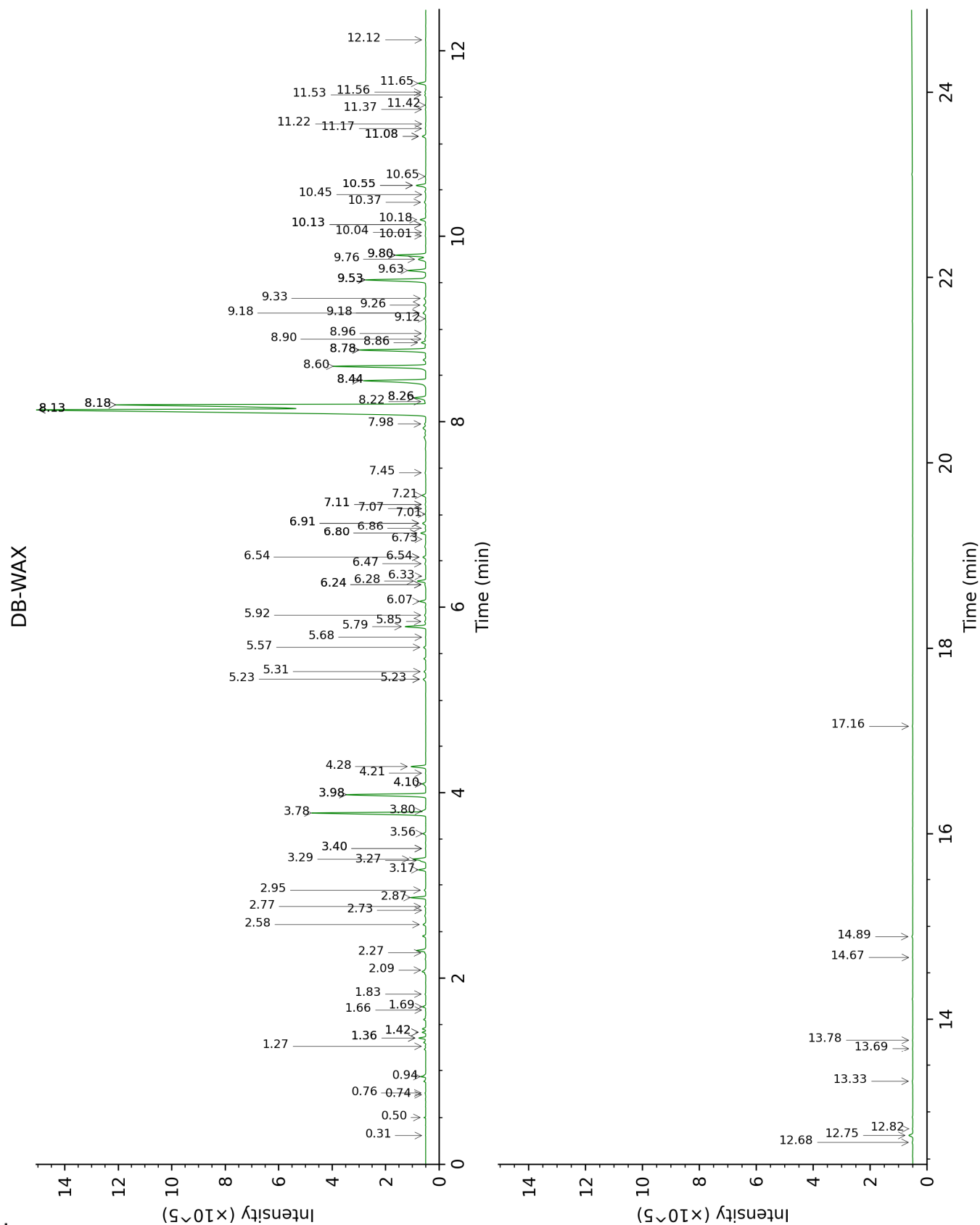
Note: no correction factor was applied

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	%
β-Isoamylene	0.30	500	0.01	0.31	500	tr
Isobutyral	0.38	537	tr	0.50	784	0.03
Isovaleral	0.54	642	0.02	0.76	888	0.02
2-Methylbutyral	0.57	652	0.01	0.74	881	0.01
Isoamyl alcohol	0.88	733	0.01	3.40*	1177	0.02
2-Methylbutanol	0.90	736	tr	3.40*	1177	[0.02]
Toluene	1.04	759	tr	1.42*†	998	[0.40]
Butyl acetate	1.48	817	0.02	1.83	1039	0.03
Methyl hexyl ether	1.60	827	0.13	0.94	920	0.15
(3Z)-Hexenol	1.97	860	0.01	5.68	1344	0.02
Hexanol	2.15	875	0.07	5.31	1318	0.08
Hashishene	2.61	913	0.01	1.36*†	991	0.40
Tricyclene	2.68	918	0.02	1.27	976	0.02
α-Thujene	2.79	925	0.13	1.42*†	998	[0.40]
α-Pinene	2.86	930	0.24	1.36*†	991	[0.40]
Camphene	3.05*	943	0.14	1.69	1026	0.13
α-Fenchene	3.05*	943	[0.14]	1.66	1022	0.01
Butyl isobutyrate	3.24	956	0.02	2.73	1123	0.02
β-Pinene	3.46*	970	0.08	2.09	1065	0.03
Sabinene	3.46*	970	[0.08]	2.27	1084	0.04
Octen-3-ol	3.69	986	0.21	6.80*	1424	0.22
Octan-3-one	3.73	989	1.23	3.98*	1221	4.06
Myrcene	3.79	993	0.67	2.87	1134	0.61
Butyl butyrate	3.89	1000	0.11	3.56	1189	0.11
α-Phellandrene	3.92*	1002	0.31	2.77	1126	0.05
Octan-3-ol	3.92*	1002	[0.31]	6.06	1371	0.27
Δ3-Carene	4.00	1007	0.10	2.58	1111	0.13
(3Z)-Hexenyl acetate	4.04	1009	0.01			
α-Terpinene	4.12	1014	0.06	2.95	1140	0.07
Hexyl acetate	4.18	1018	0.58	4.28	1244	0.68
meta-Cymene	4.21	1020	0.04	4.10*	1230	0.18
para-Cymene	4.24	1022	0.14	4.10*	1230	[0.18]
Limonene	4.30†	1026	1.11	3.17	1158	0.31
1,8-Cineole	4.32*†	1027	[1.11]	3.29	1167	0.61
β-Phellandrene	4.32*†	1027	[1.11]	3.27	1166	0.18
(Z)-β-Ocimene	4.54	1041	6.01	3.78†	1206	5.64
(E)-β-Ocimene	4.69	1051	3.25	3.98*	1221	[4.06]
γ-Terpinene	4.79	1057	0.20	3.80†	1208	[5.64]
cis-Sabinene hydrate	4.95	1067	0.07	6.91*	1432	0.18
cis-Linalool oxide (fur.)	5.03	1072	0.14	6.54*	1405	0.14
para-Cymenene	5.24*	1086	0.10	6.24*	1384	0.07
Terpinolene	5.24*	1086	[0.10]	4.21	1238	0.02
