Date : May 24, 2022

Certificate of Analysis – GC Profiling

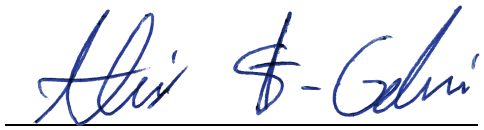
Sample identification

Internal code : 22E16-PTH02
Customer identification : Lavender ORGANIC - Greece - L50115R
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 : Seydou Ka, Ph. D.
Analysis date : May 24, 2022

Checked and approved by :



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

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Méthode certifiée ISO 17025:2017 Certified method

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4626 ± 0.0003 (20 °C; method PC-MAT-016)

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	0.01	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	0.01	Simple phenolic
Butyl acetate	0.03	Aliphatic ester
Methyl hexyl ether	0.09	Aliphatic ether
(3*Z*)-Hexenol	0.02	Aliphatic alcohol
Hexanol	0.06	Aliphatic alcohol
Tricyclene	0.02	Monoterpene
α-Thujene	0.14	Monoterpene
α-Pinene	0.29	Monoterpene
Camphene	0.13	Monoterpene
5,5-Dimethyl-2(5H)-furanone	0.01	Aliphatic lactone
Butyl isobutyrate	0.02	Aliphatic ester
Sabinene	0.03	Monoterpene
β-Pinene	0.03	Monoterpene
Octen-3-ol	0.21	Aliphatic alcohol
Octan-3-one	0.74	Aliphatic ketone
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	0.65	Monoterpene
Octan-3-ol	0.11	Aliphatic alcohol
Butyl butyrate	0.10	Aliphatic ester
α-Phellandrene	0.05	Monoterpene
Δ3-Carene	0.07	Monoterpene
α-Terpinene	0.06	Monoterpene
Hexyl acetate	0.49	Aliphatic ester
meta-Cymene	0.03	Monoterpene
para-Cymene	0.17	Monoterpene
Limonene	0.27	Monoterpene
1,8-Cineole	0.60	Monoterpenic ether
Lavender lactone	0.01	Aliphatic lactone
(*Z*)-β-Ocimene	8.03	Monoterpene
(*E*)-β-Ocimene	3.61	Monoterpene
γ-Terpinene	0.21	Monoterpene
cis-Sabinene hydrate	0.07	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.14	Monoterpenic alcohol
Octanol	0.04	Aliphatic alcohol
α-Pinene oxide analog	0.02	Monoterpenic ether
trans-Linalool oxide (fur.)	0.10	Monoterpenic alcohol
Terpinolene	0.10	Monoterpene
Rosefuran	0.05	Monoterpenic ether
Linalool	27.62	Monoterpenic alcohol
(*Z*)-6-Methyl-3,5-heptadien-2-one	0.03	Aliphatic ketone
Octen-3-yl acetate	0.99	Aliphatic ester

