Date : September 19, 2022

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 22I13-PTH07
Customer identification : Lavandin - Spain - L20109R
Type : Essential oil
Source : *Lavandula x intermedia* cv. Grosso
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 : Sylvain Mercier, M. Sc., Chimiste 2014-005
Analysis date : September 15, 2022

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4608 ± 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
Ethanol	0.01	Aliphatic alcohol
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Methyl hexyl ether	0.02	Aliphatic ether
(2*E*)-Hexenal	0.01	Aliphatic aldehyde
(3*Z*)-Hexenol	0.05	Aliphatic alcohol
Hexanol	0.09	Aliphatic alcohol
Tricyclene	0.02	Monoterpene
α-Thujene	0.08	Monoterpene
α-Pinene	0.42	Monoterpene
α-Fenchene	0.01	Monoterpene
Camphene	0.27	Monoterpene
5,5-Dimethyl-2(5H)-furanone	0.01	Aliphatic lactone
Thuja-2,4(10)-diene	0.01	Monoterpene
Butyl isobutyrate	0.01	Aliphatic ester
β-Pinene	0.33	Monoterpene
Sabinene	0.10	Monoterpene
Octen-3-ol	0.17	Aliphatic alcohol
Octan-3-one	0.02	Aliphatic ketone
Dehydro-1,8-cineole	0.01	Monoterpenic ether
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
trans-Dehydroxylinalool oxide	0.01	Monoterpenic ether
Myrcene	0.50	Monoterpene
Butyl butyrate	0.03	Aliphatic ester
Octan-3-ol	0.01	Aliphatic alcohol
α-Phellandrene	0.04	Monoterpene
Pseudolimonene	0.01	Monoterpene
Δ3-Carene	0.08	Monoterpene
(3*Z*)-Hexenyl acetate	0.01	Aliphatic ester
α-Terpinene	0.04	Monoterpene
Hexyl acetate	0.13	Aliphatic ester
meta-Cymene	0.02	Monoterpene
para-Cymene	0.18	Monoterpene
Limonene	0.80	Monoterpene
1,8-Cineole	5.75	Monoterpenic ether
Lavender lactone	0.02	Aliphatic lactone
(*Z*)-β-Ocimene	0.90	Monoterpene
(*E*)-β-Ocimene	0.27	Monoterpene
γ-Terpinene	0.15	Monoterpene
cis-Sabinene hydrate	0.13	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.15	Monoterpenic alcohol
