

GC/MS BATCH NUMBER: L40110

ESSENTIAL OIL: LAVENDER
BOTANICAL NAME: LAVANDULA ANGUSTIFOLIA
ORIGIN: GREECE

KEY CONSTITUENTS PRESENT IN THIS BATCH OF LAVENDER OIL	%
LINALOOL	31.4
LINALYL ACETATE	28.9
(Z)- β -OCIMENE	5.5
TERPINEN-4-OL	5.3
LAVANDULYL ACETATE	3.5
cis- α -BERGAMOTENE + β -CARYOPHYLLENE	3.5
(E)- β -OCIMENE	2.7
(E)- β -FARNESENE	2.5
α -TERPINEOL	1.2
OCTEN-3-YL ACETATE	1.0

Comments from Robert Tisserand: Has a beautiful fine, dry odor profile. There is no ISO standard for Greek Lavender oil, but in terms of constituents it's very much in line with a French or Bulgarian Lavender.

Date : May 09, 2018

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18D30-PTH1-1-CC

Customer identification : Lavender - Greece - L4011079R

Type : Essential oil

Source : *Lavandula angustifolia*

Customer : Plant Therapy

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 04, 2018

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4615 ± 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	0.01	0.01	Aliphatic ketone
Acetic acid	0.01	0.01	Aliphatic acid
2-Methyl-3-buten-2-ol	0.03	0.03	Aliphatic alcohol
Isovaleral	tr	tr	Aliphatic aldehyde
2-Methylbutyral	tr	tr	Aliphatic aldehyde
Isoamyl alcohol	0.01	0.01	Aliphatic alcohol
Toluene	0.01	0.04	Simple phenolic
Prenal	0.01	0.35*	Aliphatic aldehyde
Butyl acetate	0.02	0.02	Aliphatic ester
Methyl hexyl ether	0.08	0.08	Aliphatic ether
(3Z)-Hexenol	0.02	1.04*	Aliphatic alcohol
Hexanol	0.06	0.06	Aliphatic alcohol
Tricyclene	0.02	0.03	Monoterpene
α -Thujene	0.13	0.13	Monoterpene
α -Pinene	0.30	0.31	Monoterpene
Camphene	0.18*	0.17	Monoterpene
α -Fenchene	[0.18]*	tr	Monoterpene
5,5-Dimethyl-2(5H)-furanone	0.02	3.51*	Aliphatic lactone
Butyl isobutyrate	0.02	0.01	Aliphatic ester
β -Pinene	0.13*	0.06	Monoterpene
Sabinene	[0.13]*	0.04	Monoterpene
Octen-3-ol	0.25	0.26	Aliphatic alcohol
Octan-3-one	0.88*	3.63*	Aliphatic ketone
6-Methyl-5-hepten-2-one	[0.88]*	0.01	Aliphatic ketone
Myrcene	0.70	0.69	Monoterpene
Butyl butyrate	0.23*	0.10	Aliphatic ester
Octan-3-ol	[0.23]*	0.15	Aliphatic alcohol
α -Phellandrene	0.04	0.04	Monoterpene
<i>cis</i> -Dehydroxylinalool oxide	0.01	0.01	Monoterpenic ether
Δ^3 -Carene	0.15	0.15	Monoterpene
α -Terpinene	0.05	0.05	Monoterpene
Hexyl acetate	0.46	0.57*	Aliphatic ester
ortho-Cymene	0.04	0.29*	Simple phenolic
para-Cymene	0.24	[0.29]*	Monoterpene
Limonene	1.35*	[0.35]*	Monoterpene
1,8-Cineole	[1.35]*	1.00*	Monoterpenic ether
β -Phellandrene	[1.35]*	[1.00]*	Monoterpene
(Z)- β -Ocimene	5.52	5.65	Monoterpene
(E)- β -Ocimene	2.73	[3.63]*	Monoterpene
γ -Terpinene	0.17	0.11	Monoterpene
<i>cis</i> -Sabinene hydrate	0.06	0.19*	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.18	0.18	Monoterpenic alcohol
Octanol	0.04	28.56*	Aliphatic alcohol
α -Pinene oxide analog	0.03	0.02*	Monoterpenic ether
Isoterpinolene	0.01	0.01	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	0.24*	[0.19]*	Monoterpenic alcohol
Terpinolene	[0.24]*	[0.57]*	Monoterpene
α -Pinene oxide	tr	[0.02]*	Monoterpenic ether