Unknown	0.03	Unknown
Octan-3-yl acetate	0.06	Aliphatic ester
allo-Ocimene	0.12	Monoterpene
(*Z*)-Myroxide	0.03	Monoterpenic ether
Camphor	0.22	Monoterpenic ketone
(*E*)-Myroxide	0.04	Monoterpenic ether
Hexyl isobutyrate	0.09	Aliphatic ester
Nerol oxide	0.01	Aliphatic ether
Borneol	0.41	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.01	Monoterpenic alcohol
Lavandulol	0.78	Monoterpenic alcohol
Terpinen-4-ol	5.65	Monoterpenic alcohol
(3*E*,5*Z*)-Undeca-1,3,5-triene	0.05	Alkene
Cryptone	0.08	Normonoterpenic ketone
meta-Cymen-8-ol	0.04	Monoterpenic alcohol
para-Cymen-8-ol	0.06	Monoterpenic alcohol
α-Terpineol	1.02	Monoterpenic alcohol
Hexyl butyrate	0.30	Aliphatic ester
Hodiendiol	0.01	Monoterpenic alcohol
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.02	Monoterpenic alcohol
trans-Carveol	0.02	Monoterpenic alcohol
Nerol	0.16	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.05	Aliphatic ester
Carvone	0.01	Monoterpenic ketone
Neral	0.03	Monoterpenic aldehyde
Geraniol	0.38	Monoterpenic alcohol
Linalyl acetate	31.74	Monoterpenic ester
Geranial	tr	Monoterpenic aldehyde
Bornyl acetate	0.13	Monoterpenic ester
Lavandulyl acetate	3.69	Monoterpenic ester
Thymol	0.01	Monoterpenic alcohol
Hexyl tiglate	0.04	Aliphatic ester
Hodiendiol derivative	0.01	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Neryl acetate	0.27	Monoterpenic ester
β-Bourbonene	0.02	Sesquiterpene
Geranyl acetate	0.44	Monoterpenic ester
7-epi-Sesquithujene	0.04	Sesquiterpene
Hexyl hexanoate	0.09	Aliphatic ester
Isocaryophyllene	0.01	Sesquiterpene
Sesquithujene	0.03	Sesquiterpene
β-Caryophyllene	3.28	Sesquiterpene
cis-α-Bergamotene	0.03	Sesquiterpene
α-Santalene	0.41	Sesquiterpene
Lavandulyl isobutyrate	0.01	Monoterpenic ester
trans-α-Bergamotene	0.13	Sesquiterpene
Sesquisabinene A	0.03	Sesquiterpene
cis-β-Bergamotene?	0.04	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
Lavandulyl butyrate?	0.09	Monoterpenic ester
(*E*)-β-Farnesene	2.64	Sesquiterpene

Germacrene D	0.23	Sesquiterpene
trans-β-Bergamotene	0.04	Sesquiterpene
β-Bisabolene	0.02	Sesquiterpene
γ-Cadinene	0.07	Sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
δ-Cadinene	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.01	Sesquiterpenic ether
(*E*)-Nerolidol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Caryophyllene oxide	0.17	Sesquiterpenic ether
Dendrolasin	0.01	Sesquiterpenic ether
τ-Cadinol	0.02	Sesquiterpenic alcohol
Consolidated total	**99.05%**	