Octanol	0.05	Aliphatic alcohol
Terpinolene	0.22	Monoterpene
para-Cymenene	0.12	Monoterpene

trans-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Linalool	29.92	Monoterpenic alcohol
(*Z*)-6-Methyl-3,5-heptadien-2-one	0.04	Aliphatic ketone
Octen-3-yl acetate	0.24	Aliphatic ester
Unknown	0.02	Unknown
α-Campholenal	0.03	Monoterpenic aldehyde
Octan-3-yl acetate	0.04	Aliphatic ester
Camphor	7.63	Monoterpenic ketone
Camphene hydrate	0.05	Monoterpenic alcohol
Hexyl isobutyrate	0.15	Aliphatic ester
Nerol oxide	0.01	Aliphatic ether
Borneol	2.33	Monoterpenic alcohol
δ-Terpineol	0.07	Monoterpenic alcohol
Lavandulol	0.44	Monoterpenic alcohol
Terpinen-4-ol	2.71	Monoterpenic alcohol
(3*E*,5*Z*)-Undeca-1,3,5-triene	0.02	Alkene
Cryptone	0.03	Normonoterpenic ketone
meta-Cymen-8-ol	0.02	Monoterpenic alcohol
para-Cymen-8-ol	0.05	Monoterpenic alcohol
α-Terpineol	0.78	Monoterpenic alcohol
Myrtenal	0.03	Monoterpenic aldehyde
Myrtenol	0.02	Monoterpenic alcohol
Hodiendiol	0.01	Monoterpenic alcohol
Hexyl butyrate	0.36	Aliphatic ester
(3*Z*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol?	0.05	Monoterpenic alcohol
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.01	Monoterpenic alcohol
Octyl acetate	0.03	Aliphatic ester
trans-Carveol	0.01	Monoterpenic alcohol
Bornyl formate	0.03	Monoterpenic ester
Nerol	0.12	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.02	Aliphatic ester
Neral	0.08	Monoterpenic aldehyde
Hexyl isovalerate	0.14	Aliphatic ester
Geraniol	0.33	Monoterpenic alcohol
Linalyl acetate	31.81	Monoterpenic ester
Geranial	0.01	Monoterpenic aldehyde
Bornyl acetate	0.03	Monoterpenic ester
Lavandulyl acetate	2.11	Monoterpenic ester
Hexyl tiglate	0.15	Aliphatic ester
Hodiendiol derivative	0.03	Oxygenated monoterpene
Unknown	0.03	Oxygenated monoterpene
Unknown	0.03	Oxygenated monoterpene
Neryl acetate	0.22	Monoterpenic ester
