

Date : February 23, 2018

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18B20-PLG2-1-CC

Customer identification : Lavender - Bulgarian

Type : Essential oil

Source : *Lavandula angustifolia*

Customer : Plant Guru

ANALYSIS

Method: PC-PA-014-17J19 - Analysis of the composition of an essential oil, or other volatile liquid, by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Sarah-Eve Tremblay, M. Sc. A., Chimiste

Analysis date : February 23, 2018

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.4598 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
3-Buten-2-one	tr	tr	Aliphatic ketone
Acetic acid	tr	0.01	Aliphatic acid
2-Methyl-3-buten-2-ol	0.02	0.01*	Aliphatic alcohol
Isovaleral	0.01	0.01	Aliphatic aldehyde
2-Methylbutyral	0.01	0.01	Aliphatic aldehyde
Isoamyl alcohol	0.01	0.01	Aliphatic alcohol
Toluene	0.01	0.01	Simple phenolic
Prenal	0.01	0.42*	Aliphatic aldehyde
Butyl acetate	0.03	0.03	Aliphatic ester
Methyl hexyl ether	0.08	0.08	Aliphatic ether
(3Z)-Hexenol	0.03	0.95*	Aliphatic alcohol
Hexanol	0.07	0.09*	Aliphatic alcohol
Tricyclene	0.02	0.02	Monoterpene
α -Thujene	0.09	0.09	Monoterpene
α -Pinene	0.15	0.15	Monoterpene
Camphene	0.15	0.15	Monoterpene
5,5-Dimethyl-2(5H)-furanone	tr	0.02	Aliphatic lactone
Butyl isobutyrate	0.01	0.01	Aliphatic ester
endo-Isocamphane	tr	[0.01]*	Monoterpene
Sabinene	0.12*	0.06	Monoterpene
β -Pinene	[0.12]*	0.07	Monoterpene
Octen-3-ol	0.25	0.26	Aliphatic alcohol
Octan-3-one	1.02	2.81*	Aliphatic ketone
Myrcene	0.58	0.60	Monoterpene
Butyl butyrate	0.10	0.11	Aliphatic ester
Octan-3-ol	0.22*	0.19	Aliphatic alcohol
α -Phellandrene	[0.22]*	0.03	Monoterpene
Δ 3-Carene	0.19	0.19	Monoterpene
(3Z)-Hexenyl acetate	0.01	0.01	Aliphatic ester
α -Terpinene	0.03	0.04	Monoterpene
Hexyl acetate	0.54	0.64*	Aliphatic ester
ortho-Cymene	0.05	0.21*	Simple phenolic
para-Cymene	0.15*	[0.21]*	Monoterpene
Hexanoic acid	[0.15]*	0.12*	Aliphatic acid
Limonene	1.52*	[0.42]*	Monoterpene
1,8-Cineole	[1.52]*	1.12*	Monoterpenic ether
β -Phellandrene	[1.52]*	[1.12]*	Monoterpene
Lavender lactone	tr	0.02	Aliphatic lactone
(Z)- β -Ocimene	4.09	4.13	Monoterpene
(E)- β -Ocimene	1.77	[2.81]*	Monoterpene
γ -Terpinene	0.11	0.10	Monoterpene
cis-Sabinene hydrate	0.05	0.12*	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.11	0.11	Monoterpenic alcohol
Octanol	0.03	35.31*	Aliphatic alcohol
Terpinolene	0.10	[0.64]*	Monoterpene
trans-Linalool oxide (fur.)	0.09	[0.12]*	Monoterpenic alcohol
α -Pinene oxide	tr	[0.09]*	Monoterpenic ether
Rosefuran	0.07	0.02	Monoterpenic ether