Rosefuran	0.04	0.03	Monoterpenic ether
Linalool	31.43	31.60*	Monoterpenic alcohol
(Z)-6-Methyl-3,5-heptadien-2-one	0.06	[28.56]*	Aliphatic ketone
Octen-3-yl acetate	1.03	[1.04]*	Aliphatic ester
Unknown	0.03	0.02	Unknown
Octan-3-yl acetate	0.06	0.06	Aliphatic ester
allo-Ocimene	0.06	0.07	Monoterpene
(Z)-Myroxide	0.03	0.04*	Monoterpenic ether
Camphor	0.41	0.39*	Monoterpenic ketone
(E)-Myroxide	0.02	0.02	Monoterpenic ether
Unknown	0.01	0.01	Oxygenated monoterpene
Hexyl isobutyrate	0.10	0.09	Aliphatic ester
Nerol oxide	0.02	[0.04]*	Aliphatic ether
Borneol	0.67	2.05*	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.01	0.02	Monoterpenic alcohol
Lavandulol	0.79	0.80	Monoterpenic alcohol
Terpinen-4-ol	5.38*	5.31	Monoterpenic alcohol
(3E,5E)-Undeca-1,3,5-triene	[5.38]*	0.05	Alkene
meta-Cymen-8-ol	0.17*	0.06	Monoterpenic alcohol
trans-Linalool oxide (pyr.)	[0.17]*	0.01	Monoterpenic alcohol
Cryptone	0.06*	0.13*	Normonoterpenic ketone
para-Cymen-8-ol	[0.06]*	0.07	Monoterpenic alcohol
α-Terpineol	1.16	[2.05]*	Monoterpenic alcohol
Hexyl butyrate	0.38*	0.35	Aliphatic ester
Hodiendiol	[0.38]*	0.03	Monoterpenic alcohol
Unknown	0.03		Unknown
Bornyl formate	0.05		Monoterpenic ester
Nerol	0.20	0.22*	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.06	0.05	Aliphatic ester
Carvone	0.06*	0.01	Monoterpenic ketone
Neral	[0.06]*	2.55*	Monoterpenic aldehyde
Hexyl isovalerate	0.01	tr	Aliphatic ester
Geraniol	29.35*	0.47	Monoterpenic alcohol
Linalyl acetate	[29.35]*	[28.56]*	Monoterpenic ester
trans-Ascaridole glycol	0.02	0.01	Monoterpenic alcohol
Geranial	0.03	0.04	Monoterpenic aldehyde
Bornyl acetate	0.18	0.68*	Monoterpenic ester
Lavandulyl acetate	3.51*	3.49	Monoterpenic ester
Cuminol	[3.51]*	0.02	Monoterpenic alcohol
Hexyl tiglate	0.05	0.05	Aliphatic ester
Hodiendiol derivative	0.02	0.03	Oxygenated monoterpene
Unknown	0.03	[0.22]*	Oxygenated monoterpene
Unknown	0.03	0.03	Oxygenated monoterpene
Hodiendiol derivative III	0.02		Oxygenated monoterpene
Neryl acetate	0.35	0.35*	Monoterpenic ester
7-Cubebene	0.02	0.02	Sesquiterpene
Daucene	0.02	[0.39]*	Sesquiterpene
β-Bourbonene	0.05	0.05	Sesquiterpene
7-epi-Sesquithujene?	0.02	0.01	Sesquiterpene
Geranyl acetate	0.62	0.65	Monoterpenic ester
7-epi-Sesquithujene	0.13*	0.07	Sesquiterpene
Hexyl hexanoate	[0.13]*	0.07	Aliphatic ester