trans-Linalool oxide (fur.)	5.28	1088	0.10	6.91*	1432	[0.18]

Rosefuran	5.45	1098	0.03	5.92	1361	0.07
Linalool	5.62*	1109	29.24	8.13*†	1523	58.37
(Z)-6-Methyl-3,5-heptadien-2-one	5.62*	1109	[29.24]	8.22	1530	0.05
Hotrienol	5.64	1110	0.06	8.78*	1572	3.37
Octen-3-yl acetate	5.75	1118	0.97	5.79	1352	0.96
α-Campholenal	5.81	1122	0.03	7.01	1440	0.03
allo-Ocimene	5.93	1129	0.10	5.57	1336	0.10
Octan-3-yl acetate	5.95*	1131	0.11	5.23*	1312	0.14
cis-Limonene oxide	5.95*	1131	[0.11]	6.34	1390	0.02
(Z)-Myroxide	6.03	1136	0.02	6.86	1428	0.04
Camphor	6.06*	1138	0.21	7.21	1454	0.18
trans-Limonene oxide	6.06*	1138	[0.21]	6.54*	1405	[0.14]
(E)-Myroxide	6.16	1144	0.03	7.11*	1447	0.03
Hexyl isobutyrate	6.30	1153	0.08	5.23*	1312	[0.14]
Nerol oxide	6.33	1155	0.02	6.80*	1424	[0.22]
Borneol	6.48	1165	0.47	9.76	1650	0.48
Lavandulol	6.59	1172	0.85	9.64	1640	0.87
Terpinen-4-ol	6.67*	1177	4.80	8.60	1558	4.80
(3E,5Z)-Undeca-1,3,5-triene	6.67*	1177	[4.80]	5.85	1356	0.06
meta-Cymen-8-ol	6.75*	1182	0.13	11.53	1797	0.05
Cryptone	6.75*	1182	[0.13]	9.18*	1603	0.18
para-Cymen-8-ol	6.81	1186	0.06	11.56	1800	0.05
Butyl hexanoate	6.85	1188	0.05	6.24*	1384	[0.07]
α-Terpineol	6.90	1191	0.99	9.80*	1653	1.47
Hexyl butyrate	6.97*	1196	0.42	6.28	1387	0.39
Hodiendiol	6.97*	1196	[0.42]	12.82	1912	0.02
Unknown [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.08	1203	0.02	11.22	1770	0.02
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.17	1209	0.03	11.37	1783	0.02
trans-Carveol	7.28*	1216	0.05	11.42	1787	0.02
Octyl acetate	7.28*	1216	[0.05]	7.07	1444	0.01
Bornyl formate	7.37	1223	0.05	7.98	1511	0.06
Nerol	7.52	1232	0.16	11.08*	1759	0.18
Hexyl 2-methylbutyrate	7.58	1236	0.07	6.47	1400	0.05
Neral	7.63*	1240	0.06	9.53*	1632	3.30
Carvone	7.63*	1240	[0.06]	10.01	1670	0.03
Hexyl isovalerate	7.70	1245	0.02	6.73	1419	0.02
Linalyl acetate	7.97*	1263	30.24	8.18*†	1527	[58.37]
Geraniol	7.97*	1263	[30.24]	11.65	1808	0.37

