

Date : May 22, 2018

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18E08-NAD8-1-CC

Customer identification : Lavender Oil - Bulgarian - R122257-01

Type : Essential oil

Source : *Lavandula angustifolia*

Customer : TrulQ Global, LLC

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 : May 17, 2018

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4600 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Acetic acid	tr	tr	Aliphatic acid
2-Methyl-3-buten-2-ol	0.01	0.01	Aliphatic alcohol
Isovaleral	0.02	0.02	Aliphatic aldehyde
2-Methylbutyral	0.01	0.01	Aliphatic aldehyde
Isoamyl alcohol	0.01	0.01	Aliphatic alcohol
Toluene	0.01	tr	Simple phenolic
Prenal	tr	0.32*	Aliphatic aldehyde
Hexanal	tr	tr	Aliphatic aldehyde
Butyl acetate	0.02	0.02	Aliphatic ester
Methyl hexyl ether	0.14	0.14	Aliphatic ether
(3Z)-Hexenol	0.02	0.03	Aliphatic alcohol
Hexanol	0.08	0.10*	Aliphatic alcohol
Tricyclene	0.01	0.02	Monoterpene
α -Thujene	0.09	0.09	Monoterpene
α -Pinene	0.16	0.16	Monoterpene
Camphene	0.12*	0.11	Monoterpene
α -Fenchene	[0.12]*	tr	Monoterpene
5,5-Dimethyl-2(5H)-furanone	0.01	tr	Aliphatic lactone
Butyl isobutyrate	0.01	0.01	Aliphatic ester
β -Pinene	0.09*	0.04	Monoterpene
Sabinene	[0.09]*	0.04	Monoterpene
Octen-3-ol	0.21	0.24	Aliphatic alcohol
Octan-3-one	1.47*	5.01*	Aliphatic ketone
6-Methyl-5-hepten-2-one	[1.47]*	0.01	Aliphatic ketone
Myrcene	0.58	0.58	Monoterpene
Butyl butyrate	0.39*	0.10	Aliphatic ester
Octan-3-ol	[0.39]*	0.30	Aliphatic alcohol
α -Phellandrene	0.07	0.04	Monoterpene
<i>cis</i> -Dehydroxylinalool oxide	0.01	tr	Monoterpenic ether
Δ^3 -Carene	0.10	0.11	Monoterpene
α -Terpinene	0.04	0.05	Monoterpene
Hexyl acetate	0.53	0.61*	Aliphatic ester
ortho-Cymene	0.04	0.12*	Simple phenolic
para-Cymene	0.11	[0.12]*	Monoterpene
Limonene	1.18*	[0.32]*	Monoterpene
1,8-Cineole	[1.18]*	0.86*	Monoterpenic ether
β -Phellandrene	[1.18]*	[0.86]*	Monoterpene
(Z)- β -Ocimene	3.68	3.76	Monoterpene
(E)- β -Ocimene	3.50	[5.01]*	Monoterpene
γ -Terpinene	0.14	0.10	Monoterpene
<i>cis</i> -Sabinene hydrate	0.04	0.13*	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.09	0.10	Monoterpenic alcohol
Octanol	0.02	31.15*	Aliphatic alcohol
α -Pinene oxide analog	0.01	[0.10]*	Monoterpenic ether
Terpinolene	0.17*	[0.61]*	Monoterpene
Isoterpinolene	[0.17]*	tr	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	[0.17]*	[0.13]*	Monoterpenic alcohol
Rosefuran	0.02	0.01	Monoterpenic ether

