Date : November 26, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20K20-PTH12
Customer identification : Lavender Fine ORGANIC - LM0105208R
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 : November 23, 2020

Checked and approved by :

Alexis St-Gelais, M. Sc., 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

Laboratoire PhytoChemia
628 Boulevard du Saguenay Ouest, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4617 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 3515:2004 - OIL OF CLONAL LAVENDER - "OTHER ORIGINS"

Compound	Min. %	Max. %	Observed %	Complies?
α-Terpineol		2.0	0.8	Yes
Lavandulyl acetate		8	3	Yes
Terpinen-4-ol		8	4	Yes
Lavandulol		3.0	1.1	Yes
Linalyl acetate	25	47	31	Yes
Linalool	20	43	29	Yes
Camphor		1.5	0.3	Yes
Octan-3-one		3.0	1.2	Yes
(E)-β-Ocimene	tr	6	3	Yes
(Z)-β-Ocimene	1	10	5	Yes
β-Phellandrene		1.0	0.1	Yes
1,8-Cineole		3.0	0.9	Yes
Limonene		1.0	0.3	Yes
Refractive index	1.4600	1.4660	1.4617	Yes

CONCLUSION

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

Analysis summary – Consolidated contents

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

Identification	%	Class
Ethanol	tr	Aliphatic alcohol
Isovaleral	0.02	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
Isoamyl alcohol	0.01	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	tr	Simple phenolic
Hexanal	0.01	Aliphatic aldehyde
Methyl hexyl ether	0.12	Aliphatic ether
(3*Z*)-Hexenol	0.02	Aliphatic alcohol
Hexanol	0.10	Aliphatic alcohol
Tricyclene	0.02	Monoterpene
α-Thujene	0.11	Monoterpene
α-Pinene	0.23	Monoterpene
Camphene	0.17	Monoterpene
α-Fenchene	tr	Monoterpene
Butyl isobutyrate	0.02	Aliphatic ester
Sabinene	0.05	Monoterpene
β-Pinene	0.05	Monoterpene
Octen-3-ol	0.24	Aliphatic alcohol
Octan-3-one	1.19	Aliphatic ketone
Myrcene	0.53	Monoterpene
Butyl butyrate	0.11	Aliphatic ester
Octan-3-ol	0.26	Aliphatic alcohol
α-Phellandrene	0.04	Monoterpene
Pseudolimonene	0.01	Monoterpene
Δ3-Carene	0.13	Monoterpene
α-Terpinene	0.05	Monoterpene
Hexyl acetate	0.61	Aliphatic ester
ortho-Cymene	0.05	Monoterpene
para-Cymene	0.17	Monoterpene
Limonene	0.31	Monoterpene
β-Phellandrene	0.14	Monoterpene
1,8-Cineole	0.87	Monoterpenic ether
(*Z*)-β-Ocimene	4.86	Monoterpene
(*E*)-β-Ocimene	2.71	Monoterpene
γ-Terpinene	0.16	Monoterpene
cis-Sabinene hydrate	0.08	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.11	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.09	Monoterpene
trans-Linalool oxide (fur.)	0.07	Monoterpenic alcohol
Rosefuran	0.01	Monoterpenic ether
Linalool	28.84	Monoterpenic alcohol
(*Z*)-6-Methyl-3,5-heptadien-2-one	0.04	Aliphatic ketone
β-Thujone	0.03	Monoterpenic ketone