α-Copaene	0.01	Sesquiterpene
Daucene	0.10	Sesquiterpene
β-Bourbonene	0.06	Sesquiterpene
Unknown	0.09	Sesquiterpene
Geranyl acetate	0.38	Monoterpenic ester
7-epi-Sesquithujene	0.02	Sesquiterpene
Hexyl hexanoate	0.11	Aliphatic ester
Sesquithujene	0.13	Sesquiterpene

β-Caryophyllene	1.47	Sesquiterpene
cis-α-Bergamotene	0.26	Sesquiterpene
α-Santalene	0.23	Sesquiterpene
Lavandulyl isobutyrate	0.07	Monoterpenic ester
Coumarin	0.09	Coumarin
trans-α-Bergamotene	0.16	Sesquiterpene
cis-β-Bergamotene?	0.10	Sesquiterpene
α-Humulene	0.06	Sesquiterpene
Lavandulyl butyrate?	0.09	Monoterpenic ester
β-Santalene	0.01	Sesquiterpene
(*E*)-β-Farnesene	1.10	Sesquiterpene
Dauca-5,8-diene?	0.08	Sesquiterpene
trans-Cadina-1(6),4-diene	0.09	Sesquiterpene
Germacrene D	0.78	Sesquiterpene
trans-β-Bergamotene	0.05	Sesquiterpene
Isodaucene	0.10	Sesquiterpene
α-Muurolene	0.05	Sesquiterpene
β-Bisabolene	0.20	Sesquiterpene
Lavandulyl isovalerate	0.33	Monoterpenic ester
γ-Cadinene	0.26	Sesquiterpene
Cubebol	0.01	Sesquiterpenic alcohol
trans-Calamenene	0.02	Sesquiterpene
β-Sesquiphellandrene	0.22	Sesquiterpene
δ-Cadinene	0.01	Sesquiterpene
(*E*)-α-Bisabolene	0.02	Sesquiterpene
Isocaryophyllene epoxide B	0.01	Sesquiterpenic ether
cis-Sesquisabinene hydrate	0.01	Sesquiterpenic alcohol
(*E*)-Nerolidol	0.01	Sesquiterpenic alcohol
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.09	Sesquiterpenic ether
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Humulene epoxide II	0.01	Sesquiterpenic ether
10-epi-Cubenol	0.03	Sesquiterpenic alcohol
τ-Cadinol	0.17	Sesquiterpenic alcohol
cis-14-nor-Muurol-5-en-4-one?	0.01	Norsesquiterpenic ketone
α-Bisabolol	0.36	Sesquiterpenic alcohol
Consolidated total	**99.10%**	

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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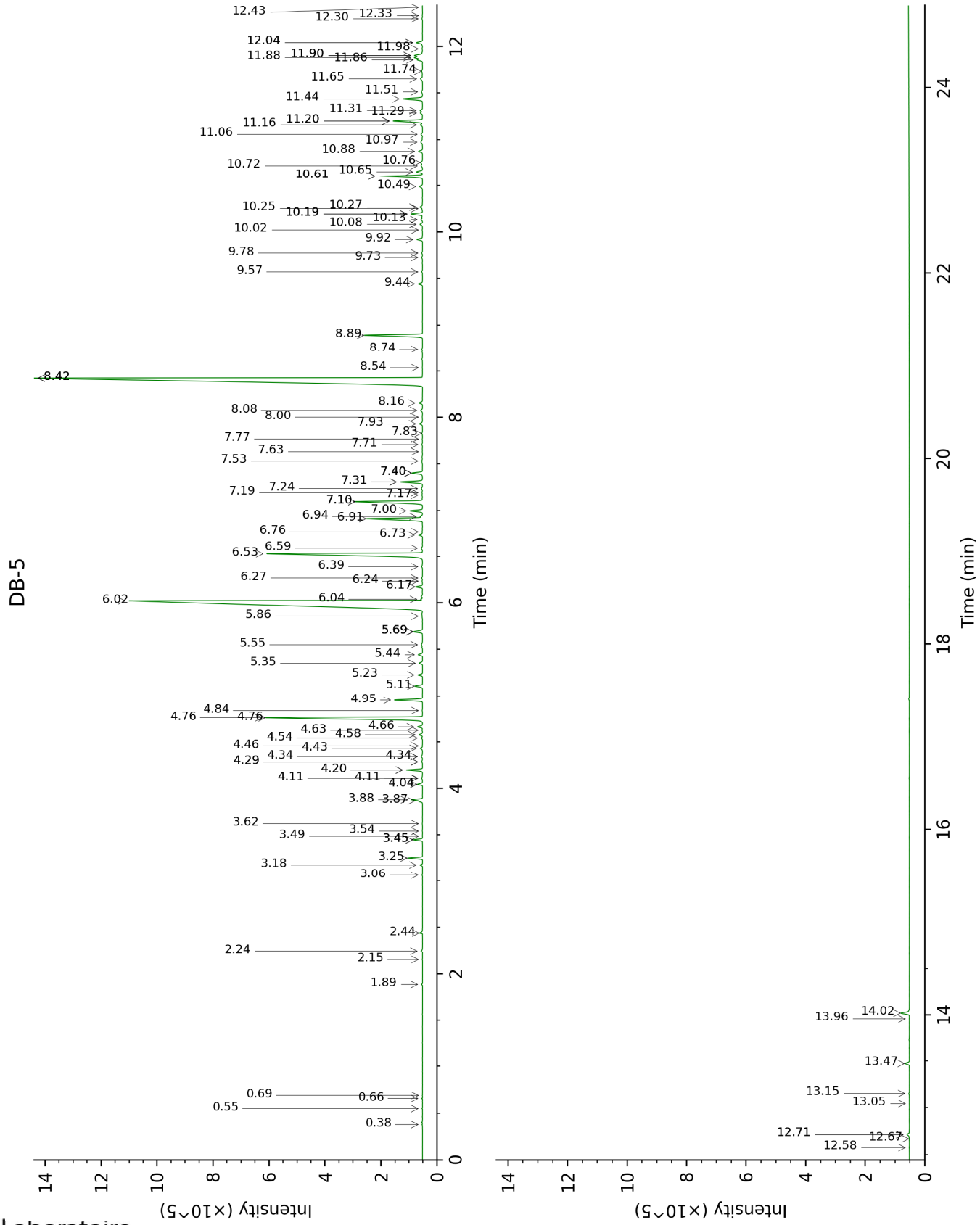

