Date : July 29, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20G17-PTH03
Customer identification : Lavender Fine organic - Bontoux - LM010496R
Type : Essential oil
Source : *Lavandula angustifolia*
Customer : Plant Therapy

Analysis

Method: PC-MAT-014 ISO - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Fanny Charlier, B. Sc., chimiste à l'entraînement
Analysis date : July 27, 2020

Checked and approved by :

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

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Méthode certifiée ISO 17025:2017 Certified method

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4614 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 3515:2004 - OIL OF SPONTANEOUS LAVENDER - FRANCE

Compound	Min. %	Max. %	Observed %	Complies?
α-Terpineol		1.0	0.8	Yes
Lavandulyl acetate	2.0		3.7	Yes
Terpinen-4-ol	2	6	5	Yes
Lavandulol	0.3		0.9	Yes
Linalyl acetate	25	45	32	Yes
Linalool	25	38	29	Yes
Camphor	tr	0.50	0.22	Yes
Octan-3-one	tr	2.0	1.3	Yes
(E)-β-Ocimene	1.5	6.0	2.7	Yes
(Z)-β-Ocimene	4	10	4	Yes
β-Phellandrene	tr	0.50	0.20	Yes
1,8-Cineole		1.0	0.7	Yes
Limonene		0.5	0.3	Yes
Refractive index	1.4580	1.4640	1.4614	Yes

CONCLUSION

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

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Analysis summary – Consolidated contents

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	0.01	Aliphatic alcohol
Toluene	tr	Simple phenolic
Butyl acetate	0.02	Aliphatic ester
Methyl hexyl ether	0.12	Aliphatic ether
(3*Z*)-Hexenol	0.01	Aliphatic alcohol
Hexanol	0.06	Aliphatic alcohol
Unknown	tr	Unknown
Hashishene	tr	Monoterpene
Tricyclene	0.02	Monoterpene
α-Thujene	0.12	Monoterpene
α-Pinene	0.25	Monoterpene
Camphene	0.13	Monoterpene
α-Fenchene	0.02	Monoterpene
Butyl isobutyrate	0.02	Aliphatic ester
β-Pinene	0.04	Monoterpene
Sabinene	0.04	Monoterpene
Octen-3-ol	0.17	Aliphatic alcohol
Octan-3-one	1.32	Aliphatic ketone
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
trans-Dehydroxylinalool oxide	0.02	Monoterpenic ether
Myrcene	0.49	Monoterpene
Butyl butyrate	0.13	Aliphatic ester
Octan-3-ol	0.18	Aliphatic alcohol
α-Phellandrene	0.02	Monoterpene
Pseudolimonene	tr	Monoterpene
Δ3-Carene	0.12	Monoterpene
(3*Z*)-Hexenyl acetate	0.01	Aliphatic ester
α-Terpinene	0.04	Monoterpene
Hexyl acetate	0.59	Aliphatic ester
ortho-Cymene	0.04	Monoterpene
para-Cymene	0.20	Monoterpene
β-Phellandrene	0.20	Monoterpene
1,8-Cineole	0.67	Monoterpenic ether
Limonene	0.29	Monoterpene
(*Z*)-β-Ocimene	4.34	Monoterpene
(*E*)-β-Ocimene	2.67	Monoterpene
γ-Terpinene	0.15	Monoterpene
cis-Sabinene hydrate	0.09	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.13	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
α-Pinene oxide analog	0.05	Monoterpenic ether
Terpinolene	0.06	Monoterpene