Octen-3-yl acetate	0.72	Aliphatic ester
Unknown	0.03	Unknown
Octan-3-yl acetate	0.10	Aliphatic ester
allo-Ocimene	0.06	Monoterpene
(*Z*)-Myroxide	0.04	Monoterpenic ether
Camphor	0.27	Monoterpenic ketone
Unknown	0.01	Oxygenated monoterpene
Hexyl isobutyrate	0.09	Aliphatic ester
Nerol oxide	0.02	Aliphatic ether
Borneol	0.68	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.03	Monoterpenic alcohol
Lavandulol	1.09	Monoterpenic alcohol
Terpinen-4-ol	4.04	Monoterpenic alcohol
Cryptone	0.02	Normonoterpenic ketone
meta-Cymen-8-ol	0.26	Monoterpenic alcohol
para-Cymen-8-ol	0.08	Monoterpenic alcohol
α-Terpineol	0.84	Monoterpenic alcohol
Hexyl butyrate	0.49	Aliphatic ester
Unknown	0.02	Unknown
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.03	Monoterpenic alcohol
Octyl acetate	0.03	Aliphatic ester
trans-Carveol	0.02	Monoterpenic alcohol
Bornyl formate	0.04	Monoterpenic ester
Nerol	0.14	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.10	Aliphatic ester
Neral	0.08	Monoterpenic aldehyde
Hexyl isovalerate	0.01	Aliphatic ester
Geraniol	0.02	Monoterpenic alcohol
Linalyl acetate	31.07	Monoterpenic ester
Geranial	0.04	Monoterpenic aldehyde
Cuminol	0.17	Monoterpenic alcohol
Lavandulyl acetate	3.34	Monoterpenic ester
Hexyl tiglate	0.06	Aliphatic ester
Hodiendiol derivative	0.02	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	0.03	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
α-Funebrene	0.48	Sesquiterpene
Hexyl hexanoate	0.12	Aliphatic ester
cis-α-Bergamotene	0.15	Sesquiterpene
β-Caryophyllene	3.83	Sesquiterpene
α-Santalene	0.46	Sesquiterpene
Coumarin	0.06	Coumarin
trans-α-Bergamotene	0.14	Sesquiterpene
Sesquisabinene A	0.05	Sesquiterpene
cis-β-Bergamotene?	0.02	Sesquiterpene
α-Humulene	0.13	Sesquiterpene
Lavandulyl butyrate?	0.12	Monoterpenic ester
(*E*)-β-Farnesene	4.24	Sesquiterpene

Germacrene D	0.51	Sesquiterpene
trans-β-Bergamotene	0.06	Sesquiterpene
Bicyclogermacrene	0.02	Sesquiterpene
γ-Cadinene	0.14	Sesquiterpene
β-Bisabolene	tr	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
Isocaryophyllene epoxide B	0.03	Sesquiterpenic ether
Caryophyllene oxide	0.36	Sesquiterpenic ether
Caryophyllene oxide isomer	0.04	Sesquiterpenic ether
τ-Cadinol	0.09	Sesquiterpenic alcohol
cis-14-nor-Muurol-5-en-4-one?	0.01	Norsesquiterpenic ketone
Consolidated total	**98.21%**	

tr: The compound has been detected below 0.005% of total signal.