α -Funebrene	0.01	0.02	Sesquiterpene
Isocaryophyllene	0.02	[28.56]*	Sesquiterpene
Sesquithujene	0.01	[31.60]*	Sesquiterpene
α -Cedrene	0.03	0.04	Sesquiterpene
<i>cis</i> - α -Bergamotene	3.48*	[0.68]*	Sesquiterpene
β -Caryophyllene	[3.48]*	[3.51]*	Sesquiterpene
α -Santalene	0.46	[0.68]*	Sesquiterpene
Lavandulyl isobutyrate	0.01	0.01	Monoterpenic ester
<i>trans</i> - α -Bergamotene	0.15	[3.51]*	Sesquiterpene
Sesquisabinene A	0.07*	0.03	Sesquiterpene
Isogermacrene D	[0.07]*	0.04	Sesquiterpene
α -Humulene	0.11	0.11	Sesquiterpene
Lavandulyl butyrate?	0.11*	0.02	Monoterpenic ester
β -Santalene	[0.11]*	[0.13]*	Sesquiterpene
(<i>E</i>)- β -Farnesene	2.47	[2.55]*	Sesquiterpene
Dauca-5,8-diene?	0.02	0.02	Sesquiterpene
Germacrene D	0.24	[2.05]*	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.06*	[2.55]*	Sesquiterpene
<i>ar</i> -Curcumene	[0.06]*	0.01	Sesquiterpene
Isodaucene	0.01	0.03	Sesquiterpene
γ -Cadinene	0.14*	0.11	Sesquiterpene
β -Bisabolene	[0.14]*	[0.35]*	Sesquiterpene
Lavandulyl isovalerate	[0.14]*	0.03	Monoterpenic ester
δ -Cadinene	0.02*	0.01	Sesquiterpene
<i>trans</i> -Calamenene	[0.02]*	0.02	Sesquiterpene
β -Sesquiphellandrene	0.01	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.03	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.31*	0.26	Sesquiterpenic ether
Dendrolasin	[0.31]*	0.02	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.31]*	0.04	Sesquiterpenic ether
Humulene epoxide II	tr	tr	Sesquiterpenic ether
τ -Cadinol	0.04	0.04	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.01	0.02	Sesquiterpenic alcohol
α -Bisabolol	0.01	0.01	Sesquiterpenic alcohol
Total identified	98.93%	98.52%	

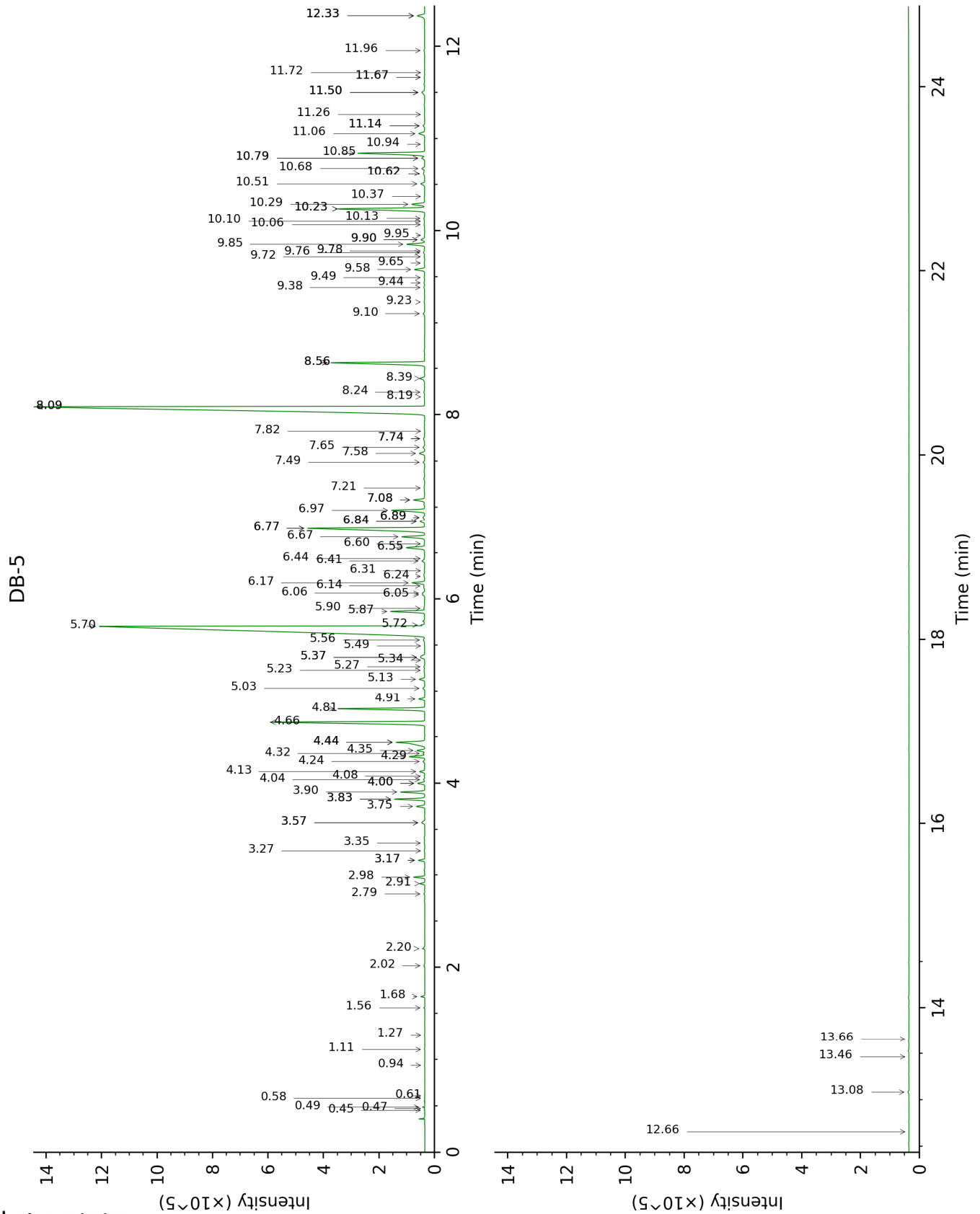
*: Two or more compounds are coeluting on this column

