Date : April 19, 2022

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 22D01-NSO02
Customer identification : Lavandin Abrialis - Lot: B550048
Type : Essential oil
Source : *Lavandula hybrida* cv. abrial
Customer : Natural Sourcing LLC

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 : Sylvain Mercier, M. Sc., Chimiste 2014-005
Analysis date : April 13, 2022

Checked and approved by :

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

Méthode certifiée ISO 17025:2017 Certified method

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4612 ± 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
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Isovaleral	0.02	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	tr	Simple phenolic
Hexanal	0.01	Aliphatic aldehyde
Methyl hexyl ether	0.07	Aliphatic ether
(2*E*)-Hexenal	0.01	Aliphatic aldehyde
(3*Z*)-Hexenol	0.08	Aliphatic alcohol
Hexanol	0.26	Aliphatic alcohol
Tricyclene	0.02	Monoterpene
α-Thujene	0.03	Monoterpene
α-Pinene	0.38	Monoterpene
Unknown	0.01	Simple phenolic
Camphene	0.38	Monoterpene
α-Fenchene	0.01	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Butyl isobutyrate	0.01	Aliphatic ester
β-Pinene	0.44	Monoterpene
Sabinene	0.15	Monoterpene
Octen-3-ol	0.70	Aliphatic alcohol
Octan-3-one	0.19	Aliphatic ketone
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Dehydro-1,8-cineole	0.03	Monoterpenic ether
Myrcene	0.55	Monoterpene
Butyl butyrate	0.01	Aliphatic ester
Octan-3-ol	0.03	Aliphatic alcohol
α-Phellandrene	0.02	Monoterpene
Pseudolimonene	0.01	Monoterpene
Δ3-Carene	0.03	Monoterpene
(3*Z*)-Hexenyl acetate	0.01	Aliphatic ester
α-Terpinene	0.05	Monoterpene
Hexyl acetate	0.13	Aliphatic ester
para-Cymene	0.08	Monoterpene
1,8-Cineole	9.07	Monoterpenic ether
Limonene	0.91	Monoterpene
(*Z*)-β-Ocimene	1.80	Monoterpene
(*E*)-β-Ocimene	2.71	Monoterpene
γ-Terpinene	0.11	Monoterpene
cis-Sabinene hydrate	0.15	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.11	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
α-Pinene oxide analog	0.06	Monoterpenic ether

Terpinolene	0.34	Monoterpene
trans-Linalool oxide (fur.)	0.11	Monoterpenic alcohol
trans-Sabinene hydrate	0.03	Monoterpenic alcohol
Linalool	32.28	Monoterpenic alcohol
(*Z*)-6-Methyl-3,5-heptadien-2-one	0.03	Aliphatic ketone
Octen-3-yl acetate	0.51	Aliphatic ester
Unknown	0.02	Unknown
α-Campholenal	0.04	Monoterpenic aldehyde
Octan-3-yl acetate	0.06	Aliphatic ester
Camphor	10.23	Monoterpenic ketone
Camphene hydrate	0.07	Monoterpenic alcohol
Nerol oxide	0.01	Aliphatic ether
Hexyl isobutyrate	0.12	Aliphatic ester
Borneol	2.19	Monoterpenic alcohol
δ-Terpineol	0.13	Monoterpenic alcohol
Lavandulol	0.75	Monoterpenic alcohol
Terpinen-4-ol	0.82	Monoterpenic alcohol
Cryptone	0.03	Normonoterpenic ketone
meta-Cymen-8-ol	0.02	Monoterpenic alcohol
para-Cymen-8-ol	0.04	Monoterpenic alcohol
α-Terpineol	0.65	Monoterpenic alcohol
Myrtenal	0.03	Monoterpenic aldehyde
Hexyl butyrate	0.33	Aliphatic ester
Verbenone	0.02	Monoterpenic ketone
Octyl acetate	0.04	Aliphatic ester
Bornyl formate	0.05	Monoterpenic ester
Nerol	0.08	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.02	Aliphatic ester
Neral	0.11	Monoterpenic aldehyde
Hexyl isovalerate	0.07	Aliphatic ester
Linalyl acetate	22.56	Monoterpenic ester
Geraniol	0.22	Monoterpenic alcohol
Geranial	0.01	Monoterpenic aldehyde
Bornyl acetate	0.04	Monoterpenic ester
Lavandulyl acetate	1.58	Monoterpenic ester
Hexyl tiglate	0.20	Aliphatic ester
Hodiendiol derivative	0.01	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Neryl acetate	0.14	Monoterpenic ester
α-Copaene	0.13	Sesquiterpene
β-Bourbonene	0.02	Sesquiterpene
7-Cubebene epimer?	0.01	Aliphatic alcohol
Unknown	0.07	Sesquiterpene
Geranyl acetate	0.24	Monoterpenic ester
7-epi-Sesquithujene	0.01	Sesquiterpene
Hexyl hexanoate	0.05	Aliphatic ester
α-Funebrene	0.01	Sesquiterpene
Isocaryophyllene	0.01	Sesquiterpene
Sesquithujene	0.05	Sesquiterpene
α-Gurjunene	tr	Sesquiterpene
β-Caryophyllene	1.92	Sesquiterpene