Linalool	32.09	32.20	Monoterpenic alcohol
(Z)-6-Methyl-3,5-heptadien-2-one	0.02	[31.15]*	Aliphatic ketone
Octen-3-yl acetate	0.75	0.76	Aliphatic ester
Unknown	0.02	0.88*	Unknown
Octan-3-yl acetate	0.13	0.15	Aliphatic ester
allo-Ocimene	0.09	0.10	Monoterpene
(Z)-Myroxide	0.03	0.02	Monoterpenic ether
Camphor	0.16	0.15	Monoterpenic ketone
(E)-Myroxide	0.03	0.04*	Monoterpenic ether
Unknown	0.01	0.01	Oxygenated monoterpene
Hexyl isobutyrate	0.06	0.05	Aliphatic ester
Nerol oxide	0.01	[0.13]*	Aliphatic ether
Borneol	0.40	2.64*	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.02	0.01	Monoterpenic alcohol
Lavandulol	0.87	[0.88]*	Monoterpenic alcohol
Terpinen-4-ol	4.45	4.38	Monoterpenic alcohol
meta-Cymen-8-ol	0.18*	0.04	Monoterpenic alcohol
trans-Linalool oxide (pyr.)	[0.18]*	0.05*	Monoterpenic alcohol
para-Cymen-8-ol	0.04	0.04	Monoterpenic alcohol
α-Terpineol	1.85	[2.64]*	Monoterpenic alcohol
Hexyl butyrate	0.35	0.31	Aliphatic ester
Unknown	0.01		Unknown
Bornyl formate	0.03		Monoterpenic ester
Nerol	0.14	0.17*	Monoterpenic alcohol
Cuminal	0.08*	[0.05]*	Monoterpenic aldehyde
Hexyl 2-methylbutyrate	[0.08]*	0.03	Aliphatic ester
Carvone	0.03	0.02	Monoterpenic ketone
Neral	0.03	0.03	Monoterpenic aldehyde
Linalyl acetate	31.76*	[31.15]*	Monoterpenic ester
Geraniol	[31.76]*	0.34	Monoterpenic alcohol
trans-Ascaridole glycol	0.06*	0.03	Monoterpenic alcohol
Geranial	[0.06]*	0.04	Monoterpenic aldehyde
Bornyl acetate	0.08	0.04	Monoterpenic ester
Cuminol	0.03	0.03	Monoterpenic alcohol
Lavandulyl acetate	2.53	2.55	Monoterpenic ester
Hexyl tiglate	0.04	0.04	Aliphatic ester
Hodiendiol derivative	0.02	0.02	Oxygenated monoterpene
Unknown	0.02	[0.17]*	Oxygenated monoterpene
Unknown	0.02	0.02	Oxygenated monoterpene
Hodiendiol derivative III	0.02		Oxygenated monoterpene
Neryl acetate	0.24	0.25*	Monoterpenic ester
7-Cubebene	0.04	[0.04]*	Sesquiterpene
β-Bourbonene	0.03	0.03	Sesquiterpene
Geranyl acetate	0.40	0.41	Monoterpenic ester
Hexyl hexanoate	0.15*	0.09	Aliphatic ester
7-epi-Sesquithujene	[0.15]*	0.05	Sesquiterpene
Isocaryophyllene	0.01	[31.15]*	Sesquiterpene
α-Cedrene	0.03*	tr	Sesquiterpene
Dodecanal	[0.03]*	0.03	Aliphatic aldehyde
β-Caryophyllene	4.29*	4.29*	Sesquiterpene
cis-α-Bergamotene	[4.29]*	0.38*	Sesquiterpene
α-Santalene	0.29	[0.38]*	Sesquiterpene

Lavandulyl isobutyrate	0.03	0.01	Monoterpenic ester
Coumarin	0.01	0.04	Coumarin
<i>trans</i> - α -Bergamotene	0.10	[4.29]*	Sesquiterpene
Sesquisabinene A	0.04	0.17	Sesquiterpene
α -Humulene	0.20	0.19*	Sesquiterpene
Lavandulyl butyrate?	0.08	0.06	Monoterpenic ester
(<i>E</i>)- β -Farnesene	2.66	2.70	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.01	[0.19]*	Sesquiterpene
Germacrene D	0.39	[2.64]*	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.04	[0.88]*	Sesquiterpene
Isodaucene	0.02	0.01	Sesquiterpene
Hodiendiol derivative II	0.03		Oxygenated monoterpene
γ -Cadinene	0.12*	0.08	Sesquiterpene
β -Bisabolene	[0.12]*	[0.25]*	Sesquiterpene
δ -Cadinene	0.03	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.01	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.19*	0.17	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.19]*	0.02	Sesquiterpenic ether
τ -Cadinol	0.04	0.05	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.01	tr	Sesquiterpenic alcohol
Total identified	99.09%	98.65%	