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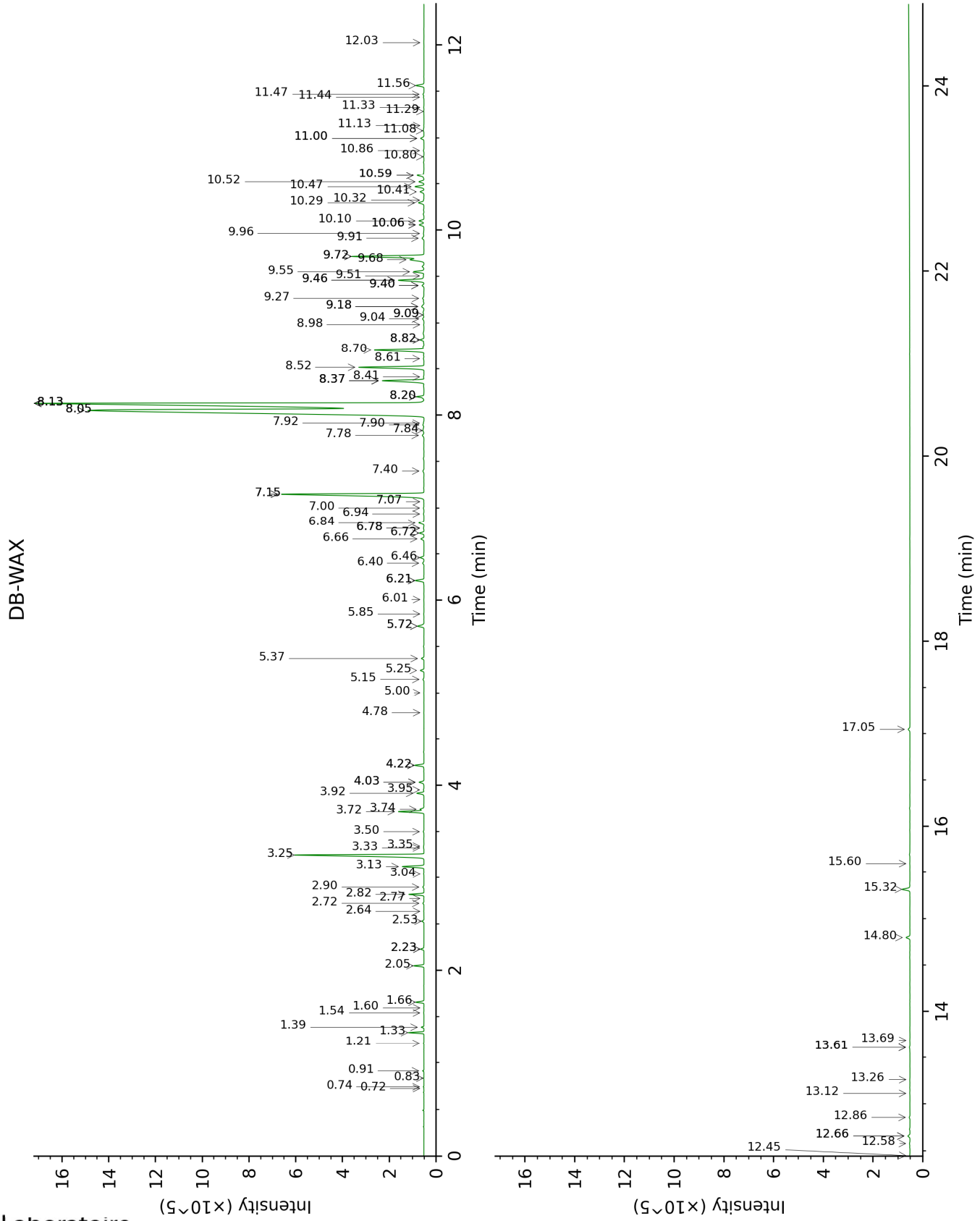
DB-WAX
Intensity (×10^5)
Time (min)
12.03
11.56
11.47
11.44
11.33
11.29
11.13
11.08
11.00
10.86
10.80
10.59
10.52
10.47
10.41
10.29
10.32
10.10
10.06
9.96
9.91
9.72
9.68
9.55
9.51
9.46
9.40
9.27
9.18
9.04
9.09
8.98
8.82
8.70
8.61
8.52
8.41
8.37
8.20
8.13
8.05
7.92
7.90
7.84
7.78
7.40
7.15
7.07
7.00
6.94
6.84
6.78
6.72
6.66
6.46
6.40
6.21
6.01
5.85
5.72
5.37
5.25
5.15
5.00
4.78
4.22
4.03
3.95
3.92
3.74
3.72
3.50
3.35
3.33
3.25
3.13
3.04
2.90
2.82
2.77
2.72
2.64
2.53
2.23
2.05
1.66
1.60
1.54
1.39
1.33
1.21
0.91
0.83
0.74
0.72
17.05
15.60
15.32
14.80
13.69
13.61
13.26
13.12
12.86
12.66
12.58
12.45

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Ethanol	0.38	495	0.01	0.84	908	tr
2-Methyl-3-buten-2-ol	0.55	608	0.01	1.54	1015	0.01
Isovaleral	0.66	642	0.01	0.74	889	0.01
2-Methylbutyral	0.69	652	tr	0.72	882	tr
Methyl hexyl ether	1.89	826	0.02	0.91	921	0.03
(2*E*)-Hexenal	2.16	848	0.01	3.33	1173	0.02
(3*Z*)-Hexenol	2.24	856	0.05	5.72*	1348	0.28
Hexanol	2.44	872	0.09	5.37	1323	0.10
Tricyclene	3.06	919	0.02	1.21	972	0.01
α-Thujene	3.18	926	0.08	1.39	1000	0.07
α-Pinene	3.25	931	0.42	1.33	993	0.42
α-Fenchene	3.45*	944	0.29	1.60	1021	0.01
Camphene	3.45*	944	[0.29]	1.66	1027	0.27
5,5-Dimethyl-2(5H)-furanone	3.49	946	0.01	8.41	1550	0.02
Thuja-2,4(10)-diene	3.54	950	0.01	2.23*	1084	0.11
Butyl isobutyrate	3.62	955	0.01	2.64	1119	0.01
β-Pinene	3.87†	971	0.44	2.05	1066	0.33
Sabinene	3.88†	972	[0.44]	2.23*	1084	[0.11]
Octen-3-ol	4.04	983	0.17	6.72	1422	0.17
Octan-3-one	4.11*	988	0.05	3.95†	1220	[0.30]
Dehydro-1,8-cineole	4.11*	988	[0.05]	3.04	1151	0.01
6-Methyl-5-hepten-2-one	4.11*	988	[0.05]	5.00	1297	0.01
trans-Dehydroxylinalool oxide	4.20*	993	0.51	3.35	1175	0.01
Myrcene	4.20*	993	[0.51]	2.82	1133	0.50
Butyl butyrate	4.29*	999	0.04	3.50	1187	0.03