cis-α-Bergamotene	0.07	Sesquiterpene
α-Santalene	0.58	Sesquiterpene
Lavandulyl isobutyrate	0.01	Monoterpenic ester
Coumarin	0.06	Coumarin
trans-α-Bergamotene	0.26	Sesquiterpene
Sesquisabinene A	0.09	Sesquiterpene
cis-β-Bergamotene?	0.03	Sesquiterpene
α-Humulene	0.07	Sesquiterpene
Lavandulyl butyrate?	0.14	Monoterpenic ester
β-Santalene	0.01	Sesquiterpene
(*E*)-β-Farnesene	0.50	Sesquiterpene
Dauca-5,8-diene?	0.14	Sesquiterpene
trans-Cadina-1(6),4-diene	0.06	Sesquiterpene
Germacrene D	0.63	Sesquiterpene
trans-β-Bergamotene	0.08	Sesquiterpene
Isodaucene	0.11	Sesquiterpene
α-Muurolene	0.03	Sesquiterpene
β-Bisabolene	0.04	Sesquiterpene
Lavandulyl isovalerate	0.29	Monoterpenic ester
γ-Cadinene	0.18	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.02	Sesquiterpene
β-Sesquiphellandrene	0.03	Sesquiterpene
Isocaryophyllene epoxide B	0.02	Sesquiterpenic ether
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Caryophyllene oxide	0.11	Sesquiterpenic ether
τ-Cadinol	0.09	Sesquiterpenic alcohol
α-Bisabolol	0.09	Sesquiterpenic alcohol
Consolidated total	**99.00%**	