trans-Linalool oxide (fur.)	0.10	Monoterpenic alcohol
Rosefuran	0.08	Monoterpenic ether
Linalool	28.60	Monoterpenic alcohol
(*Z*)-6-Methyl-3,5-heptadien-2-one	0.08	Aliphatic ketone
β-Thujone	0.08	Monoterpenic ketone
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
Octen-3-yl acetate	0.93	Aliphatic ester
Unknown	0.05	Unknown
Octan-3-yl acetate	0.14	Aliphatic ester
allo-Ocimene	0.07	Monoterpene
(*Z*)-Myroxide	0.02	Monoterpenic ether
Camphor	0.22	Monoterpenic ketone
cis-Verbenol	0.10	Monoterpenic alcohol
(*E*)-Myroxide	0.02	Monoterpenic ether
Unknown	0.02	Oxygenated monoterpene
Hexyl isobutyrate	0.09	Aliphatic ester
Nerol oxide	0.01	Aliphatic ether
Borneol	0.53	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.01	Monoterpenic alcohol
Lavandulol	0.86	Monoterpenic alcohol
Terpinen-4-ol	4.82	Monoterpenic alcohol
(3*E*,5*Z*)-Undeca-1,3,5-triene	0.04	Alkene
Cryptone	0.17	Normonoterpenic ketone
para-Cymen-8-ol	0.04	Monoterpenic alcohol
α-Terpineol	0.79	Monoterpenic alcohol
Hexyl butyrate	0.45	Aliphatic ester
Hodiendiol	0.01	Monoterpenic alcohol
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.03	Monoterpenic alcohol
7-Methyl-2-octyl acetate	0.01	Aliphatic ester
trans-Carveol	0.02	Monoterpenic alcohol
Bornyl formate	0.04	Monoterpenic ester
Nerol	0.13	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.07	Aliphatic ester
Carvone	0.05	Monoterpenic ketone
Neral	0.03	Monoterpenic aldehyde
Hexyl isovalerate	0.02	Aliphatic ester
Linalyl acetate	32.21	Monoterpenic ester
Geraniol	0.37	Monoterpenic alcohol
Geranial	0.03	Monoterpenic aldehyde
Bornyl acetate	0.16	Monoterpenic ester
Cuminol	0.02	Monoterpenic alcohol
Lavandulyl acetate	3.67	Monoterpenic ester
Hexyl tiglate	0.07	Aliphatic ester
Hodiendiol derivative	0.03	Oxygenated monoterpene
Unknown	0.03	Oxygenated monoterpene
Unknown	0.03	Oxygenated monoterpene
Neryl acetate	0.24	Monoterpenic ester
α-Copaene	0.01	Sesquiterpene
β-Bourbonene	0.06	Sesquiterpene
Geranyl acetate	0.41	Monoterpenic ester
7-epi-Sesquithujene	0.08	Sesquiterpene
Hexyl hexanoate	0.12	Aliphatic ester

Isocaryophyllene	0.02	Sesquiterpene
Sesquithujene	0.03	Sesquiterpene
β-Caryophyllene	3.68	Sesquiterpene
α-Santalene	0.42	Sesquiterpene
Coumarin	0.01	Coumarin
trans-α-Bergamotene	0.15	Sesquiterpene
Isogermacrene D	0.01	Sesquiterpene
Sesquisabinene A	0.02	Sesquiterpene
cis-β-Bergamotene?	0.06	Sesquiterpene
α-Humulene	0.12	Sesquiterpene
Lavandulyl butyrate?	0.11	Monoterpenic ester
(*E*)-β-Farnesene	3.24	Sesquiterpene
β-Santalene	0.02	Sesquiterpene
Germacrene D	0.43	Sesquiterpene
trans-β-Bergamotene	0.06	Sesquiterpene
Hodiendiol derivative II	0.02	Oxygenated monoterpene
Lavandulyl isovalerate	0.03	Monoterpenic ester
γ-Cadinene	0.06	Sesquiterpene
β-Bisabolene	0.03	Sesquiterpene
δ-Cadinene	0.05	Sesquiterpene
Isocaryophyllene epoxide B	0.05	Sesquiterpenic ether
(*E*)-Nerolidol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.35	Sesquiterpenic ether
Caryophyllene oxide isomer	0.06	Sesquiterpenic ether
τ-Cadinol	0.07	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.01	Sesquiterpenic alcohol
Herniarin	0.01	Coumarin
Consolidated total	**98.35%**	

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.