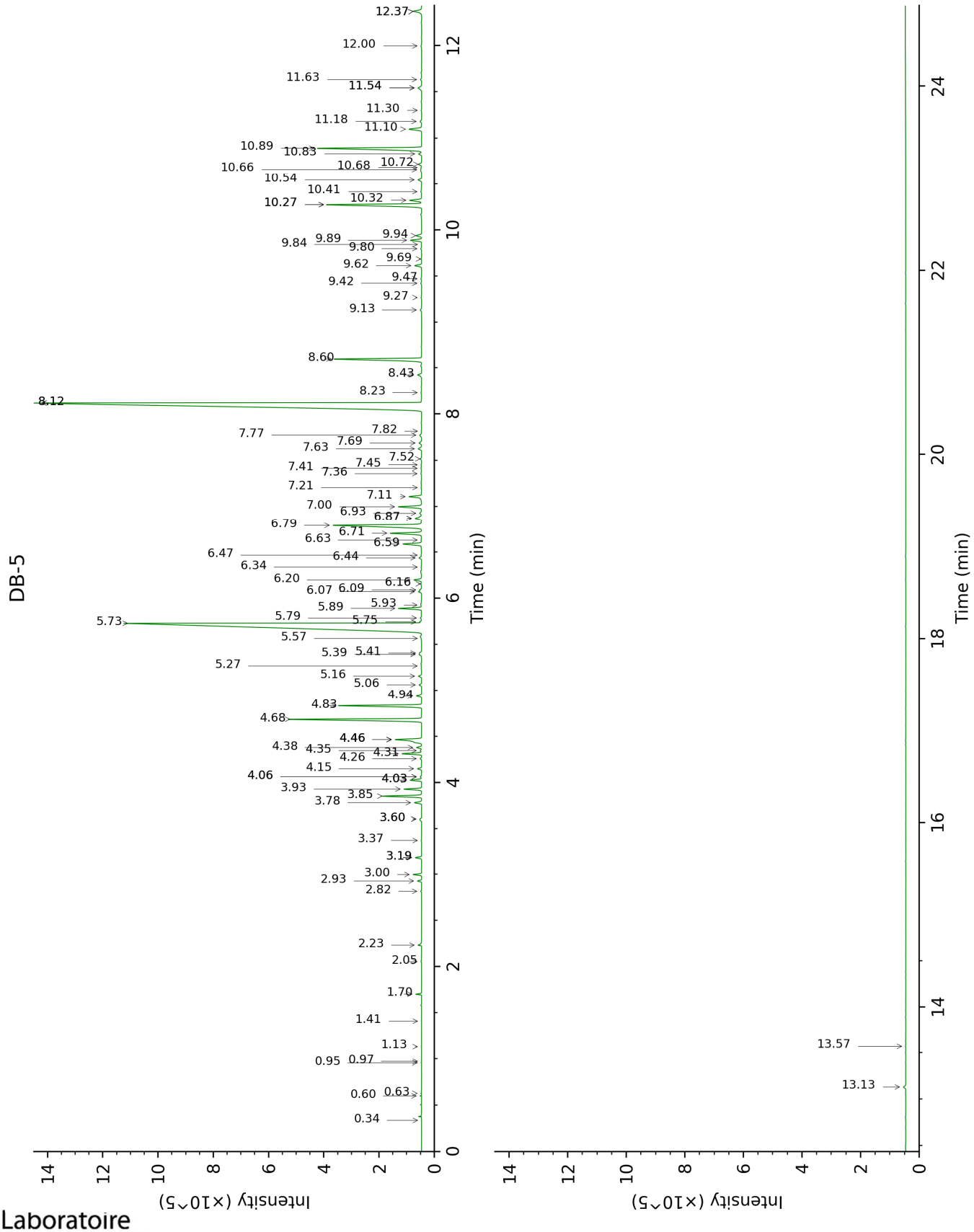
Note: no correction factor was applied

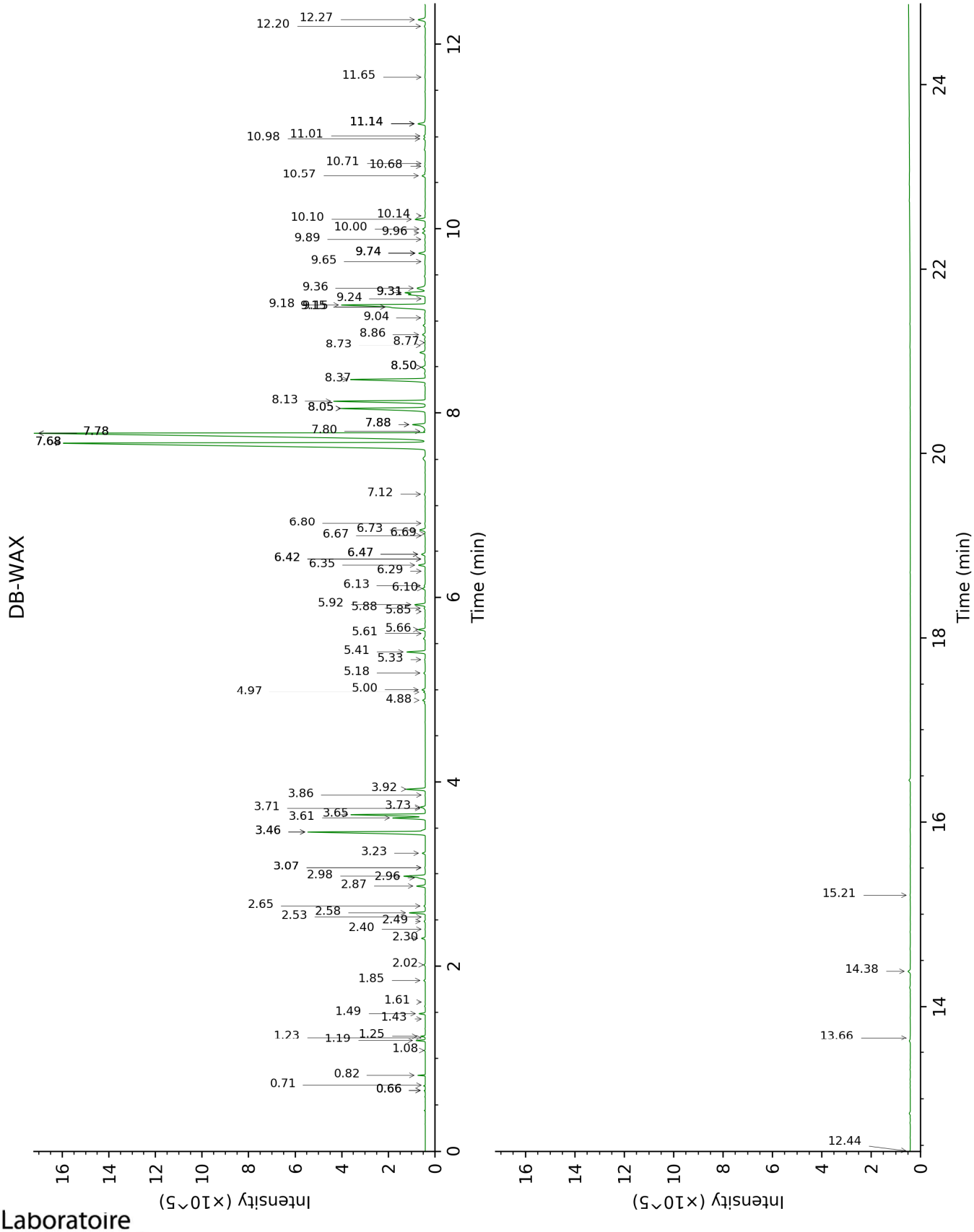
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