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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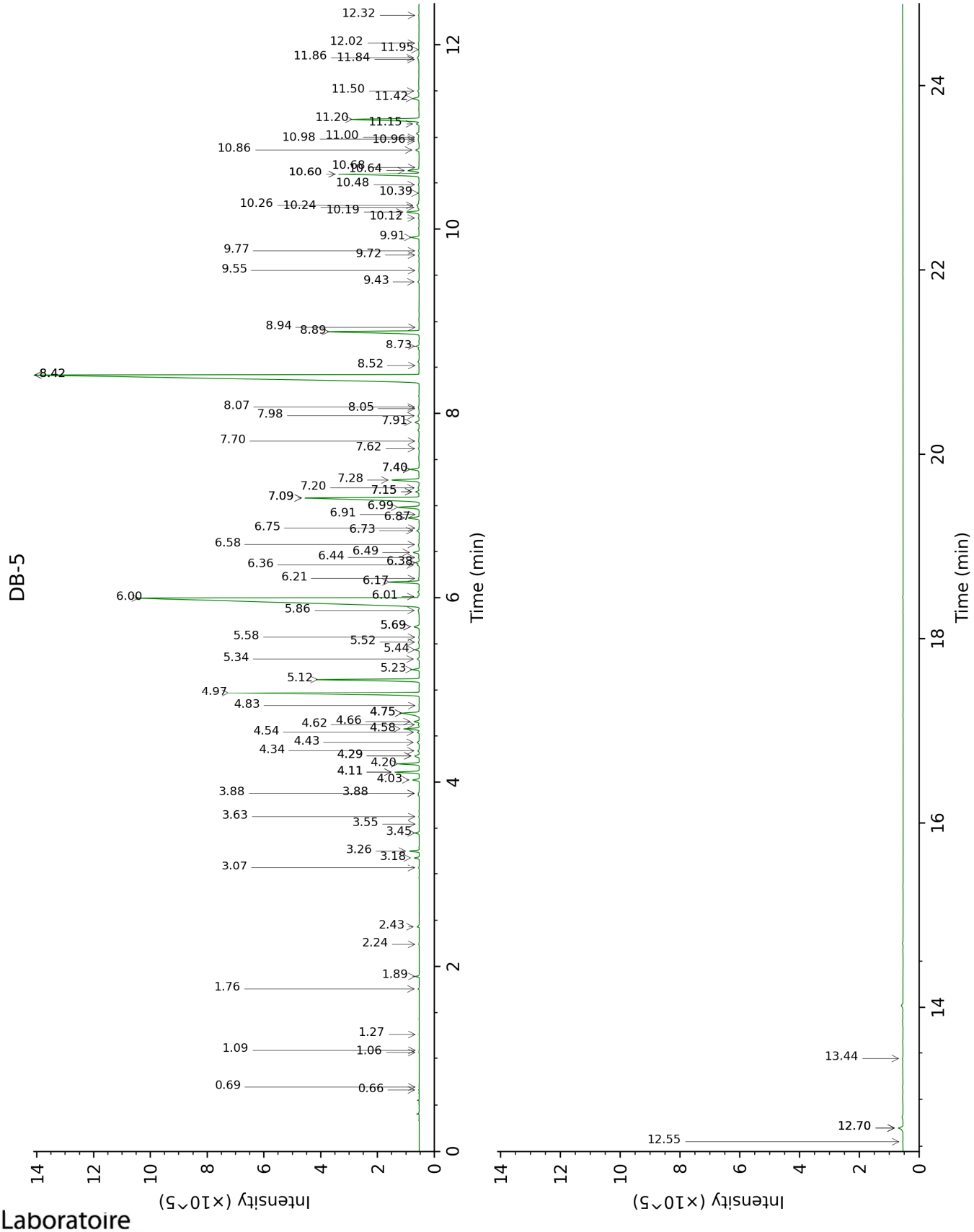
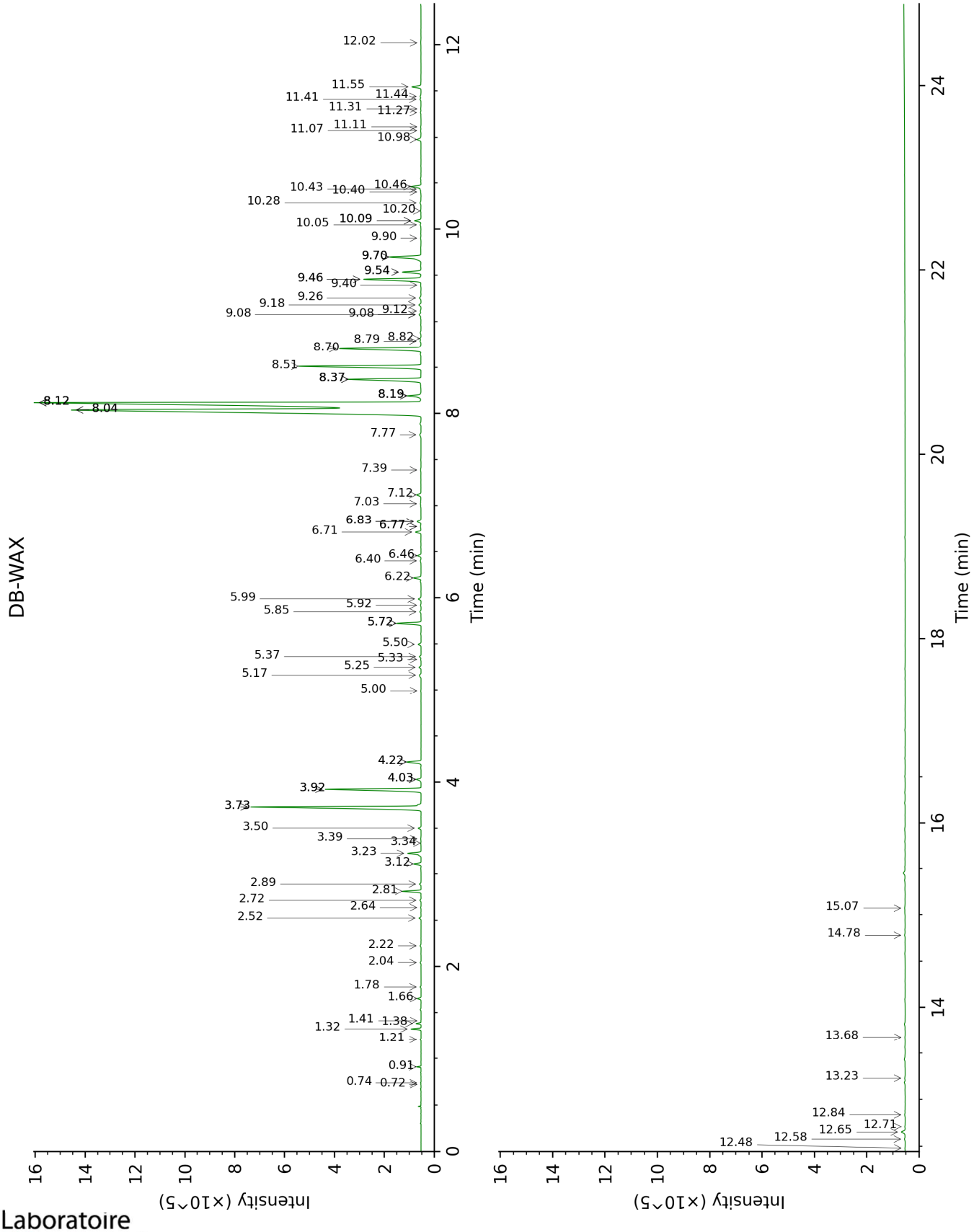