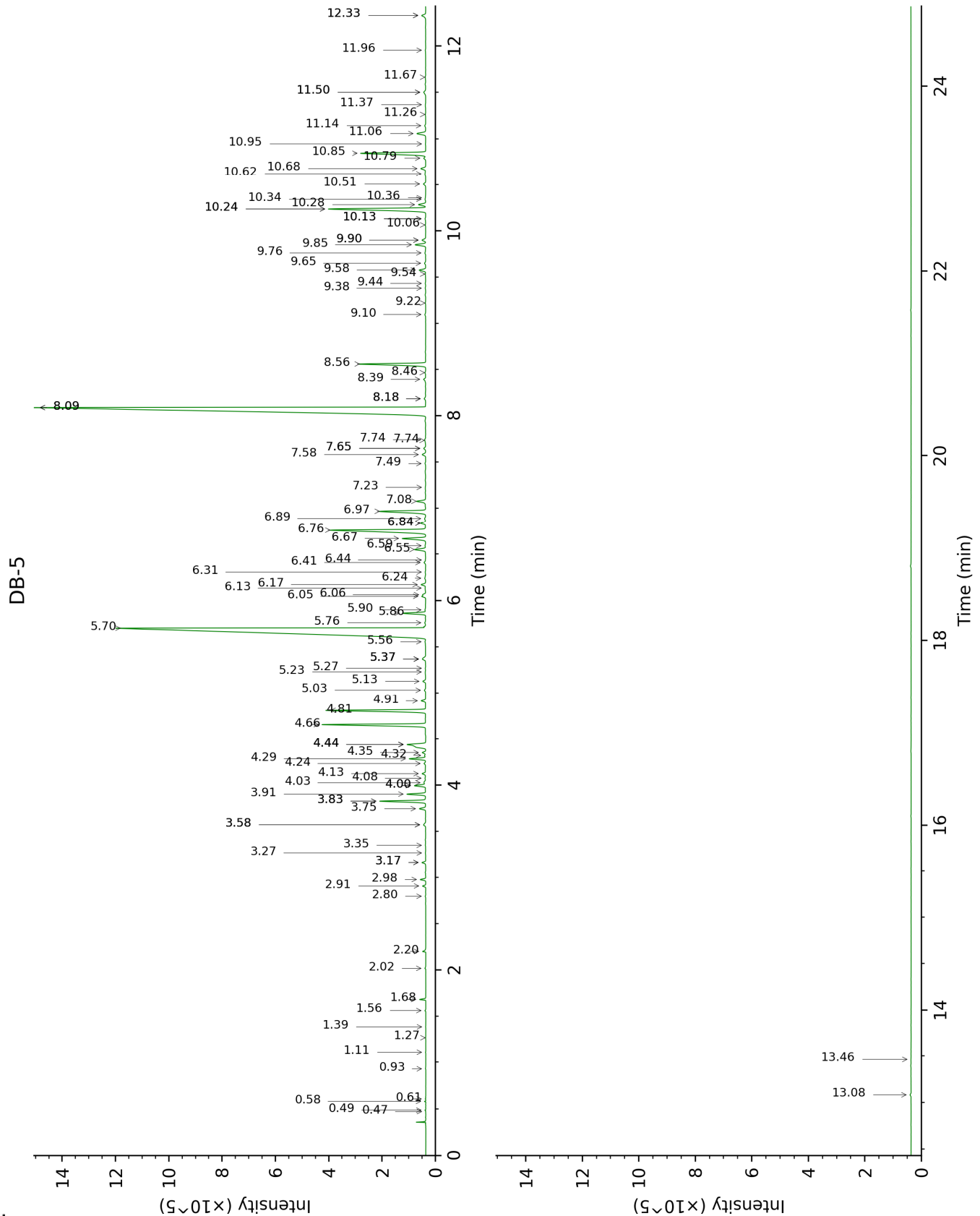
*: Two or more compounds are coeluting on this column