Linalool	32.24*	32.44	Monoterpenic alcohol
6-Methyl-3,5-heptadien-2-one	[32.24]*	[35.31]*	Aliphatic ketone
Octen-3-yl acetate	0.98	[0.95]*	Aliphatic ester
Unknown	0.04	0.73*	Unknown
Octan-3-yl acetate	0.10	0.13	Aliphatic ester
allo-Ocimene	0.10	0.10	Monoterpene
(Z)-Myroxide	0.03	0.01*	Monoterpenic ether
Camphor	0.22	0.20	Monoterpenic ketone
(E)-Myroxide	0.04	0.04	Monoterpenic ether
Unknown	0.01	0.02	Oxygenated monoterpene
Hexyl isobutyrate	0.05	0.05	Aliphatic ester
Nerol oxide	0.01	[0.01]*	Aliphatic ether
Borneol	0.70*	2.28*	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	[0.70]*	tr	Monoterpenic alcohol
Lavandulol	0.74*	[0.73]*	Monoterpenic alcohol
δ-Terpineol	[0.74]*	0.02	Monoterpenic alcohol
Terpinen-4-ol	2.59*	2.55	Monoterpenic alcohol
(3E,5E)-Undeca-1,3,5-triene	[2.59]*	0.05	Alkene
Cryptone	0.37*	0.28	Normonoterpenic ketone
trans-Linalool oxide (pyr.)	[0.37]*	0.66*	Monoterpenic alcohol
meta-Cymen-8-ol	[0.37]*	[0.12]*	Monoterpenic alcohol
para-Cymen-8-ol	0.06	[0.12]*	Monoterpenic alcohol
α-Terpineol	0.99	[2.28]*	Monoterpenic alcohol
Hexyl butyrate	0.38	0.31*	Aliphatic ester
Hodiendiol	0.02	0.32*	Monoterpenic alcohol
Unknown	0.02		Unknown
Bornyl formate	0.03		Monoterpenic ester
Nerol	0.19	0.22*	Monoterpenic alcohol
Cuminal	0.11*	0.03*	Monoterpenic aldehyde
Hexyl 2-methylbutyrate	[0.11]*	[0.31]*	Aliphatic ester
Carvone	0.07*	0.02	Monoterpenic ketone
Neral	[0.07]*	1.84*	Monoterpenic aldehyde
Hexyl isovalerate	0.01	tr	Aliphatic ester
Geraniol	36.15*	0.49	Monoterpenic alcohol
Linalyl acetate	[36.15]*	[35.31]*	Monoterpenic ester
Geranial	0.05*	0.03*	Monoterpenic aldehyde
trans-Ascaridole glycol	[0.05]*	0.04	Monoterpenic alcohol
Bornyl acetate	0.13	0.51*	Monoterpenic ester
Lavandulyl acetate	2.24	2.19	Monoterpenic ester
Hexyl tiglate	0.03	0.02	Aliphatic ester
Hodiendiol derivative	0.02	0.03	Oxygenated monoterpene
Unknown	0.03	[0.22]*	Oxygenated monoterpene
Unknown	0.05	0.02	Oxygenated monoterpene
Neryl acetate	0.34	0.33	Monoterpenic ester
β-Bourbonene	0.04	0.05	Sesquiterpene
7-epi-Sesquithujene?	0.69*	0.06	Sesquiterpene
Geranyl acetate	[0.69]*	[0.66]*	Monoterpenic ester
Hexyl hexanoate	[0.69]	0.08	Aliphatic ester
Isocaryophyllene	0.03	[35.31]*	Sesquiterpene
β-Caryophyllene	3.23	3.32*	Sesquiterpene
α-Santalene	0.41	[0.51]*	Sesquiterpene
Coumarin	0.04	0.08	Coumarin