Geranial	8.11	1272	0.02	10.13*	1680	0.05
2,6-Dimethyl-1,7-octadiene-3,6-diol	8.22	1279	0.02	14.67	2085	0.02
Bornyl acetate	8.28	1283	0.15	8.26*	1533	0.63
Lavandulyl acetate	8.46	1295	3.38	8.78*	1572	[3.37]
Hexyl tiglate	9.00	1333	0.06	8.90	1581	0.06
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.30	1354	0.03	11.08*	1759	[0.18]
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.35	1358	0.03	11.17	1766	0.03
Neryl acetate	9.48	1367	0.29	10.18	1684	0.29
α-Copaene	9.53	1370	0.03	7.11*	1447	[0.03]
β-Bourbonene	9.64	1378	0.05	7.45	1472	0.05
Geranyl acetate	9.76	1386	0.48	10.55*	1714	0.50
Hexyl hexanoate	9.80	1389	0.20	8.86	1578	0.21
Isocaryophyllene	9.95	1400	0.01	8.13*†	1523	[58.37]
Sesquithujene	10.02	1405	0.04	8.13*†	1523	[58.37]
cis-α-Bergamotene	10.12*	1412	3.78	8.18*†	1527	[58.37]
β-Caryophyllene	10.12*	1412	[3.78]	8.44*	1547	3.87
α-Santalene	10.17	1416	0.47	8.26*	1533	[0.63]
Coumarin	10.22	1420	0.01	17.16	2341	0.03
Lavandulyl isobutyrate	10.25	1422	0.01	9.33	1616	0.10
trans-α-Bergamotene	10.39	1433	0.16	8.44*	1547	[3.87]
epi-β-Santalene	10.51	1441	0.06	8.96	1586	0.05
α-Humulene	10.57	1446	0.12	9.26	1610	0.12
β-Santalene	10.68*	1454	0.13	9.18*	1603	[0.18]
Lavandulyl butyrate?	10.68*	1454	[0.13]	10.55*	1714	[0.50]
(E)-β-Farnesene	10.74	1459	3.85	9.53*	1632	[3.30]
Dauca-5,8-diene?	10.83	1466	0.01	9.12	1598	0.03
Germacrene D	10.95	1474	0.49	9.80*	1653	[1.47]
trans-β-Bergamotene	11.03	1480	0.06	9.53*	1632	[3.30]
Isodaucene	11.15	1489	0.02	10.04	1673	0.03
γ-Cadinene	11.40*	1508	0.14	10.37	1699	0.10
β-Bisabolene	11.40*	1508	[0.14]	10.13*	1680	[0.05]
Lavandulyl isovalerate	11.40*	1508	[0.14]	10.65	1723	0.03
Unknown [m/z 121, 93 (56), 91	11.51	1517	0.04	13.33	1958	0.04

(12), 94 (11), 122 (10)...220]						
δ-Cadinene	11.57*	1521	0.02	10.45	1706	0.01
<i>trans</i> -Calamenene	11.57*	1521	[0.02]			
Isocaryophyllene epoxide B	11.86	1544	0.02	12.12	1849	0.03
(<i>E</i>)-Nerolidol	12.13	1565	0.02	13.78	2000	0.02
Caryophyllene oxide	12.24*	1574	0.26	12.75	1905	0.21
Caryophyllene oxide isomer	12.24*	1574	[0.26]	12.68	1898	0.03
Cubenol	13.02*	1637	0.04	13.69	1991	0.02
τ-Cadinol	13.02*	1637	[0.04]	14.89	2107	0.05
Total identified		99.15%			96.88%	
Total reported		99.26%			96.97%	

*: 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