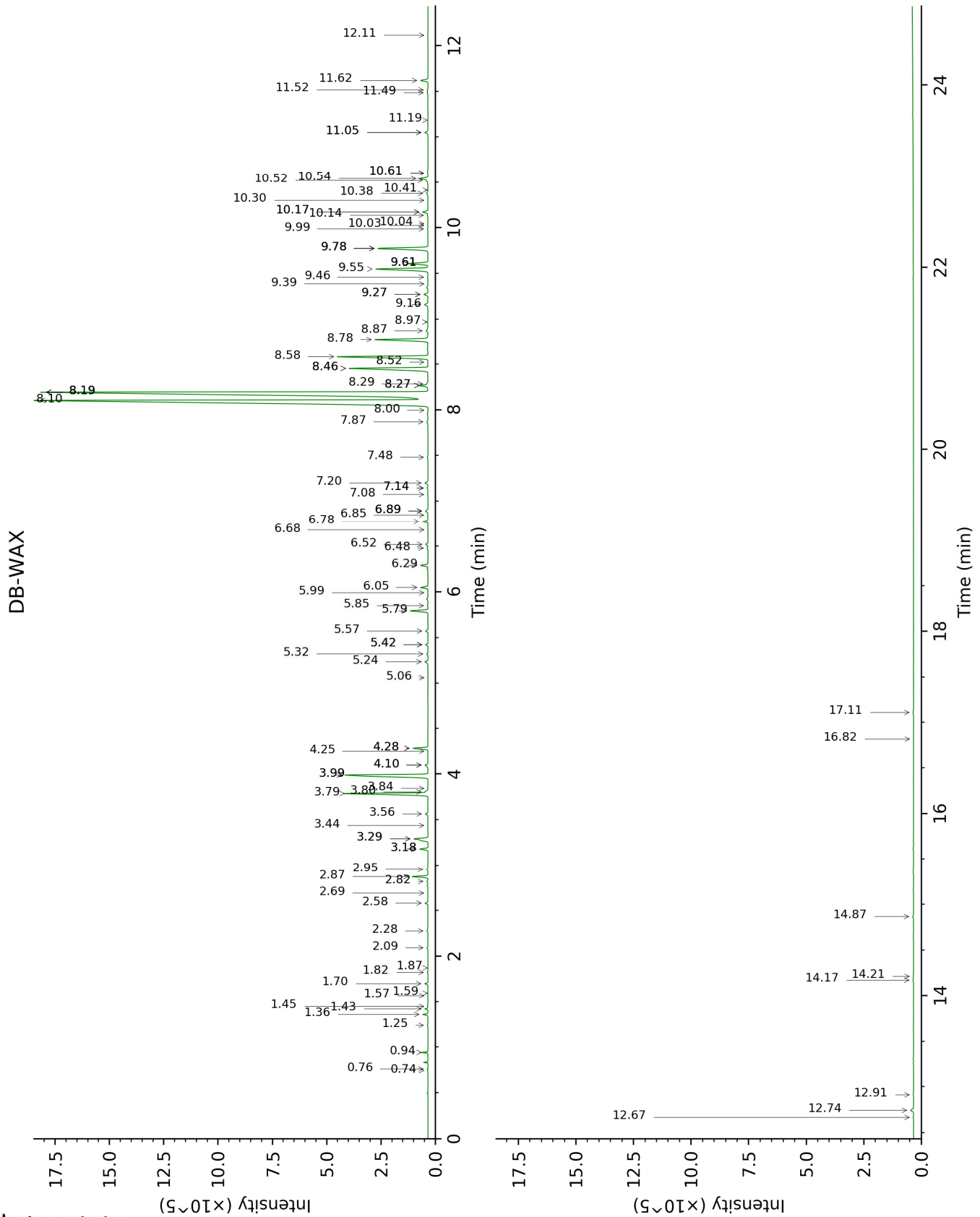
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	%
Acetic acid	0.47	596	tr	6.68	1412	tr
2-Methyl-3-buten-2-ol	0.49	604	0.01	1.57	1015	0.01
Isovaleral	0.58	637	0.02	0.76	884	0.02
2-Methylbutyral	0.61	647	0.01	0.74	878	0.01
Isoamyl alcohol	0.93	726	0.01	3.44	1178	0.01
Toluene	1.11	752	0.01	1.45	1003	tr
Prenal	1.27	776	tr	3.18*	1158	0.32
Hexanal	1.39	794	tr	1.87	1045	tr
Butyl acetate	1.56	812	0.02	1.82	1040	0.02
Methyl hexyl ether	1.68	822	0.14	0.94	922	0.14
(3Z)-Hexenol	2.02	851	0.02	5.85	1352	0.03
Hexanol	2.20	867	0.08	5.42*	1322	0.10
Tricyclene	2.80	914	0.01	1.24	972	0.02
α -Thujene	2.91	922	0.09	1.42	1001	0.09
α -Pinene	2.98	926	0.16	1.36	992	0.16
Camphene	3.17*	939	0.12	1.70	1028	0.11
α -Fenchene	3.17*	939	[0.12]	1.60	1018	tr
5,5-Dimethyl-2(5H)-furanone	3.27	946	0.01	8.52	1551	tr
Butyl isobutyrate	3.35	952	0.01	2.69	1120	0.01
β -Pinene	3.58*	967	0.09	2.09	1067	0.04
Sabinene	3.58*	967	[0.09]	2.28	1085	0.04
Octen-3-ol	3.75	978	0.21	6.78	1419	0.24
Octan-3-one	3.83*	984	1.47	3.99*	1219	5.01
6-Methyl-5-hepten-2-one	3.83*	984	[1.47]	5.06	1294	0.01
Myrcene	3.91	989	0.58	2.87	1134	0.58
Butyl butyrate	4.00*	995	0.39	3.56	1188	0.10
Octan-3-ol	4.00*	995	[0.39]	6.05	1366	0.30
α -Phellandrene	4.03	997	0.07	2.82	1130	0.04
<i>cis</i> -Dehydroxylinalool oxide	4.08	1000	0.01	3.84	1208	tr
Δ 3-Carene	4.13	1004	0.10	2.58	1112	0.11
α -Terpinene	4.24	1010	0.04	2.95	1141	0.05
Hexyl acetate	4.29	1014	0.53	4.28*	1239	0.61
ortho-Cymene	4.32	1016	0.04	4.10*	1226	0.12
para-Cymene	4.35	1018	0.11	4.10*	1226	[0.12]
Limonene	4.44*	1024	1.18	3.18*	1158	[0.32]
1,8-Cineole	4.44*	1024	[1.18]	3.29*	1167	0.86
β -Phellandrene	4.44*	1024	[1.18]	3.29*	1167	[0.86]
(Z)- β -Ocimene	4.66	1037	3.68	3.79	1204	3.76
(E)- β -Ocimene	4.81	1047	3.50	3.99*	1219	[5.01]
γ -Terpinene	4.91	1053	0.14	3.80	1206	0.10
<i>cis</i> -Sabinene hydrate	5.03	1061	0.04	6.89*	1428	0.13