<i>trans</i> - α -Bergamotene	0.10	[3.32]*	Sesquiterpene
Isogermacrene D	0.04*	0.02	Sesquiterpene
Sesquisabinene A	[0.04]*	0.02*	Sesquiterpene
α -Humulene	0.10	0.10	Sesquiterpene
Lavandulyl butyrate?	0.08	0.02	Monoterpenic ester
(<i>E</i>)- β -Farnesene	1.84	[1.84]*	Sesquiterpene
Dauca-5,8-diene?	0.01	[0.02]*	Sesquiterpene
Germacrene D	0.57	[2.28]*	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.05	0.05	Sesquiterpene
Valencene	0.02	0.01	Sesquiterpene
Isodaucene	0.02	0.01	Sesquiterpene
Lavandulyl isovalerate	0.02	0.01	Monoterpenic ester
γ -Cadinene	0.11*	0.10*	Sesquiterpene
β -Bisabolene	[0.11]*	[0.03]*	Sesquiterpene
δ -Cadinene	0.02*	[0.10]*	Sesquiterpene
<i>trans</i> -Calamenene	[0.02]*	0.01	Sesquiterpene
β -Sesquiphellandrene	0.01	[0.03]*	Sesquiterpene
Isocaryophyllene epoxide B	0.03	0.04	Sesquiterpenic ether
Dendrolasin	0.01	0.01	Sesquiterpenic ether
Caryophyllene oxide	0.35*	[0.32]*	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.35]*	0.04	Sesquiterpenic ether
Humulene epoxide II	0.01	0.01	Sesquiterpenic ether
τ -Cadinol	0.06	0.08	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.01	0.02	Sesquiterpenic alcohol
Total identified	98.80%	98.42%	

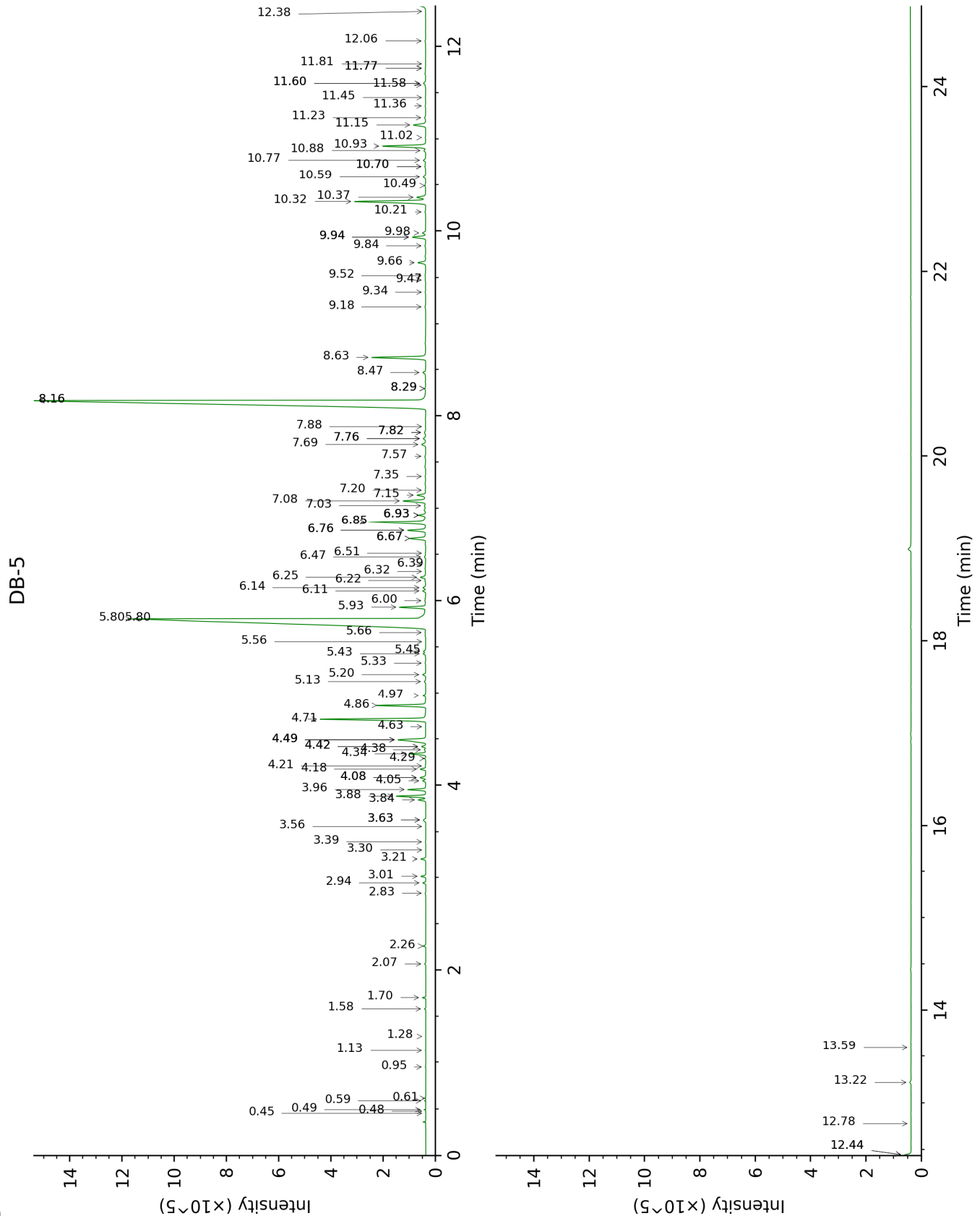
*: Two or more compounds are coeluting on this column