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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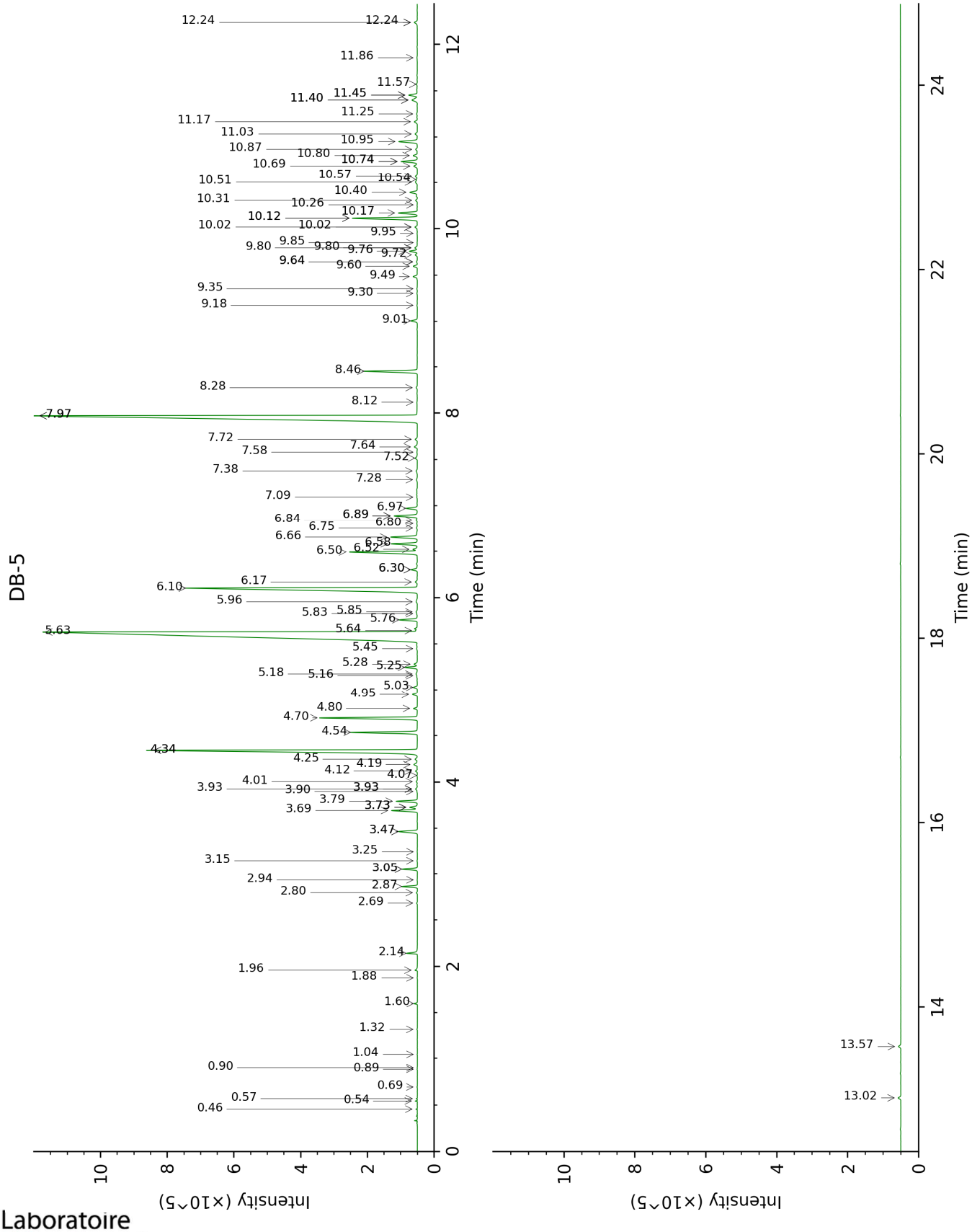
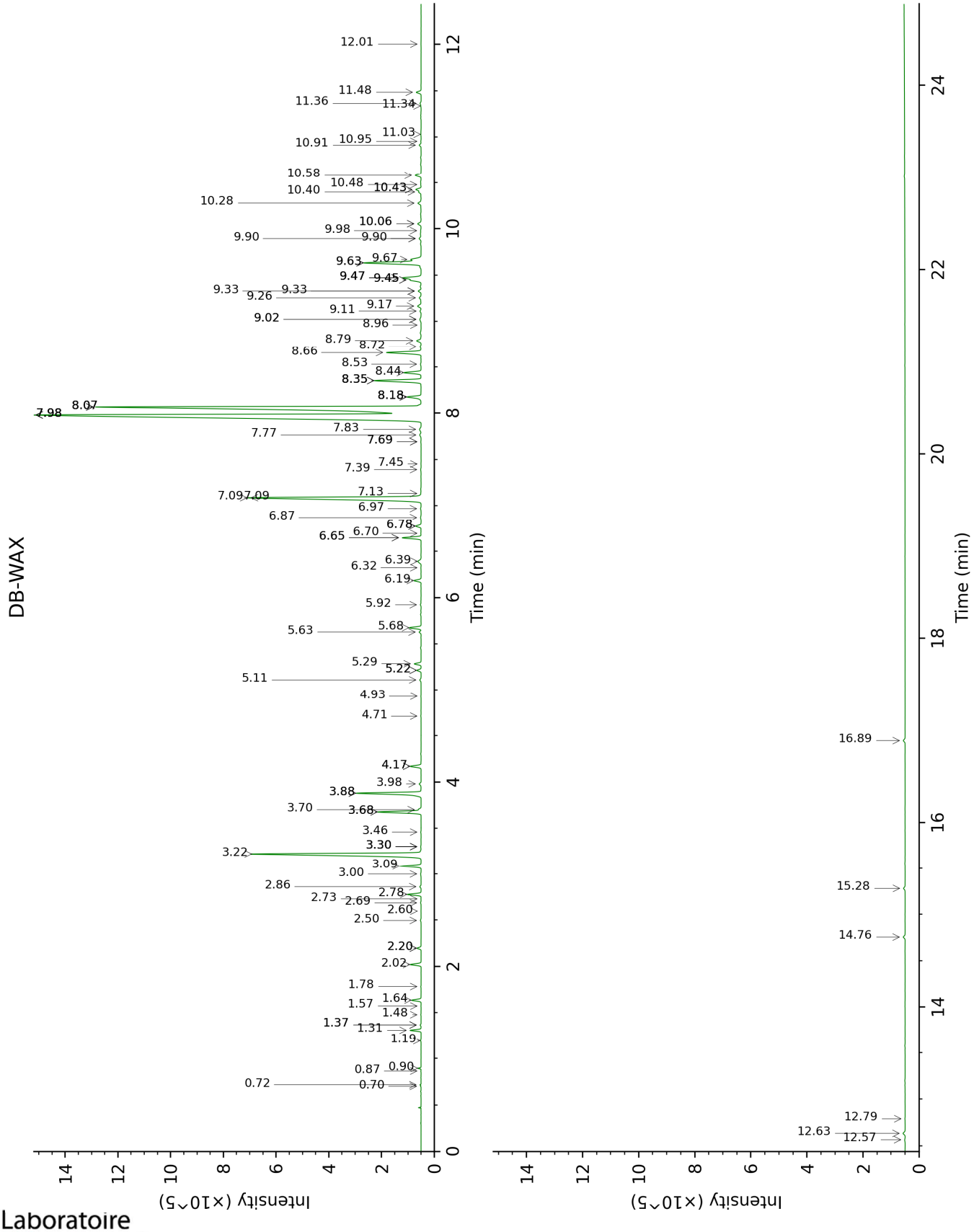