DB-5
Time (min)
Intensity (×10^5)
12.32
12.02
11.95
11.86
11.84
11.50
11.42
11.20
11.15
10.98
11.00
10.96
10.86
10.68
10.64
10.60
10.48
10.39
10.26
10.24
10.19
10.12
9.91
9.77
9.72
9.55
9.43
8.94
8.89
8.73
8.52
8.42
8.07
8.05
7.98
7.91
7.70
7.62
7.40
7.28
7.20
7.15
7.09
6.99
6.91
6.87
6.75
6.73
6.58
6.49
6.44
6.38
6.36
6.21
6.17
6.00
6.01
5.86
5.69
5.58
5.52
5.44
5.34
5.23
5.12
4.97
4.83
4.75
4.66
4.62
4.58
4.54
4.43
4.34
4.29
4.20
4.11
4.03
3.88
3.88
3.63
3.55
3.45
3.26
3.18
3.07
2.43
2.24
1.89
1.76
1.27
1.09
1.06
0.69
0.66
13.44
12.70
12.55


DB-WAX
Time (min)
Intensity (×10^5)
12.02
11.55
11.41
11.44
11.31
11.27
11.07
11.11
10.98
10.43
10.40
10.46
10.28
10.20
10.05
10.09
9.90
9.70
9.54
9.46
9.40
9.26
9.18
9.08
9.08
9.12
8.79
8.82
8.70
8.51
8.37
8.19
8.12
8.04
7.77
7.39
7.12
7.03
6.83
6.77
6.71
6.40
6.46
6.22
5.99
5.92
5.85
5.72
5.50
5.37
5.33
5.25
5.17
5.00
4.22
4.03
3.92
3.73
3.50
3.39
3.34
3.23
3.12
2.89
2.81
2.72
2.64
2.52
2.22
2.04
1.78
1.66
1.41
1.38
1.32
1.21
0.91
0.74
0.72
15.07
14.78
13.68
13.23
12.84
12.71
12.65
12.58
12.48