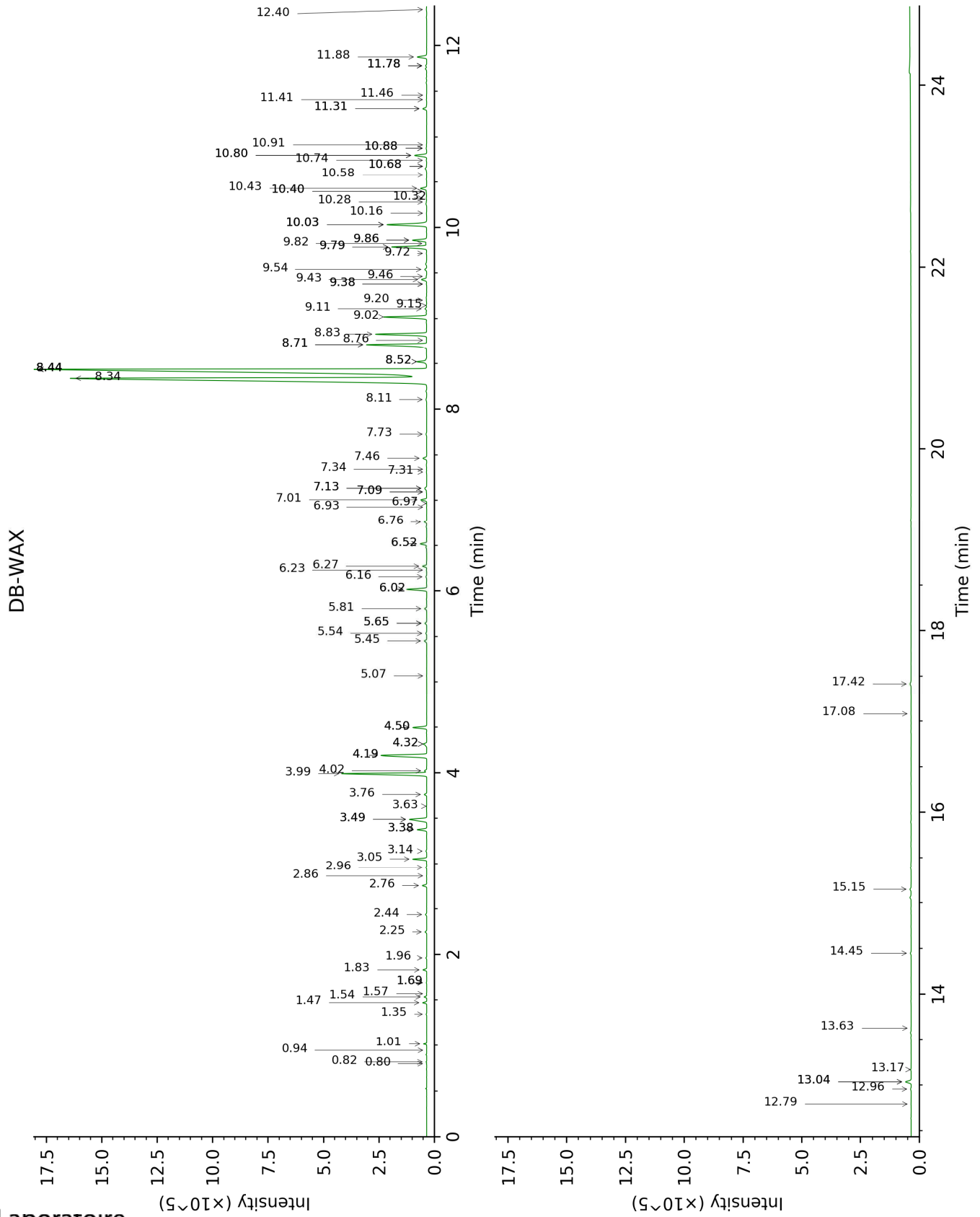
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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