DB-5
Time (min)
Intensity (×10^5)
12.24
11.86
11.57
11.40
11.45
11.25
11.17
11.03
10.95
10.87
10.80
10.74
10.69
10.57
10.54
10.51
10.40
10.31
10.26
10.17
10.12
10.02
10.02
9.95
9.80
9.85
9.80
9.76
9.72
9.64
9.60
9.49
9.35
9.30
9.18
9.01
8.46
8.28
8.12
7.97
7.72
7.64
7.58
7.52
7.38
7.28
7.09
6.97
6.89
6.84
6.80
6.75
6.66
6.58
6.50
6.52
6.30
6.17
6.10
5.96
5.85
5.83
5.76
5.64
5.63
5.45
5.28
5.25
5.18
5.16
5.03
4.95
4.80
4.70
4.54
4.34
4.25
4.19
4.12
4.07
4.01
3.93
3.90
3.93
3.79
3.73
3.69
3.47
3.25
3.15
3.05
2.94
2.87
2.80
2.69
2.14
1.96
1.88
1.60
1.32
1.04
0.90
0.89
0.69
0.57
0.54
0.46
13.57
13.02


DB-WAX
Intensity (×10^5)
Time (min)
12.01
11.48
11.36
11.34
11.03
10.91
10.95
10.58
10.48
10.40
10.43
10.28
10.06
9.98
9.90
9.90
9.63
9.67
9.47
9.45
9.33
9.26
9.33
9.17
9.11
9.02
8.96
8.79
8.72
8.66
8.53
8.44
8.35
8.18
8.07
7.98
7.83
7.77
7.69
7.45
7.39
7.13
7.09
7.09
6.97
6.87
6.78
6.70
6.65
6.39
6.32
6.19
5.92
5.68
5.63
5.29
5.22
5.11
4.93
4.71
4.17
3.98
3.88
3.70
3.68
3.46
3.30
3.22
3.09
3.00
2.86
2.78
2.73
2.69
2.60
2.50
2.20
2.02
1.78
1.64
1.57
1.48
1.37
1.31
1.19
0.90
0.87
0.72
0.70
16.89
15.28
14.76
12.79
12.63
12.57

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
2-Methyl-3-buten-2-ol	0.46	607	0.01	1.48	1013	0.01
Isovaleral	0.54	642	0.02	0.72	888	0.02
2-Methylbutyral	0.57	652	0.01	0.70	882	0.01
2-Ethylfuran	0.69	702	tr	0.87	920	0.01
Isoamyl alcohol	0.88	733	tr	3.30*	1176	0.03
2-Methylbutanol	0.90	735	tr	3.30*	1176	[0.03]
Toluene	1.04	758	tr	1.37*	1002	0.03
Hexanal	1.32	801	0.01	1.78	1044	0.01
Methyl hexyl ether	1.60	826	0.07	0.90	925	0.07
(2*E*)-Hexenal	1.88	850	0.01	3.30*	1176	[0.03]
(3*Z*)-Hexenol	1.96	858	0.08	5.63	1347	0.08
Hexanol	2.14	874	0.26	5.29	1323	0.28
Tricyclene	2.69	917	0.02	1.19	974	0.02
α-Thujene	2.80	924	0.03	1.37*	1002	[0.03]
α-Pinene	2.86	929	0.38	1.31	994	0.38
Unknown [m/z 122, 121 (36), 107 (33), 79 (27), 93 (25), 77 (25), 43 (20)]	2.94	934	0.01	3.70†	1208	[1.91]
Camphene	3.05*	942	0.38	1.64	1029	0.38
α-Fenchene	3.05*	942	[0.38]	1.57	1022	0.01
Thuja-2,4(10)-diene	3.15	948	0.01	2.20*	1085	0.16
Butyl isobutyrate	3.25	955	0.01	2.60	1120	0.01
β-Pinene	3.47*	970	0.59	2.02	1067	0.44
Sabinene	3.47*	970	[0.59]	2.20*	1085	[0.16]
Octen-3-ol	3.69	985	0.70	6.65*	1421	0.79
Octan-3-one	3.73*	988	0.24	3.88*	1221	2.93
6-Methyl-5-hepten-2-one	3.73*	988	[0.24]	4.93	1300	0.01
Dehydro-1,8-cineole	3.73*	988	[0.24]	3.00	1152	0.03
Myrcene	3.79	992	0.55	2.78	1135	0.54
Butyl butyrate	3.90	999	0.01	3.46	1189	0.02
Octan-3-ol	3.93*	1001	0.06	5.92	1368	0.03
α-Phellandrene	3.93*	1001	[0.06]	2.69	1127	0.02
Pseudolimonene	3.93*	1001	[0.06]	2.73	1131	0.01
Δ3-Carene	4.01	1006	0.03	2.50	1112	0.03
(3*Z*)-Hexenyl acetate	4.07	1010	0.01	4.71	1284	0.01
α-Terpinene	4.12	1013	0.05	2.86	1141	0.06
Hexyl acetate	4.19	1018	0.13	4.17*	1243	0.48
para-Cymene	4.25	1021	0.08	3.98	1229	0.09
1,8-Cineole	4.34*	1027	10.02	3.22	1170	9.07
Limonene	4.34*	1027	[10.02]	3.09	1159	0.91
(*Z*)-β-Ocimene	4.54	1040	1.80	3.68*†	1206	1.91
(*E*)-β-Ocimene	4.70	1050	2.71	3.88*	1221	[2.93]
γ-Terpinene	4.80	1056	0.11	3.68*†	1206	[1.91]