This page was intentionally left blank. The following pages present the complete data of the analysis.

628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com


DB-5
Time (min)
Intensity (×10^5)
12.37
12.00
11.63
11.54
11.30
11.18
11.10
10.89
10.83
10.66
10.68
10.72
10.54
10.41
10.32
10.27
9.94
9.84
9.89
9.80
9.69
9.62
9.47
9.42
9.27
9.13
8.60
8.43
8.23
8.12
7.82
7.77
7.69
7.63
7.52
7.45
7.41
7.36
7.21
7.11
7.00
6.93
6.87
6.79
6.71
6.63
6.59
6.47
6.44
6.34
6.20
6.16
6.07
6.09
5.93
5.89
5.79
5.75
5.73
5.57
5.41
5.39
5.27
5.16
5.06
4.94
4.83
4.68
4.46
4.38
4.35
4.31
4.26
4.15
4.06
4.03
3.93
3.85
3.78
3.60
3.37
3.19
3.00
2.93
2.82
2.23
2.05
1.70
1.41
1.13
0.97
0.95
0.63
0.60
0.34
13.57
13.13


DB-WAX
Time (min)
Intensity (×10^5)
12.20
12.27
11.65
11.14
10.98
11.01
10.71
10.68
10.57
10.10
10.14
10.00
9.96
9.89
9.74
9.65
9.36
9.31
9.24
9.18
9.15
9.04
8.86
8.73
8.77
8.50
8.37
8.13
8.05
7.78
7.80
7.88
7.68
7.12
6.80
6.67
6.73
6.69
6.42
6.47
6.35
6.29
6.13
6.10
5.92
5.88
5.85
5.61
5.66
5.41
5.33
5.18
4.97
5.00
4.88
3.92
3.86
3.71
3.73
3.61
3.65
3.46
3.23
3.07
2.98
2.96
2.87
2.65
2.53
2.58
2.49
2.40
2.30
2.02
1.85
1.61
1.49
1.43
1.23
1.19
1.25
1.08
0.82
0.71
0.66
15.21
14.38
13.66
12.44