Note: no correction factor was applied

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
3-Buten-2-one	0.45	577	tr	0.94	910	tr
Acetic acid	0.48	598	tr	6.93	1414	0.01
2-Methyl-3-buten-2-ol	0.49	605	0.02	1.69*	1016	0.01
Isovaleral	0.59	638	0.01	0.82	886	0.01
2-Methylbutyral	0.62	648	0.01	0.80	878	0.01
Isoamyl alcohol	0.95	727	0.01	3.63	1179	0.01
Toluene	1.13	753	0.01	1.57	1005	0.01
Prenal	1.28	776	0.01	3.38*	1159	0.42
Butyl acetate	1.58	811	0.03	1.96	1042	0.03
Methyl hexyl ether	1.70	822	0.08	1.02	922	0.08
(3Z)-Hexenol	2.07	852	0.03	6.02*	1349	0.95
Hexanol	2.26	868	0.07	5.65*	1322	0.09
Tricyclene	2.83	913	0.02	1.35	975	0.02
α-Thujene	2.94	920	0.09	1.54	1001	0.09
α-Pinene	3.01	925	0.15	1.47	995	0.15
Camphene	3.21	938	0.15	1.83	1030	0.15
5,5-Dimethyl-2(5H)-furanone	3.30	944	tr	8.76	1552	0.02
Butyl isobutyrate	3.39	950	0.01	2.86	1120	0.01
endo-Isocamphane	3.56	961	tr	1.69*	1016	[0.01]
Sabinene	3.63*	966	0.12	2.44	1086	0.06
β-Pinene	3.63*	966	[0.12]	2.25	1069	0.07
Octen-3-ol	3.84	980	0.25	7.01	1420	0.26
Octan-3-one	3.88	983	1.02	4.19*	1219	2.81
Myrcene	3.96	988	0.58	3.05	1134	0.60
Butyl butyrate	4.05	994	0.10	3.76	1188	0.11
Octan-3-ol	4.08*	996	0.22	6.27	1367	0.19
α-Phellandrene	4.08*	996	[0.22]	2.96	1127	0.03
Δ3-Carene	4.18	1002	0.19	2.76	1112	0.19
(3Z)-Hexenyl acetate	4.21	1005	0.01	5.07	1282	0.01
α-Terpinene	4.29	1010	0.03	3.14	1141	0.04
Hexyl acetate	4.34	1013	0.54	4.50*	1241	0.64
ortho-Cymene	4.38	1016	0.05	4.32*	1228	0.21
para-Cymene	4.42*	1018	0.15	4.32*	1228	[0.21]
Hexanoic acid	4.42*	1018	[0.15]	11.78*†	1798	0.12
Limonene	4.49*	1022	1.52	3.38*	1159	[0.42]
1,8-Cineole	4.49*	1022	[1.52]	3.49*	1168	1.12
β-Phellandrene	4.49*	1022	[1.52]	3.49*	1168	[1.12]
Lavender lactone	4.63	1031	tr	9.46	1607	0.02
(Z)-β-Ocimene	4.72	1036	4.09	3.99	1205	4.13
(E)-β-Ocimene	4.86	1046	1.77	4.19*	1219	[2.81]
γ-Terpinene	4.97	1052	0.11	4.02	1207	0.10
cis-Sabinene hydrate	5.13	1062	0.05	7.13*	1430	0.12
cis-Linalool oxide (fur.)	5.20	1067	0.11	6.76	1402	0.11