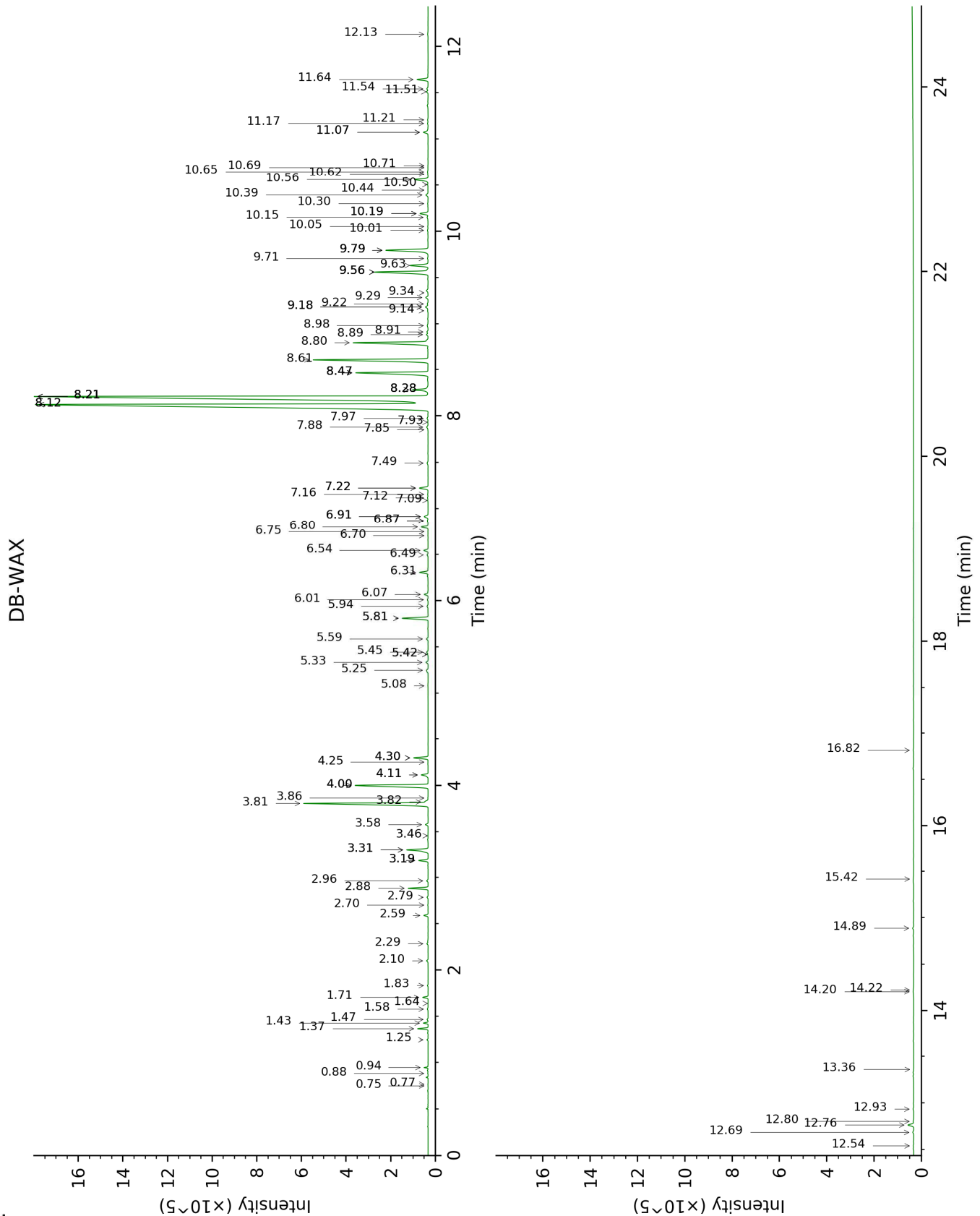
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	0.01	0.88	912	0.01
Acetic acid	0.47	595	0.01	6.70	1414	0.01
2-Methyl-3-buten-2-ol	0.49	604	0.03	1.58	1016	0.03
Isovaleral	0.58	637	tr	0.77	886	tr
2-Methylbutyral	0.61	647	tr	0.75	879	tr
Isoamyl alcohol	0.94	726	0.01	3.46	1179	0.01
Toluene	1.11	752	0.01	1.47	1005	0.04
Prenal	1.27	776	0.01	3.19*	1159	0.35
Butyl acetate	1.56	812	0.02	1.83	1041	0.02
Methyl hexyl ether	1.68	822	0.08	0.94	922	0.08
(3Z)-Hexenol	2.02	851	0.02	5.81*	1349	1.04
Hexanol	2.20	867	0.06	5.45	1323	0.06
Tricyclene	2.80	914	0.02	1.25	973	0.03
α-Thujene	2.91	922	0.13	1.43	1001	0.13
α-Pinene	2.98	926	0.30	1.37	992	0.31
Camphene	3.17*	939	0.18	1.71	1029	0.17
α-Fenchene	3.17*	939	[0.18]	1.64	1022	tr
5,5-Dimethyl-2(5H)-furanone	3.27	946	0.02	8.47*	1547	3.51
Butyl isobutyrate	3.35	952	0.02	2.70	1121	0.01
β-Pinene	3.57*	966	0.13	2.10	1068	0.06
Sabinene	3.57*	966	[0.13]	2.28	1086	0.04
Octen-3-ol	3.75	978	0.25	6.80	1421	0.26
Octan-3-one	3.83*	984	0.88	4.00*	1219	3.63
6-Methyl-5-hepten-2-one	3.83*	984	[0.88]	5.08	1296	0.01
Myrcene	3.90	989	0.70	2.88	1135	0.69
Butyl butyrate	4.00*	995	0.23	3.58	1189	0.10
Octan-3-ol	4.00*	995	[0.23]	6.07	1368	0.15
α-Phellandrene	4.04	998	0.04	2.79	1128	0.04
cis-Dehydroxylinalool oxide	4.08	1000	0.01	3.86	1210	0.01
Δ3-Carene	4.13	1004	0.15	2.59	1112	0.15
α-Terpinene	4.24	1010	0.05	2.96	1141	0.05
Hexyl acetate	4.29	1014	0.46	4.30*	1240	0.57
ortho-Cymene	4.32	1016	0.04	4.11*	1227	0.29
para-Cymene	4.35	1018	0.24	4.11*	1227	[0.29]
Limonene	4.44*	1024	1.35	3.19*	1159	[0.35]
1,8-Cineole	4.44*	1024	[1.35]	3.30*	1168	1.00
β-Phellandrene	4.44*	1024	[1.35]	3.30*	1168	[1.00]
(Z)-β-Ocimene	4.66	1037	5.52	3.81	1206	5.65
(E)-β-Ocimene	4.81	1047	2.73	4.00*	1219	[3.63]
γ-Terpinene	4.91	1053	0.17	3.82	1207	0.11
cis-Sabinene hydrate	5.03	1061	0.06	6.91*	1430	0.19
cis-Linalool oxide	5.13	1067	0.18	6.54	1402	0.18