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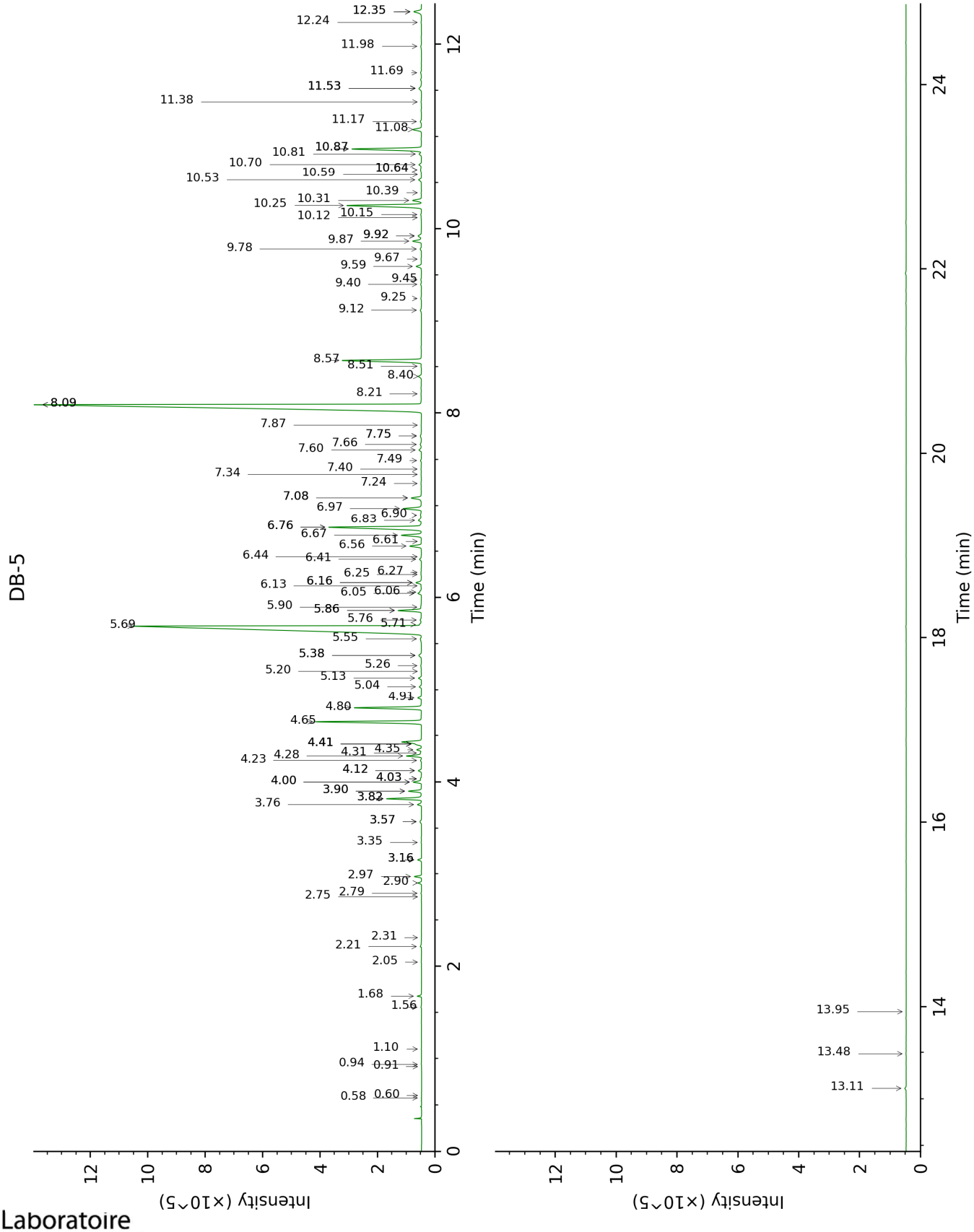
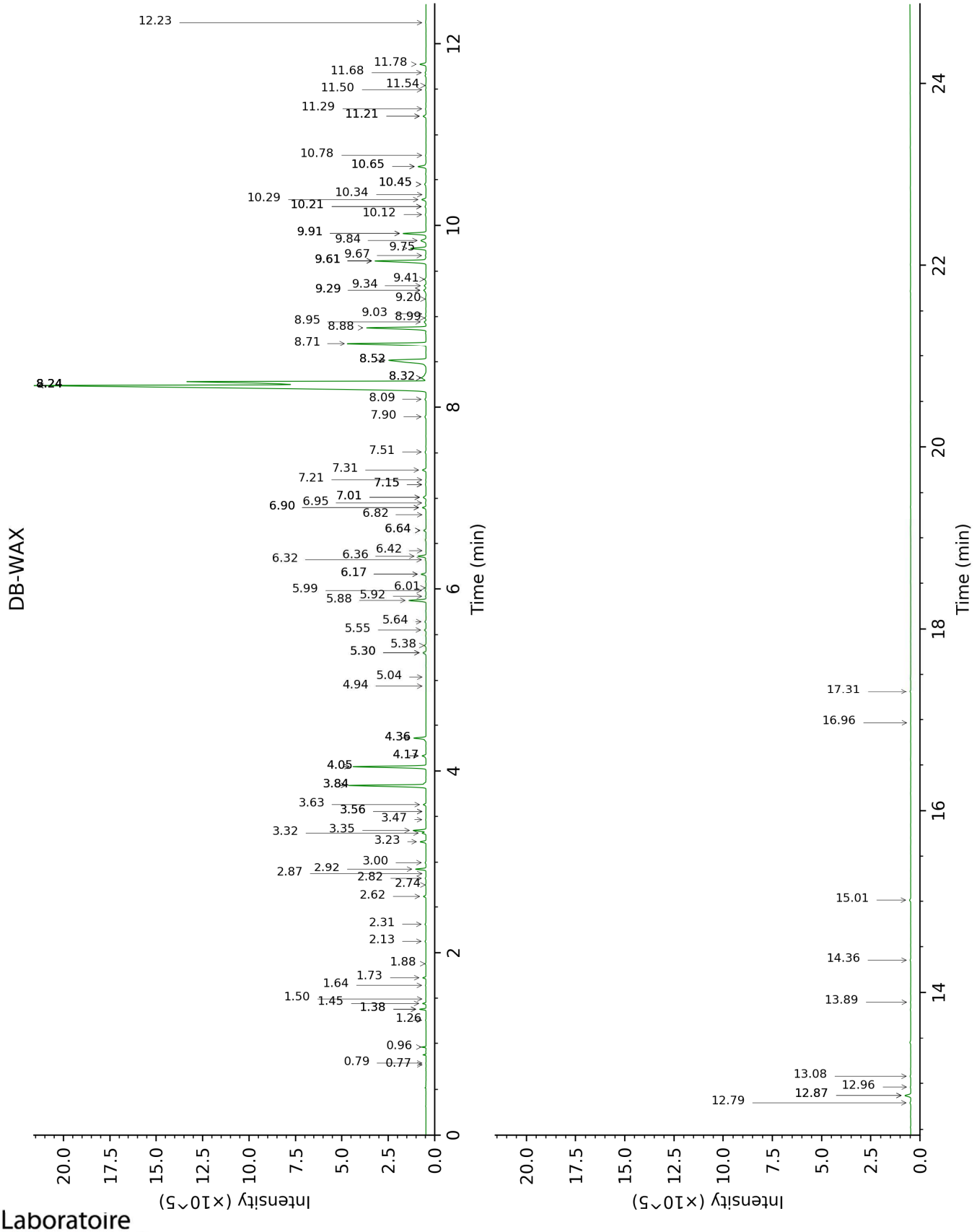