Octanol	5.33	1075	0.03	8.44*	1527	35.31
Terpinolene	5.43	1081	0.10	4.50*	1241	[0.64]
<i>trans</i> -Linalool oxide (fur.)	5.45	1083	0.09	7.13*	1430	[0.12]
α -Pinene oxide	5.56	1089	tr	5.65*	1322	[0.09]
Rosefuran	5.66	1095	0.07	6.23	1364	0.02
Linalool	5.80*	1105	32.24	8.34	1520	32.44
6-Methyl-3,5-heptadien-2-one	5.80*	1105	[32.24]	8.44*	1527	[35.31]
Octen-3-yl acetate	5.93	1113	0.98	6.02*	1349	[0.95]
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	6.00	1117	0.04	9.86*	1639	0.73
Octan-3-yl acetate	6.10	1124	0.10	5.45	1309	0.13
allo-Ocimene	6.14	1126	0.10	5.81	1334	0.10
(<i>Z</i>)-Myroxide	6.22	1131	0.03	7.09*	1427	0.01
Camphor	6.25	1133	0.22	7.46	1454	0.20
(<i>E</i>)-Myroxide	6.32	1137	0.04	7.34	1445	0.04
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.39	1142	0.01	7.31	1443	0.02
Hexyl isobutyrate	6.47	1147	0.05	5.54	1315	0.05
Nerol oxide	6.51	1150	0.01	7.09*	1427	[0.01]
Borneol	6.67*	1160	0.70	10.03*	1652	2.28
<i>cis</i> -Linalool oxide (pyr.)	6.67*	1160	[0.70]	10.58	1697	tr
Lavandulol	6.76*	1166	0.74	9.86*	1639	[0.73]
δ -Terpineol	6.76*	1166	[0.74]	9.72	1627	0.02
Terpinen-4-ol	6.85*	1172	2.59	8.83	1557	2.55
(3 <i>E</i> ,5 <i>E</i>)-Undeca-1,3,5-triene	6.85*	1172	[2.59]	6.16	1359	0.05
Cryptone	6.93*†	1176	0.37	9.43	1604	0.28
<i>trans</i> -Linalool oxide (pyr.)	6.93*†	1176	[0.37]	10.80*	1715	0.66
meta-Cymen-8-ol	6.93*†	1176	[0.37]	11.78*†	1798	[0.12]
para-Cymen-8-ol	7.03	1183	0.06	11.78*†	1798	[0.12]
α -Terpineol	7.08	1186	0.99	10.03*	1652	[2.28]
Hexyl butyrate	7.15	1190	0.38	6.52*	1385	0.31
Hodiendiol	7.20	1194	0.02	13.04*	1910	0.32
Unknown [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.35	1203	0.02			
Bornyl formate	7.56	1218	0.03			
Nerol	7.69	1226	0.19	11.31*	1758	0.22
Cuminal	7.76*	1230	0.11	10.88*	1722	0.03
Hexyl 2-methylbutyrate	7.76*	1230	[0.11]	6.52*	1385	[0.31]
Carvone	7.82*	1235	0.07	10.32	1676	0.02
Neral	7.82*	1235	[0.07]	9.79*	1633	1.84
Hexyl isovalerate	7.88	1239	0.01	6.97	1417	tr
Geraniol	8.16*	1258	36.15	11.88	1807	0.49