cis-Sabinene hydrate	4.95	1066	0.15	6.78*	1430	0.25
cis-Linalool oxide (fur.)	5.03	1071	0.11	6.39	1402	0.21
Octanol	5.16	1079	0.02	8.07*†	1527	[55.01]
α-Pinene oxide analog	5.18	1080	0.06	5.22*	1318	0.18
Terpinolene	5.25	1084	0.34	4.17*	1243	[0.48]
trans-Linalool oxide (fur.)	5.28	1087	0.11	6.78*	1430	[0.25]
trans-Sabinene hydrate	5.45	1097	0.03	7.83	1508	0.11
Linalool	5.63	1109	32.28	7.98*†	1520	55.01
(*Z*)-6-Methyl-3,5-heptadien-2-one	5.64	1110	0.03	8.07*†	1527	[55.01]
Octen-3-yl acetate	5.76	1117	0.51	5.68	1351	0.50
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	5.83	1121	0.02	9.47*†	1637	[1.36]
α-Campholenal	5.85	1122	0.04	6.87	1437	0.03
Octan-3-yl acetate	5.96	1129	0.06	5.11	1311	0.07
Camphor	6.10	1139	10.23	7.09*	1453	10.20
Camphene hydrate	6.17	1143	0.07	8.35*	1549	2.25
Nerol oxide	6.30*	1152	0.19	6.70	1424	0.01
Hexyl isobutyrate	6.30*	1152	[0.19]	5.22*	1318	[0.18]
Borneol	6.50	1164	2.19	9.63*†	1650	3.47
δ-Terpineol	6.52	1166	0.13	9.33*	1626	0.14
Lavandulol	6.58	1170	0.75	9.47*†	1637	[1.36]
Terpinen-4-ol	6.66	1174	0.82	8.44	1556	0.77
Cryptone	6.75	1180	0.03	9.02*	1601	0.10
meta-Cymen-8-ol	6.80	1184	0.02	11.34	1793	0.01
para-Cymen-8-ol	6.84	1186	0.04	11.36	1796	0.06
α-Terpineol	6.89*	1189	0.71	9.63*†	1650	[3.47]
Myrtenal	6.89*	1189	[0.71]	8.53	1563	0.03
Hexyl butyrate	6.97	1195	0.33	6.19	1387	0.31
Verbenone	7.09	1202	0.02	9.47*†	1637	[1.36]
Octyl acetate	7.28	1215	0.04	6.97	1444	0.03
Bornyl formate	7.38	1221	0.05	7.98*†	1520	[55.01]
Nerol	7.52	1230	0.08	10.91	1757	0.09
Hexyl 2-methylbutyrate	7.58	1235	0.02	6.32	1397	0.01
Neral	7.64	1239	0.11	9.33*	1626	[0.14]
Hexyl isovalerate	7.72	1244	0.07	6.65*	1421	[0.79]
Linalyl acetate	7.97*	1261	22.78	8.07*†	1527	[55.01]
Geraniol	7.97*	1261	[22.78]	11.48	1806	0.22
Geranial	8.12	1271	0.01	9.98	1679	0.03
Bornyl acetate	8.28	1281	0.04	8.18*	1535	0.69
Lavandulyl acetate	8.46	1293	1.58	8.66	1573	1.59
Hexyl tiglate	9.01	1332	0.20	8.79	1583	0.23
Hodiendiol derivative	9.18	1344	0.01	12.79	1924	0.01

Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.30	1352	0.02	10.95	1761	0.01
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.35	1356	0.02	11.03	1767	0.02
Neryl acetate	9.49	1365	0.14	10.06*	1685	0.19
α-Copaene	9.60	1373	0.13	7.09*	1453	[10.20]
β-Bourbonene	9.64*	1376	0.03	7.39	1476	0.02
7-Cubebene epimer?	9.64*	1376	[0.03]	7.13	1457	0.01
Unknown [m/z 161, 91 (40), 105 (38), 79 (31), 93 (29), 119 (29)... 204 (1)]	9.72	1382	0.07	7.77	1504	0.09
Geranyl acetate	9.76	1385	0.24	10.43*	1716	0.26
7-epi-Sesquithujene	9.80*	1387	0.09	7.69*	1498	0.02
Hexyl hexanoate	9.80*	1387	[0.09]	8.72	1578	0.05
α-Funebrene	9.85	1391	0.01	7.69*	1498	[0.02]
Isocaryophyllene	9.95	1398	0.01	7.98*†	1520	[55.01]
Sesquithujene	10.02*	1403	0.08	7.98*†	1520	[55.01]
α-Gurjunene	10.02*	1403	[0.08]	7.45	1480	tr
β-Caryophyllene	10.12*	1410	2.07	8.35*	1549	[2.25]
cis-α-Bergamotene	10.12*	1410	[2.07]	8.18*	1535	[0.69]
α-Santalene	10.17	1414	0.58	8.18*	1535	[0.69]
Lavandulyl isobutyrate	10.26	1421	0.01	9.26	1620	0.12
Coumarin	10.31	1424	0.06	16.89	2336	0.09
trans-α-Bergamotene	10.40	1431	0.26	8.35*	1549	[2.25]
Sesquisabinene A	10.51	1439	0.09	9.02*	1601	[0.10]
cis-β-Bergamotene?	10.54	1441	0.03			
α-Humulene	10.57	1444	0.07	9.17	1612	0.20
Lavandulyl butyrate?	10.69	1452	0.14	10.40	1713	0.10
β-Santalene	10.74*	1456	0.51	8.96	1596	0.01
(*E*)-β-Farnesene	10.74*	1456	[0.51]	9.45*†	1636	1.36
Dauca-5,8-diene?	10.80	1461	0.14			
trans-Cadina-1(6),4-diene	10.87	1466	0.06	9.11	1608	0.05
Germacrene D	10.95	1472	0.63	9.67†	1654	[3.47]
trans-β-Bergamotene	11.03	1478	0.08	9.45*†	1636	[1.36]
Isodaucene	11.17	1488	0.11	9.90*	1672	0.11
α-Muurolene	11.25	1494	0.03	9.90*	1672	[0.11]
β-Bisabolene	11.40*†	1506	0.54	10.06*	1685	[0.19]
Lavandulyl isovalerate	11.40*†	1506	[0.54]	10.58	1729	0.29
γ-Cadinene	11.45*†	1510	[0.54]	10.28	1703	0.18

(3*E*,6*E*)-α-Farnesene	11.45*†	1510	[0.54]	10.43*	1716	[0.26]
β-Sesquiphellandrene	11.57	1519	0.03	10.48	1720	0.02
Isocaryophyllene epoxide B	11.86	1542	0.02	12.00	1852	0.01
Caryophyllene oxide isomer	12.24*	1571	0.12	12.57	1903	0.03
Caryophyllene oxide	12.24*	1571	[0.12]	12.64	1909	0.11
τ-Cadinol	13.02	1634	0.09	14.76	2112	0.09
α-Bisabolol	13.57	1679	0.09	15.28	2166	0.08
Total identified		**99.13%**			**98.92%**	
Total reported		**99.26%**			**99.04%**	

*: 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