<i>cis</i> -Linalool oxide (fur.)	5.13	1067	0.09	6.52	1400	0.10
Octanol	5.23	1074	0.02	8.19*	1526	31.15
α -Pinene oxide analog	5.27	1076	0.01	5.42*	1322	[0.10]
Terpinolene	5.37*	1082	0.17	4.28*	1239	[0.61]
Isoterpinolene	5.37*	1082	[0.17]	4.25	1237	tr
<i>trans</i> -Linalool oxide (fur.)	5.37*	1082	[0.17]	6.89*	1428	[0.13]
Rosefuran	5.56	1094	0.02	5.99	1362	0.01
Linalool	5.70	1103	32.09	8.10	1519	32.20
(<i>Z</i>)-6-Methyl-3,5-heptadien-2-one	5.76	1107	0.02	8.19*	1526	[31.15]
Octen-3-yl acetate	5.86	1114	0.75	5.80	1348	0.76
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	5.90	1116	0.02	9.61*	1637	0.88
Octan-3-yl acetate	6.05	1126	0.13	5.24	1308	0.15
allo-Ocimene	6.06	1127	0.09	5.57	1332	0.10
(<i>Z</i>)-Myroxide	6.14	1131	0.03	6.85	1425	0.02
Camphor	6.17	1134	0.16	7.20	1451	0.15
(<i>E</i>)-Myroxide	6.24	1138	0.03	7.14*	1447	0.04
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.31	1142	0.01	7.08	1442	0.01
Hexyl isobutyrate	6.41	1149	0.06	5.32	1314	0.05
Nerol oxide	6.44	1151	0.01	6.89*	1428	[0.13]
Borneol	6.55	1158	0.40	9.78*	1650	2.64
<i>cis</i> -Linalool oxide (pyr.)	6.59	1161	0.02	10.30	1693	0.01
Lavandulol	6.67	1166	0.87	9.61*	1637	[0.88]
Terpinen-4-ol	6.76	1172	4.45	8.58	1556	4.38
meta-Cymen-8-ol	6.84*	1176	0.18	11.52	1796	0.04
<i>trans</i> -Linalool oxide (pyr.)	6.84*	1176	[0.18]	10.60*	1719	0.05
para-Cymen-8-ol	6.89	1180	0.04	11.49	1794	0.04
α -Terpineol	6.97	1185	1.85	9.78*	1650	[2.64]
Hexyl butyrate	7.08	1192	0.35	6.29	1384	0.31
Unknown [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.23	1202	0.01			
Bornyl formate	7.48	1219	0.03			
Nerol	7.58	1225	0.14	11.05*	1757	0.17
Cuminal	7.65*	1230	0.08	10.60*	1719	[0.05]
Hexyl 2-methylbutyrate	7.65*	1230	[0.08]	6.48	1398	0.03
Carvone	7.74	1236	0.03	10.04	1672	0.02
Neral	7.74	1236	0.03	9.46	1625	0.03
Linalyl acetate	8.09*	1260	31.76	8.19*	1526	[31.15]
Geraniol	8.09*	1260	[31.76]	11.62	1805	0.34