Linalyl acetate	8.16*	1258	[36.15]	8.44*	1527	[35.31]
Geranial	8.30*	1266	0.05	10.40*	1682	0.03
<i>trans</i> -Ascaridole glycol	8.30*	1266	[0.05]	14.45	2042	0.04
Bornyl acetate	8.47	1278	0.13	8.52*	1534	0.51
Lavandulyl acetate	8.63	1289	2.24	9.02	1572	2.19
Hexyl tiglate	9.18	1327	0.03	9.15	1582	0.02
Hodiendiol derivative	9.34	1338	0.02	13.17	1922	0.03
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.47	1348	0.03	11.31*	1758	[0.22]
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.52	1351	0.05	11.41	1767	0.02
Neryl acetate	9.66	1361	0.34	10.43	1685	0.33
β-Bourbonene	9.84	1374	0.04	7.73	1473	0.05
7-epi-Sesquithujene?	9.94*†	1380	0.69	8.11	1502	0.06
Geranyl acetate	9.94*†	1380	[0.69]	10.80*	1715	[0.66]
Hexyl hexanoate	9.98†	1383	[0.69]	9.11	1579	0.08
Isocaryophyllene	10.21	1399	0.03	8.44*	1527	[35.31]
β-Caryophyllene	10.32	1408	3.23	8.71*	1548	3.32
α-Santalene	10.37	1411	0.41	8.52*	1534	[0.51]
Coumarin	10.49	1420	0.04	17.42	2344	0.08
<i>trans</i> -α-Bergamotene	10.59	1427	0.10	8.71*	1548	[3.32]
Isogermacrene D	10.70*	1436	0.04	9.20	1586	0.02
Sesquisabinene A	10.70*	1436	[0.04]	9.38*	1600	0.02
α-Humulene	10.77	1441	0.10	9.54	1613	0.10
Lavandulyl butyrate?	10.88	1449	0.08	10.74	1711	0.02
(<i>E</i>)-β-Farnesene	10.92	1452	1.84	9.79*	1633	[1.84]
Dauca-5,8-diene?	11.02	1459	0.01	9.38*	1600	[0.02]
Germacrene D	11.15	1470	0.57	10.03*	1652	[2.28]
<i>trans</i> -β-Bergamotene	11.23	1475	0.05	9.82	1636	0.05
Valencene	11.36	1485	0.02	10.16	1663	0.01
Isodaucene	11.45	1491	0.02	10.28	1672	0.01
Lavandulyl isovalerate	11.58	1502	0.02	10.91	1725	0.01
γ-Cadinene	11.60*	1503	0.11	10.68*†	1705	0.10
β-Bisabolene	11.60*	1503	[0.11]	10.40*	1682	[0.03]
δ-Cadinene	11.76*	1516	0.02	10.68*†	1705	[0.10]
<i>trans</i> -Calamenene	11.76*	1516	[0.02]	11.46	1771	0.01
β-Sesquiphellandrene	11.81	1519	0.01	10.88*	1722	[0.03]
Isocaryophyllene epoxide B	12.06	1539	0.03	12.40	1853	0.04
Dendrolasin	12.38	1564	0.01	12.79	1888	0.01

Caryophyllene oxide	12.44*	1569	0.35	13.04*	1910	[0.32]
Caryophyllene oxide isomer	12.44*	1569	[0.35]	12.96	1902	0.04
Humulene epoxide II	12.78	1595	0.01	13.63	1964	0.01
τ -Cadinol	13.22	1631	0.06	15.15	2110	0.08
(3Z)-Caryophylla-3,8(13)-dien-5 β -ol	13.59	1662	0.01	17.08	2308	0.02
Total identified		98.80%			98.42%	
Total reported		98.94%			98.46%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified 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