Octan-3-ol	4.29*	999	[0.04]	6.01	1369	0.01
α-Phellandrene	4.34*	1003	0.06	2.72	1126	0.04
Pseudolimonene	4.34*	1003	[0.06]	2.78	1130	0.01
Δ3-Carene	4.43	1008	0.08	2.53	1110	0.07
(3*Z*)-Hexenyl acetate	4.46	1010	0.01	4.78	1280	0.01
α-Terpinene	4.54	1015	0.04	2.90	1139	0.05
Hexyl acetate	4.58	1018	0.13	4.22*	1239	0.35
meta-Cymene	4.63	1020	0.02	4.03*	1226	0.20
para-Cymene	4.66	1023	0.18	4.03*	1226	[0.20]
Limonene	4.76*	1029	6.57	3.13	1157	0.80
1,8-Cineole	4.76*	1029	[6.57]	3.25	1167	5.75
Lavender lactone	4.84	1034	0.02	9.09*†	1603	0.08
(*Z*)-β-Ocimene	4.95	1041	0.90	3.72	1203	0.92
(*E*)-β-Ocimene	5.11	1051	0.27	3.92†	1218	0.30
γ-Terpinene	5.23	1058	0.15	3.74	1205	0.15

cis-Sabinene hydrate	5.35	1066	0.13	6.84	1430	0.24
cis-Linalool oxide (fur.)	5.44	1072	0.15	6.46	1402	0.15
Octanol	5.55	1078	0.05	8.13*†	1528	[62.18]
Terpinolene	5.69*	1087	0.36	4.22*	1239	[0.35]
para-Cymenene	5.69*	1087	[0.36]	6.21*	1384	0.35
trans-Linalool oxide (fur.)	5.69*	1087	[0.36]	6.78*	1426	0.02
trans-Sabinene hydrate	5.86	1098	0.01	7.90	1510	0.05
Linalool	6.02	1108	29.92	8.05*†	1522	62.18
(*Z*)-6-Methyl-3,5-heptadien-2-one	6.04	1109	0.04	8.13*†	1528	[62.18]
Octen-3-yl acetate	6.17	1118	0.24	5.72*	1348	[0.28]
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	6.24	1122	0.02	9.51	1637	0.03
α-Campholenal	6.27	1124	0.03	6.94	1438	0.02
Octan-3-yl acetate	6.39	1131	0.04	5.15	1307	0.04
Camphor	6.53	1140	7.63	7.15*	1454	7.61
Camphene hydrate	6.59	1144	0.05	8.37*	1547	1.83
Hexyl isobutyrate	6.73	1153	0.15	5.24	1314	0.14
Nerol oxide	6.76	1155	0.01	6.78*	1426	[0.02]
Borneol	6.91	1165	2.33	9.72*	1654	3.16
δ-Terpineol	6.94	1166	0.07	9.40*	1629	0.08
Lavandulol	7.00	1170	0.44	9.55	1641	0.44
Terpinen-4-ol	7.10*	1176	2.73	8.52	1558	2.71
(3*E*,5*Z*)-Undeca-1,3,5-triene	7.10*	1176	[2.73]	5.85	1358	0.02
Cryptone	7.17	1181	0.03	9.09*†	1603	[0.08]