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Ethanol	0.34	507	tr	0.71	906	tr
Isovaleral	0.60	642	0.02	0.66*	883	0.02
2-Methylbutyral	0.63	652	0.01	0.66*	883	[0.02]
Isoamyl alcohol	0.96	734	0.01	3.07*	1173	0.03
2-Methylbutanol	0.97	736	tr	3.07*	1173	[0.03]
Toluene	1.13	759	tr	1.23	998	tr
Hexanal	1.41	800	0.01	1.62	1040	tr
Methyl hexyl ether	1.70	827	0.12	0.82	925	0.12
(3*Z*)-Hexenol	2.05	857	0.02	5.33	1342	0.03
Hexanol	2.23	872	0.10	5.00	1319	0.12
Tricyclene	2.82	918	0.02	1.08	972	0.02
α-Thujene	2.93	925	0.11	1.24	1001	0.11
α-Pinene	3.00	930	0.23	1.19	991	0.23
Camphene	3.19*	943	0.19	1.49	1027	0.17
α-Fenchene	3.19*	943	[0.19]	1.43	1021	tr
Butyl isobutyrate	3.37	955	0.02	2.40	1118	0.01
Sabinene	3.60*	971	0.09	2.02	1082	0.05
β-Pinene	3.60*	971	[0.09]	1.85	1065	0.05
Octen-3-ol	3.78	982	0.24	6.35	1417	0.25
Octan-3-one	3.85	987	1.19	3.61	1217	1.20
Myrcene	3.93	992	0.53	2.58	1133	0.52
Butyl butyrate	4.03*	999	0.35	3.23	1186	0.11
Octan-3-ol	4.03*	999	[0.35]	5.66	1366	0.26
α-Phellandrene	4.06*	1001	0.05	2.49	1125	0.04
Pseudolimonene	4.06*	1001	[0.05]	2.53	1129	0.01
Δ3-Carene	4.15	1007	0.13	2.30	1110	0.13
α-Terpinene	4.26	1014	0.05	2.65	1139	0.05
Hexyl acetate	4.31	1017	0.61	3.92	1240	0.69
ortho-Cymene	4.35	1019	0.05	3.72	1225	0.03
para-Cymene	4.38	1022	0.17	3.73	1226	0.17
Limonene	4.46*†	1027	1.31	2.87	1156	0.31
β-Phellandrene	4.46*†	1027	[1.31]	2.96	1164	0.14
1,8-Cineole	4.46*†	1027	[1.31]	2.98	1165	0.87
(*Z*)-β-Ocimene	4.68	1041	4.86	3.46*†	1205	5.07
(*E*)-β-Ocimene	4.83	1050	2.71	3.65	1219	2.72
γ-Terpinene	4.94	1057	0.16	3.46*†	1205	[5.07]
cis-Sabinene hydrate	5.06	1065	0.08	6.47*	1426	0.16
cis-Linalool oxide (fur.)	5.16	1071	0.11	6.10	1398	0.11
Octanol	5.27	1078	0.02	7.80†	1526	[31.14]
Terpinolene	5.39	1086	0.09	3.86	1236	0.01
trans-Linalool oxide (fur.)	5.41	1087	0.07	6.47*	1426	[0.16]
Rosefuran	5.57	1097	0.01	5.61	1363	0.01
Linalool	5.73	1107	28.84	7.68*	1516	28.78
(*Z*)-6-Methyl-3,5-heptadien-2-one	5.74	1108	0.04	7.78*†	1525	31.14