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.66	643	0.01	0.74	886	0.01
2-Methylbutyral	0.69	653	tr	0.72	879	tr
Isoamyl alcohol	1.06	732	0.01	3.34	1174	0.01
2-Methylbutanol	1.09	735	tr	3.39	1178	0.02
Toluene	1.27	758	0.01	1.41	1001	0.01
Butyl acetate	1.76	815	0.03	1.78	1038	0.03
Methyl hexyl ether	1.89	826	0.09	0.91	920	0.08
(3*Z*)-Hexenol	2.24	854	0.02	5.72*	1349	0.99
Hexanol	2.43	870	0.06	5.37	1323	0.07
Tricyclene	3.07	918	0.02	1.21	970	0.02
α-Thujene	3.18	925	0.14	1.38	998	0.14
α-Pinene	3.26	930	0.29	1.32	989	0.29
Camphene	3.45	943	0.13	1.66	1026	0.13
5,5-Dimethyl-2(5H)-furanone	3.55	949	0.01	8.37*	1546	3.42
Butyl isobutyrate	3.63	954	0.02	2.64	1119	0.01
Sabinene	3.88*	971	0.03	2.22	1083	0.03
β-Pinene	3.88*	971	[0.03]	2.04	1064	0.03
Octen-3-ol	4.02	980	0.21	6.71	1421	0.21
Octan-3-one	4.11*	986	0.75	3.92*	1219	4.35
6-Methyl-5-hepten-2-one	4.11*	986	[0.75]	5.00	1298	0.01
Myrcene	4.20	992	0.65	2.81	1132	0.64
Octan-3-ol	4.28*	998	0.21	5.99	1368	0.11
Butyl butyrate	4.28*	998	[0.21]	3.50	1187	0.10
α-Phellandrene	4.34	1001	0.05	2.72	1125	0.04
Δ3-Carene	4.43	1007	0.07	2.52	1110	0.07
α-Terpinene	4.54	1014	0.06	2.89	1139	0.06
Hexyl acetate	4.58	1016	0.49	4.22*	1241	0.59
meta-Cymene	4.62	1019	0.03	4.03*	1227	0.20
para-Cymene	4.66	1021	0.17	4.03*	1227	[0.20]
Limonene	4.75*	1027	0.87	3.12	1156	0.27
1,8-Cineole	4.75*	1027	[0.87]	3.23	1166	0.60
Lavender lactone	4.83	1032	0.01	9.12	1604	0.04
(*Z*)-β-Ocimene	4.97	1041	8.03	3.73*	1205	8.13
(*E*)-β-Ocimene	5.12	1050	3.61	3.92*	1219	[4.35]
γ-Terpinene	5.23	1057	0.21	3.73*	1205	[8.13]
cis-Sabinene hydrate	5.34	1064	0.07	6.83*	1429	0.17
cis-Linalool oxide (fur.)	5.44	1071	0.14	6.46†	1402	[0.17]
Octanol	5.52	1076	0.04	8.12*†	1526	[59.48]
α-Pinene oxide analog	5.58	1079	0.02	5.34	1321	0.02
trans-Linalool oxide (fur.)	5.69*	1086	0.20	6.83*	1429	[0.17]

Terpinolene	5.69*	1086	[0.20]	4.22*	1241	[0.59]
Rosefuran	5.86	1097	0.05	5.92	1363	0.02
Linalool	6.00	1106	27.62	8.04*†	1520	59.48
(*Z*)-6-Methyl-3,5-heptadien-2-one	6.01	1107	0.03	8.12*†	1526	[59.48]
Octen-3-yl acetate	6.17	1117	0.99	5.72*	1349	[0.99]
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	6.21	1120	0.03	9.54*	1638	0.77
Octan-3-yl acetate	6.36	1129	0.06	5.16	1309	0.10
allo-Ocimene	6.38	1131	0.12	5.50	1333	0.12
(*Z*)-Myroxide	6.44	1134	0.03	6.77*	1425	0.03
Camphor	6.49	1138	0.22	7.12	1451	0.19
(*E*)-Myroxide	6.58	1143	0.04	7.02	1444	0.02
Hexyl isobutyrate	6.73	1153	0.09	5.25	1315	0.08
Nerol oxide	6.75	1155	0.01	6.77*	1425	[0.03]
Borneol	6.87	1163	0.41	9.70*	1651	1.64
cis-Linalool oxide (pyr.)	6.91	1165	0.01	10.20	1691	0.02
Lavandulol	6.99	1170	0.78	9.54*	1638	[0.77]
Terpinen-4-ol	7.09*	1177	5.73	8.51	1556	5.65
(3*E*,5*Z*)-Undeca-1,3,5-triene	7.09*	1177	[5.73]	5.85	1358	0.05
Cryptone	7.15*	1181	0.12	9.08*	1600	0.10
meta-Cymen-8-ol	7.15*	1181	[0.12]	11.44	1796	0.04
para-Cymen-8-ol	7.20	1184	0.06	11.41	1794	0.05
α-Terpineol	7.28	1189	1.02	9.70*	1651	[1.64]
Hexyl butyrate	7.40*	1197	0.32	6.22	1384	0.30
Hodiendiol	7.40*	1197	[0.32]	12.71	1909	0.01
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.62	1212	0.02	11.31	1785	0.02
trans-Carveol	7.70	1217	0.02	11.27	1782	0.03
Nerol	7.91	1231	0.16	10.98	1757	0.17
Hexyl 2-methylbutyrate	7.98	1236	0.05	6.40†	1398	0.17
Carvone	8.05	1241	0.01	9.90	1667	0.02
Neral	8.07	1242	0.03	9.40	1626	0.01
Geraniol	8.42*	1266	32.12	11.55	1806	0.38
Linalyl acetate	8.42*	1266	[32.12]	8.12*†	1526	[59.48]
Geranial	8.52	1273	tr	10.05	1679	0.03
Bornyl acetate	8.73	1288	0.13	8.19*	1532	0.58
Lavandulyl acetate	8.89	1299	3.69	8.70	1571	3.74
Thymol	8.94	1302	0.01	15.07	2135	0.01
Hexyl tiglate	9.43	1332	0.04	8.82	1580	0.04