DB-5
Time (min)
Intensity (×10^5)
12.35
12.24
11.98
11.69
11.53
11.38
11.17
11.08
10.87
10.81
10.70
10.64
10.59
10.53
10.39
10.31
10.25
10.15
10.12
9.92
9.87
9.78
9.67
9.59
9.45
9.40
9.25
9.12
8.57
8.51
8.40
8.21
8.09
7.87
7.75
7.66
7.60
7.49
7.40
7.34
7.24
7.08
6.97
6.90
6.83
6.76
6.67
6.61
6.56
6.44
6.41
6.27
6.25
6.16
6.13
6.06
6.05
5.90
5.86
5.76
5.71
5.69
5.55
5.38
5.26
5.20
5.13
5.04
4.91
4.80
4.65
4.41
4.35
4.31
4.28
4.23
4.12
4.03
4.00
3.90
3.82
3.76
3.57
3.35
3.16
2.97
2.90
2.79
2.75
2.31
2.21
2.05
1.68
1.56
1.10
0.94
0.91
0.60
0.58
13.95
13.48
13.11


DB-WAX
Time (min)
Intensity (×10^5)
12.23
11.78
11.68
11.50
11.54
11.29
11.21
10.78
10.65
10.45
10.34
10.29
10.21
10.12
9.91
9.84
9.75
9.67
9.61
9.41
9.34
9.29
9.20
9.03
8.99
8.95
8.88
8.71
8.52
8.32
8.24
8.09
7.90
7.51
7.31
7.21
7.15
7.01
6.95
6.90
6.82
6.64
6.42
6.36
6.32
6.17
6.01
5.99
5.92
5.88
5.64
5.55
5.38
5.30
5.04
4.94
4.36
4.17
4.05
3.84
3.63
3.56
3.47
3.35
3.32
3.23
3.00
2.92
2.87
2.82
2.74
2.62
2.31
2.13
1.88
1.73
1.64
1.50
1.45
1.38
1.26
0.96
0.79
0.77
17.31
16.96
15.01
14.36
13.89
13.08
12.96
12.87
12.79

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.58	642	0.01	0.79	889	0.01
2-Methylbutyral	0.60	652	tr	0.77	882	tr
Isoamyl alcohol	0.91	731	tr	3.56*	1183	0.01
2-Methylbutanol	0.94	734	0.01	3.56*	1183	[0.01]
Toluene	1.10	758	tr	1.50	1002	0.01
Butyl acetate	1.56	817	0.02	1.88	1040	0.02
Methyl hexyl ether	1.68	827	0.12	0.96	919	0.13
(3*Z*)-Hexenol	2.05	858	0.01	5.92	1353	0.02
Hexanol	2.21	872	0.06	5.55	1327	0.08
Unknown [m/z 59, 85 (88), 41 (57), 43 (43)...]	2.31	880	tr	6.01	1360	0.02
Hashishene	2.75	915	tr	1.38*	990	0.24
Tricyclene	2.79	917	0.02	1.26	970	0.02
α-Thujene	2.90	925	0.12	1.45	997	0.13
α-Pinene	2.97	929	0.25	1.38*	990	[0.24]
Camphene	3.16*	942	0.14	1.73	1025	0.13
α-Fenchene	3.16*	942	[0.14]	1.64	1017	0.02
Butyl isobutyrate	3.35	955	0.02	2.82	1125	0.03
β-Pinene	3.57*	970	0.09	2.13	1065	0.04
Sabinene	3.57*	970	[0.09]	2.31	1084	0.04
Octen-3-ol	3.76	982	0.17	6.90*	1424	0.20
Octan-3-one	3.82*	986	1.33	4.05*	1219	4.00
6-Methyl-5-hepten-2-one	3.82*	986	[1.33]	5.04	1290	0.01
trans-Dehydroxylinalool oxide	3.90*	992	0.52	3.47	1176	0.02
Myrcene	3.90*	992	[0.52]	2.92	1133	0.49
Butyl butyrate	4.00*	998	0.35	3.63	1189	0.13
Octan-3-ol	4.00*	998	[0.35]	6.16*	1370	0.26
α-Phellandrene	4.03*	1001	0.05	2.74	1119	0.02
Pseudolimonene	4.03*	1001	[0.05]	2.87	1129	tr
Δ3-Carene	4.12*	1006	0.13	2.62	1110	0.12
(3*Z*)-Hexenyl acetate	4.12*	1006	[0.13]	4.94	1283	0.01
α-Terpinene	4.23	1014	0.04	3.00	1139	0.04
Hexyl acetate	4.28	1017	0.59	4.36*	1241	0.65
ortho-Cymene	4.31	1019	0.04	4.17*	1227	0.23
para-Cymene	4.35	1021	0.20	4.17*	1227	[0.23]
β-Phellandrene	4.41*†	1025	1.16	3.32	1164	0.20
1,8-Cineole	4.41*†	1025	[1.16]	3.35	1167	0.67
Limonene	4.41*†	1025	[1.16]	3.23	1157	0.29
(*Z*)-β-Ocimene	4.65	1040	4.34	3.84*	1204	4.44
(*E*)-β-Ocimene	4.80	1050	2.67	4.05*	1219	[4.00]
γ-Terpinene	4.91	1056	0.15	3.84*	1204	[4.44]
cis-Sabinene	5.04	1064	0.09	7.02*	1432	0.19