(fur.)						
Octanol	5.23	1073	0.04	8.21*	1527	28.56
α -Pinene oxide analog	5.27	1076	0.03	5.42*	1322	0.02
Isoterpinolene	5.34	1080	0.01	4.25	1237	0.01
<i>trans</i> -Linalool oxide (fur.)	5.37*	1082	0.24	6.91*	1430	[0.19]
Terpinolene	5.37*	1082	[0.24]	4.30*	1240	[0.57]
α -Pinene oxide	5.49	1090	tr	5.42*	1322	[0.02]
Rosefuran	5.56	1094	0.04	6.01	1364	0.03
Linalool	5.70	1104	31.43	8.12*	1520	31.60
(<i>Z</i>)-6-Methyl-3,5-heptadien-2-one	5.72	1104	0.06	8.21*	1527	[28.56]
Octen-3-yl acetate	5.87	1114	1.03	5.81*	1349	[1.04]
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	5.90	1116	0.03	9.71	1645	0.02
Octan-3-yl acetate	6.05	1126	0.06	5.25	1309	0.06
allo-Ocimene	6.06	1127	0.06	5.59	1333	0.07
(<i>Z</i>)-Myroxide	6.14	1132	0.03	6.87*	1426	0.04
Camphor	6.18	1134	0.41	7.22*	1452	0.39
(<i>E</i>)-Myroxide	6.24	1138	0.02	7.12	1445	0.02
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.31	1142	0.01	7.09	1442	0.01
Hexyl isobutyrate	6.41	1149	0.10	5.34	1315	0.09
Nerol oxide	6.44	1151	0.02	6.87*	1426	[0.04]
Borneol	6.56	1158	0.67	9.80*	1652	2.05
<i>cis</i> -Linalool oxide (pyr.)	6.60	1161	0.01	10.30	1693	0.02
Lavandulol	6.67	1166	0.79	9.63	1639	0.80
Terpinen-4-ol	6.77*	1172	5.38	8.61	1558	5.31
(3 <i>E</i> ,5 <i>E</i>)-Undeca-1,3,5-triene	6.77*	1172	[5.38]	5.94	1359	0.05
meta-Cymen-8-ol	6.84*	1177	0.17	11.54	1798	0.06
<i>trans</i> -Linalool oxide (pyr.)	6.84*	1177	[0.17]	10.62	1720	0.01
Cryptone	6.89*	1180	0.06	9.18*	1603	0.13
para-Cymen-8-ol	6.89*	1180	[0.06]	11.51	1796	0.07
α -Terpineol	6.97	1185	1.16	9.80*	1652	[2.05]
Hexyl butyrate	7.08*	1192	0.38	6.31	1385	0.35
Hodiendiol	7.08*	1192	[0.38]	12.80	1911	0.03
Unknown [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.21	1200	0.03			
Bornyl formate	7.49	1219	0.05			
Nerol	7.58	1225	0.20	11.08*	1759	0.22
Hexyl 2-methylbutyrate	7.65	1230	0.06	6.49	1398	0.05
Carvone	7.74*	1236	0.06	10.05	1673	0.01
Neral	7.74*	1236	[0.06]	9.56*	1633	2.55