meta-Cymen-8-ol	7.19	1183	0.02	11.44	1799	0.02
para-Cymen-8-ol	7.24	1185	0.05	11.47	1801	0.04
α-Terpineol	7.31*	1190	0.81	9.72*	1654	[3.16]
Myrtenal	7.31*	1190	[0.81]	8.61	1565	0.03
Myrtenol	7.40*	1196	0.38	10.80	1744	0.02
Hodiendiol	7.40*	1196	[0.38]	12.66*	1909	0.09
Hexyl butyrate	7.40*	1196	[0.38]	6.21*	1384	[0.35]
(3*Z*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol?	7.53	1204	0.05	11.08	1768	0.04
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.63	1211	0.01	11.29	1785	0.01
Octyl acetate	7.71	1216	0.03	7.00	1442	0.02
trans-Carveol	7.77	1220	0.01	11.33	1789	0.01
Bornyl formate	7.83	1224	0.03	7.92	1511	0.02
Nerol	7.93	1231	0.12	11.00*	1761	0.15
Hexyl 2-methylbutyrate	8.00	1236	0.02	6.40	1398	0.06
Neral	8.08	1241	0.08	9.40*	1629	[0.08]
Hexyl isovalerate	8.16	1246	0.14	6.66	1417	0.14

Geraniol	8.42*	1264	32.36	11.56	1810	0.33
Linalyl acetate	8.42*	1264	[32.36]	8.13*†	1528	[62.18]
Geranial	8.54	1271	0.01	10.06*	1682	0.21
Bornyl acetate	8.74	1285	0.03	8.20*	1534	0.29
Lavandulyl acetate	8.89	1295	2.11	8.70	1573	2.12
Hexyl tiglate	9.44	1331	0.15	8.82*	1582	0.15
Hodiendiol derivative	9.57	1340	0.03	12.86	1927	0.03
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.73	1351	0.03	10.86	1750	0.03
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.78	1355	0.03	11.00*	1761	[0.15]
Neryl acetate	9.92	1365	0.22	10.10	1685	0.21
α-Copaene	10.02	1372	0.01	7.07	1448	0.01
Daucene	10.08	1376	0.10	7.15*	1454	[7.61]
β-Bourbonene	10.13	1380	0.06	7.40	1472	0.06
Unknown [m/z 161, 91 (40), 105 (38), 79 (31), 93 (29), 119 (29)... 204 (1)]	10.19*	1384	0.41	7.84	1505	0.09
Geranyl acetate	10.19*	1384	[0.41]	10.47	1716	0.38
7-epi-Sesquithujene	10.25	1388	0.02	7.78	1501	0.09
Hexyl hexanoate	10.27	1390	0.11	8.82*	1582	[0.15]
Sesquithujene	10.49	1405	0.13	8.05*†	1522	[62.18]
β-Caryophyllene	10.61*	1414	1.73	8.37*	1547	[1.83]
cis-α-Bergamotene	10.61*	1414	[1.73]	8.20*	1534	[0.29]