hydrate						
cis-Linalool oxide (fur.)	5.13	1070	0.13	6.64*	1405	0.13
Octanol	5.20	1075	0.01	8.24*†	1525	60.97
α-Pinene oxide analog	5.26	1079	0.05	5.38	1315	0.08
Terpinolene	5.38*	1086	0.17	4.36*	1241	[0.65]
trans-Linalool oxide (fur.)	5.38*	1086	[0.17]	7.02*	1432	[0.19]
Rosefuran	5.55	1097	0.08	6.16*	1370	[0.26]
Linalool	5.69	1106	28.60	8.24*†	1525	[60.97]
(*Z*)-6-Methyl-3,5-heptadien-2-one	5.71	1107	0.08	8.24*†	1525	[60.97]
β-Thujone	5.76	1110	0.08	6.32	1382	0.04
cis-para-Menth-2-en-1-ol	5.86*	1117	0.95	8.24*†	1525	[60.97]
Octen-3-yl acetate	5.86*	1117	[0.95]	5.88	1350	0.93
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	5.90	1120	0.05	9.67	1637	0.04
Octan-3-yl acetate	6.05	1129	0.14	5.30*	1309	0.19
allo-Ocimene	6.06	1130	0.07	5.64	1333	0.06
(*Z*)-Myroxide	6.13	1134	0.02	6.95	1428	0.04
Camphor	6.16*	1137	0.26	7.31	1454	0.22
cis-Verbenol	6.16*	1137	[0.26]	9.41	1616	0.10
(*E*)-Myroxide	6.25	1142	0.02	7.21	1446	0.02
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.27	1144	0.02	7.15*	1442	0.04
Hexyl isobutyrate	6.41	1153	0.09	5.30*	1309	[0.19]
Nerol oxide	6.44	1155	0.01	6.90*	1424	[0.20]
Borneol	6.56	1162	0.53	9.91*	1656	1.36
cis-Linalool oxide (pyr.)	6.61	1166	0.01	10.34	1690	0.02
Lavandulol	6.67	1170	0.86	9.75	1643	0.88
Terpinen-4-ol	6.76*	1176	4.84	8.71	1561	4.82
(3*E*,5*Z*)-Undeca-1,3,5-triene	6.76*	1176	[4.84]	5.99	1358	0.04
Cryptone	6.84	1180	0.17	9.29*	1606	0.18
para-Cymen-8-ol	6.90	1184	0.04	11.68	1804	0.05
α-Terpineol	6.97	1189	0.79	9.91*	1656	[1.36]
Hexyl butyrate	7.08*	1197	0.47	6.36	1384	0.45
Hodiendiol	7.08*	1197	[0.47]	12.87*	1908	0.37
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.24	1207	0.03	11.50	1787	0.02
7-Methyl-2-octyl acetate	7.34	1214	0.01	6.42	1389	0.01
trans-Carveol	7.40	1218	0.02	11.54	1791	0.03
Bornyl formate	7.49	1224	0.04	8.09	1513	0.07