Hexyl isovalerate	7.82	1242	0.01	6.75	1417	tr
Geraniol	8.09*	1259	29.35	11.64	1808	0.47
Linalyl acetate	8.09*	1259	[29.35]	8.21*	1527	[28.56]
<i>trans</i> -Ascaridole glycol	8.19	1267	0.02	14.22	2044	0.01
Geranial	8.24	1270	0.03	10.15	1681	0.04
Bornyl acetate	8.39	1280	0.18	8.28*	1532	0.68
Lavandulyl acetate	8.56*	1291	3.51	8.80	1572	3.49
Cuminol	8.56*	1291	[3.51]	14.20	2042	0.02
Hexyl tiglate	9.10	1329	0.05	8.92	1582	0.05
Hodiendiol derivative	9.23	1338	0.02	12.93	1923	0.03
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.38	1349	0.03	11.08*	1759	[0.22]
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.44	1353	0.03	11.17	1767	0.03
Hodiendiol derivative III	9.49	1357	0.02			
Neryl acetate	9.58	1363	0.35	10.19*	1684	0.35
7-Cubebene	9.65	1368	0.02	7.16	1447	0.02
Daucene	9.72	1373	0.02	7.22*	1452	[0.39]
β-Bourbonene	9.76	1376	0.05	7.49	1472	0.05
7-epi-Sesquithujene?	9.78	1377	0.02	7.85	1499	0.01
Geranyl acetate	9.85	1382	0.62	10.56	1715	0.65
7-epi-Sesquithujene	9.90*	1386	0.13	7.88	1501	0.07
Hexyl hexanoate	9.90*	1386	[0.13]	8.89	1579	0.07
α-Funebrene	9.95	1389	0.01	7.93	1506	0.02
Isocaryophyllene	10.06	1397	0.02	8.21*	1527	[28.56]
Sesquithujene	10.10	1400	0.01	8.12*	1520	[31.60]
α-Cedrene	10.13	1402	0.03	7.97	1509	0.04
<i>cis</i> -α-Bergamotene	10.24*	1410	3.48	8.28*	1532	[0.68]
β-Caryophyllene	10.24*	1410	[3.48]	8.47*	1547	[3.51]
α-Santalene	10.28	1414	0.46	8.28*	1532	[0.68]
Lavandulyl isobutyrate	10.37	1420	0.01	9.34	1615	0.01
<i>trans</i> -α-Bergamotene	10.51	1430	0.15	8.47*	1547	[3.51]
Sesquisabinene A	10.62*	1439	0.07	9.22	1605	0.03
Isogermacrene D	10.62*	1439	[0.07]	8.98	1587	0.04
α-Humulene	10.68	1443	0.11	9.29	1611	0.11
Lavandulyl butyrate?	10.79*	1451	0.11	10.50	1710	0.02
β-Santalene	10.79*	1451	[0.11]	9.18*	1603	[0.13]
(<i>E</i>)-β-Farnesene	10.84	1455	2.47	9.56*	1633	[2.55]
Dauca-5,8-diene?	10.94	1463	0.02	9.14	1599	0.02
Germacrene D	11.06	1471	0.24	9.80*	1652	[2.05]