Hodiendiol derivative	9.55	1340	0.01	12.84	1921	0.02
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.72	1352	0.02	11.07	1765	0.02
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.77	1355	0.02	11.11	1768	0.02
Neryl acetate	9.91	1366	0.27	10.09*	1683	0.27
β-Bourbonene	10.12	1380	0.02	7.39	1471	0.02
Geranyl acetate	10.19	1385	0.44	10.46	1713	0.45
7-epi-Sesquithujene	10.24	1389	0.04	7.77	1499	0.07
Hexyl hexanoate	10.26	1390	0.09	8.79	1578	0.04
Isocaryophyllene	10.39	1400	0.01	8.12*†	1526	[59.48]
Sesquithujene	10.48	1406	0.03	8.04*†	1520	[59.48]
β-Caryophyllene	10.60*	1415	3.37	8.37*	1546	[3.42]
cis-α-Bergamotene	10.60*	1415	[3.37]	8.19*	1532	[0.58]
α-Santalene	10.64	1418	0.41	8.19*	1532	[0.58]
Lavandulyl isobutyrate	10.68	1421	0.01	9.26	1615	0.08
trans-α-Bergamotene	10.86	1435	0.13	8.37*	1546	[3.42]
Sesquisabinene A	10.96	1442	0.03	9.08*	1600	[0.10]
cis-β-Bergamotene?	10.98	1443	0.04			
α-Humulene	11.00	1445	0.02	9.18	1609	0.10
Lavandulyl butyrate?	11.15	1456	0.09	10.43	1711	0.03
(*E*)-β-Farnesene	11.20	1459	2.64	9.46*	1631	2.70
Germacrene D	11.42	1476	0.23	9.70*	1651	[1.64]
trans-β-Bergamotene	11.50	1482	0.04	9.46*	1631	[2.70]
β-Bisabolene	11.84	1508	0.02	10.09*	1683	[0.27]
γ-Cadinene	11.86	1509	0.07	10.28	1698	0.06
Unknown [m/z 121, 93 (56), 91 (12), 94 (11), 122 (10)...220]	11.95	1516	0.01	13.23	1958	0.02
δ-Cadinene	12.02	1522	0.01	10.40	1708	0.02
Isocaryophyllene epoxide B	12.32	1545	0.01	12.02	1848	0.02
(*E*)-Nerolidol	12.55	1563	0.01	13.68	1999	0.01
Caryophyllene oxide isomer	12.70*	1575	0.22	12.58	1897	0.03

Caryophyllene oxide	12.70*	1575	[0.22]	12.65	1904	0.17
Dendrolasin	12.70*	1575	[0.22]	12.48	1888	0.01
τ-Cadinol	13.44	1635	0.02	14.78	2105	0.02
Total identified		**99.04%**			**98.88%**	
Total reported		**99.12%**			**98.93%**	

*: 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

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