<i>trans</i> -Ascaridole glycol	8.18*	1266	0.06	14.21	2043	0.03
Geranial	8.18*	1266	[0.06]	10.14	1680	0.04
Bornyl acetate	8.39	1280	0.08	8.29	1533	0.04
Cuminol	8.46	1285	0.03	14.17	2039	0.03
Lavandulyl acetate	8.56	1291	2.53	8.78	1571	2.55
Hexyl tiglate	9.10	1329	0.04	8.97	1586	0.04
Hodiendiol derivative	9.22	1338	0.02	12.91	1921	0.02
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.38	1349	0.02	11.05*	1757	[0.17]
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.44	1353	0.02	11.18	1768	0.02
Hodiendiol derivative III	9.54	1360	0.02			
Neryl acetate	9.58	1363	0.24	10.17*	1683	0.25
7-Cubebene	9.65	1368	0.04	7.14*	1447	[0.04]
β-Bourbonene	9.76	1376	0.03	7.48	1472	0.03
Geranyl acetate	9.85	1382	0.40	10.54	1713	0.41
Hexyl hexanoate	9.90*	1386	0.15	8.87	1578	0.09
7-epi-Sesquithujene	9.90*	1386	[0.15]	7.87	1501	0.05
Isocaryophyllene	10.06	1397	0.01	8.19*	1526	[31.15]
α-Cedrene	10.13*	1402	0.03	8.00	1510	tr
Dodecanal	10.13*	1402	[0.03]	9.99	1668	0.03
β-Caryophyllene	10.24*	1410	4.29	8.46*	1546	4.29
<i>cis</i> -α-Bergamotene	10.24*	1410	[4.29]	8.27*	1531	0.38
α-Santalene	10.28	1413	0.29	8.27*	1531	[0.38]
Lavandulyl isobutyrate	10.34	1418	0.03	9.39	1619	0.01
Coumarin	10.36	1419	0.01	17.11	2338	0.04
<i>trans</i> -α-Bergamotene	10.51	1430	0.10	8.46*	1546	[4.29]
Sesquisabinene A	10.62	1439	0.04	9.16	1601	0.17
α-Humulene	10.68	1443	0.20	9.27*	1610	0.19
Lavandulyl butyrate?	10.79	1451	0.08	10.52	1712	0.06
(<i>E</i>)-β-Farnesene	10.85	1455	2.66	9.55	1632	2.70
<i>trans</i> -Cadina-1(6),4-diene	10.95	1463	0.01	9.27*	1610	[0.19]
Germacrene D	11.06	1471	0.39	9.78*	1650	[2.64]
<i>trans</i> -β-Bergamotene	11.14	1478	0.04	9.61*	1637	[0.88]
Isodaucene	11.26	1487	0.02	10.03	1671	0.01
Hodiendiol derivative II	11.37	1495	0.03			

γ-Cadinene	11.50*	1505	0.12	10.38	1700	0.08
β-Bisabolene	11.50*	1505	[0.12]	10.17*	1683	[0.25]
δ-Cadinene	11.67	1518	0.03	10.41	1703	0.01
Isocaryophyllene epoxide B	11.96	1540	0.01	12.11	1849	0.02
Caryophyllene oxide	12.33*	1570	0.19	12.74	1905	0.17
Caryophyllene oxide isomer	12.33*	1570	[0.19]	12.67	1898	0.02
τ-Cadinol	13.08	1631	0.04	14.87	2107	0.05
(3Z)-Caryophylla- 3,8(13)-dien-5β-ol	13.46	1662	0.01	16.82	2307	tr
Total identified		99.09%			98.65%	
Total reported		99.16%			98.67%	

*: 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

R.T.: Retention time (minutes)

R.I.: Retention index