<i>trans</i> -β-Bergamotene	11.14*	1478	0.06	9.56*	1633	[2.55]
ar-Curcumene	11.14*	1478	[0.06]	10.72	1728	0.01
Isodaucene	11.26	1487	0.01	10.01	1670	0.03
γ-Cadinene	11.50*	1505	0.14	10.39	1701	0.11
β-Bisabolene	11.50*	1505	[0.14]	10.19*	1684	[0.35]
Lavandulyl isovalerate	11.50*	1505	[0.14]	10.65	1722	0.03
δ-Cadinene	11.67*	1518	0.02	10.44	1705	0.01
<i>trans</i> -Calamenene	11.67*	1518	[0.02]	11.21	1770	0.02
β-Sesquiphellandrene	11.72	1522	0.01	10.69	1726	0.01
Isocaryophyllene epoxide B	11.96	1540	0.03	12.13	1851	0.02
Caryophyllene oxide	12.33*	1570	0.31	12.76	1907	0.26
Dendrolasin	12.33*	1570	[0.31]	12.54	1887	0.02
Caryophyllene oxide isomer	12.33*	1570	[0.31]	12.68	1900	0.04
Humulene epoxide II	12.66	1596	tr	13.36	1962	tr
τ-Cadinol	13.08	1631	0.04	14.89	2109	0.04
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.46	1662	0.01	16.82	2306	0.02
α-Bisabolol	13.66	1678	0.01	15.42	2162	0.01
Total identified		98.93%			98.52%	
Total reported		99.05%			98.58%	

*: 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