Nerol	7.60	1229	0.13	11.21*	1763	0.18
Hexyl 2-methylbutyrate	7.66	1233	0.07	6.64*	1405	[0.13]
Carvone	7.75*	1239	0.08	10.12	1673	0.05
Neral	7.75*	1239	[0.08]	9.61*	1632	3.33
Hexyl isovalerate	7.87	1247	0.02	6.82	1418	0.01
Linalyl acetate	8.09*	1262	33.10	8.24*†	1525	[60.97]
Geraniol	8.09*	1262	[33.10]	11.78	1812	0.37
Geranial	8.21	1270	0.03	10.21*	1680	0.07
Bornyl acetate	8.40	1282	0.16	8.32*	1531	0.49
Cuminol	8.51	1290	0.02	14.36	2046	0.04
Lavandulyl acetate	8.57	1294	3.67	8.88	1574	3.64
Hexyl tiglate	9.12	1332	0.07	8.99	1582	0.06
Hodiendiol derivative	9.25	1341	0.03	13.08	1927	0.04
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.40	1352	0.03	11.21*	1763	[0.18]
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.45	1355	0.03	11.29	1770	0.04
Neryl acetate	9.59	1366	0.24	10.28	1686	0.26
α-Copaene	9.67	1371	0.01	7.15*	1442	[0.04]
β-Bourbonene	9.78	1379	0.06	7.51	1468	0.06
Geranyl acetate	9.87	1385	0.41	10.66*	1717	0.52
7-epi-Sesquithujene	9.92*	1389	0.20	7.90	1499	0.08
Hexyl hexanoate	9.92*	1389	[0.20]	8.94	1579	0.12
Isocaryophyllene	10.12	1403	0.02	8.24*†	1525	[60.97]
Sesquithujene	10.15	1405	0.03	8.24*†	1525	[60.97]
β-Caryophyllene	10.25	1412	3.68	8.52*	1546	3.76
α-Santalene	10.31	1416	0.42	8.32*	1531	[0.49]
Coumarin	10.39	1423	0.01	17.31	2344	0.05
trans-α-Bergamotene	10.53	1433	0.15	8.52*	1546	[3.76]
Isogermacrene D	10.59	1438	0.01	9.03	1586	0.03
Sesquisabinene A	10.64*	1442	0.08	9.29*	1606	[0.18]
cis-β-Bergamotene?	10.64*	1442	[0.08]			
α-Humulene	10.70	1446	0.12	9.34	1610	0.12
Lavandulyl butyrate?	10.82	1454	0.11	10.66*	1717	[0.52]
(*E*)-β-Farnesene	10.87*	1458	3.32	9.61*	1632	[3.33]
β-Santalene	10.87*	1458	[3.32]	9.20	1598	0.02
Germacrene D	11.08	1474	0.43	9.84	1650	0.43
trans-β-Bergamotene	11.17	1480	0.06	9.61*	1632	[3.33]
Hodiendiol derivative II	11.38	1496	0.02	12.96	1916	0.04

Lavandulyl isovalerate	11.52*	1507	0.18	10.78	1727	0.03
γ-Cadinene	11.52*	1507	[0.18]	10.45*	1700	0.12
β-Bisabolene	11.52*	1507	[0.18]	10.21*	1680	[0.07]
δ-Cadinene	11.69	1521	0.05	10.45*	1700	[0.12]
Isocaryophyllene epoxide B	11.98	1543	0.05	12.23	1851	0.03
(*E*)-Nerolidol	12.24	1563	0.02	13.90	2002	0.02
Caryophyllene oxide	12.35*	1572	0.45	12.87*	1908	[0.37]
Caryophyllene oxide isomer	12.35*	1572	[0.45]	12.79	1901	0.06
τ-Cadinol	13.11	1634	0.07	15.01	2109	0.08
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.48	1664	0.01	16.96	2307	0.02
Herniarin	13.95	1702	0.01			
Total identified		**98.90%**			**98.18%**	
Total reported		**99.04%**			**98.28%**	

*: 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