α-Santalene	10.65	1418	0.23	8.13*†	1528	[62.18]
Lavandulyl isobutyrate	10.72	1422	0.07	9.27	1617	0.07
Coumarin	10.76	1425	0.09	17.05	2339	0.08
trans-α-Bergamotene	10.88	1434	0.16	8.37*	1547	[1.83]
cis-β-Bergamotene?	10.97	1441	0.10			
α-Humulene	11.06	1448	0.06	9.18*	1610	0.14
Lavandulyl butyrate?	11.16	1455	0.09	10.41	1711	0.17
β-Santalene	11.20*	1458	1.11	8.98	1594	0.01
(*E*)-β-Farnesene	11.20*	1458	[1.11]	9.46*	1633	1.15
Dauca-5,8-diene?	11.29	1465	0.08	9.04	1599	0.07
trans-Cadina-1(6),4-diene	11.31	1467	0.09	9.18*	1610	[0.14]
Germacrene D	11.44	1476	0.78	9.68	1651	0.71
trans-β-Bergamotene	11.51	1482	0.05	9.46*	1633	[1.15]
Isodaucene	11.66	1492	0.10	9.91	1670	0.10
α-Muurolene	11.74	1498	0.05	9.96	1674	0.04
β-Bisabolene	11.86	1508	0.20	10.06*	1682	[0.21]

Lavandulyl isovalerate	11.88	1509	0.33	10.59*	1726	0.34
γ-Cadinene	11.90*	1511	0.32	10.30	1701	0.26
Cubebol	11.90*	1511	[0.32]	12.45	1888	0.01
trans-Calamenene	11.98	1517	0.02	11.13	1772	0.01
β-Sesquiphellandrene	12.04*	1522	0.25	10.52	1720	0.22
δ-Cadinene	12.04*	1522	[0.25]	10.32	1704	0.01
(*E*)-α-Bisabolene	12.30	1542	0.02	10.59*	1726	[0.34]
Isocaryophyllene epoxide B	12.33	1545	0.01	12.03	1851	0.02
cis-Sesquisabinene hydrate	12.42	1552	0.01	13.12	1950	0.02
(*E*)-Nerolidol	12.58	1564	0.01	13.69	2002	0.01
Germacrene D-4-ol	12.67	1571	0.01	13.61*	1995	0.03
Caryophyllene oxide	12.72*	1575	0.11	12.66*	1909	[0.09]
Caryophyllene oxide isomer	12.72*	1575	[0.11]	12.58	1901	0.03
Humulene epoxide II	13.05	1600	0.01	13.26	1963	0.01
10-epi-Cubenol	13.15	1609	0.03	13.61*	1995	[0.03]
τ-Cadinol	13.47	1636	0.17	14.80	2108	0.17
cis-14-nor-Muurol-5-en-4-one?	13.96	1676	0.01	15.60	2188	0.01
α-Bisabolol	14.02	1681	0.36	15.32	2160	0.34
Total identified		**99.28%**			**98.84%**	
Total reported		**99.36%**			**98.98%**	

*: 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