β-Thujone	5.79	1111	0.03	5.88	1382	0.05
Octen-3-yl acetate	5.89	1118	0.72	5.41	1348	0.71
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	5.93	1120	0.03	9.24	1641	0.01
Octan-3-yl acetate	6.07	1130	0.10	4.88	1310	0.10
allo-Ocimene	6.09	1131	0.06	5.18	1332	0.06
(*Z*)-Myroxide	6.16	1135	0.04	6.42*	1422	0.05
Camphor	6.20	1138	0.27	6.73	1445	0.24
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.34	1147	0.01	6.67	1440	0.02
Hexyl isobutyrate	6.44	1153	0.09	4.98	1317	0.07
Nerol oxide	6.47	1155	0.02	6.42*	1422	[0.05]
Borneol	6.59	1163	0.68	9.31*†	1646	1.50
cis-Linalool oxide (pyr.)	6.63	1166	0.03	9.89	1693	0.03
Lavandulol	6.71	1171	1.09	9.16*	1633	1.26
Terpinen-4-ol	6.79	1176	4.04	8.13	1552	3.94
Cryptone	6.87*	1181	0.28	8.77	1602	0.02
meta-Cymen-8-ol	6.87*	1181	[0.28]	11.14*	1801	0.36
para-Cymen-8-ol	6.93	1185	0.08	11.14*	1801	[0.36]
α-Terpineol	7.00	1190	0.84	9.31*†	1646	[1.50]
Hexyl butyrate	7.11	1197	0.49	5.92	1385	0.42
Unknown [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.21	1203	0.02	5.85	1380	0.01
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.36	1213	0.03	10.98	1787	0.07
Octyl acetate	7.41	1217	0.03	6.69	1442	0.02
trans-Carveol	7.45	1220	0.02	11.01	1790	0.06
Bornyl formate	7.52	1224	0.04	7.68*	1516	[28.78]
Nerol	7.63	1232	0.14	10.57	1752	0.14
Hexyl 2-methylbutyrate	7.69	1236	0.10	6.13	1400	0.05
Neral	7.77	1242	0.08	9.04	1624	0.05
Hexyl isovalerate	7.82	1245	0.01	6.28	1412	0.01
Geraniol	8.12*	1266	31.80	11.14*	1801	[0.36]
Linalyl acetate	8.12*	1266	[31.80]	7.78*†	1525	[31.14]
Geranial	8.23	1273	0.04	9.74*	1681	0.28
Cuminol	8.42	1286	0.17	13.66	2035	0.01
Lavandulyl acetate	8.60	1298	3.34	8.36	1570	3.32
Hexyl tiglate	9.14	1332	0.06	8.50*	1580	0.19
Hodiendiol derivative	9.27	1342	0.02	12.44	1918	0.02
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.42	1353	0.03	10.68	1761	0.03

Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.47	1356	0.03	10.71	1764	0.02
Neryl acetate	9.62	1366	0.24	9.74*	1681	[0.28]
α-Copaene	9.69	1371	0.01	6.80	1450	0.02
β-Bourbonene	9.80	1379	0.03	7.12	1475	0.04
Geranyl acetate	9.84	1382	0.01	10.14	1715	0.01
α-Funebrene	9.89†	1386	0.60	7.68*	1516	[28.78]
Hexyl hexanoate	9.94†	1389	[0.60]	8.50*	1580	[0.19]
cis-α-Bergamotene	10.27*	1414	3.88	7.88*	1532	0.61
β-Caryophyllene	10.27*	1414	[3.88]	8.05*	1546	3.97
α-Santalene	10.32	1417	0.46	7.88*	1532	[0.61]
Coumarin	10.42	1424	0.06			
trans-α-Bergamotene	10.54	1434	0.14	8.05*	1546	[3.97]
Sesquisabinene A	10.66	1442	0.05	8.73	1599	0.03
cis-β-Bergamotene?	10.68	1444	0.02			
α-Humulene	10.72	1447	0.13	8.86	1609	0.13
Lavandulyl butyrate?	10.83	1455	0.12	10.10	1711	0.43
(*E*)-β-Farnesene	10.89	1460	4.24	9.18	1635	4.01
Germacrene D	11.10	1475	0.51	9.36	1650	0.53
trans-β-Bergamotene	11.18	1481	0.06	9.16*	1633	[1.26]
Bicyclogermacrene	11.30	1490	0.02	9.65	1674	0.03
γ-Cadinene	11.54*	1509	0.20	9.96	1699	0.14
β-Bisabolene	11.54*	1509	[0.20]	9.74*	1681	[0.28]
δ-Cadinene	11.64	1516	0.04	10.00	1702	0.11
Isocaryophyllene epoxide B	12.00	1544	0.03	11.65	1846	0.03
Caryophyllene oxide	12.37*	1574	0.41	12.27	1902	0.36
Caryophyllene oxide isomer	12.37*	1574	[0.41]	12.20	1896	0.04
τ-Cadinol	13.13	1635	0.09	14.38	2106	0.11
cis-14-nor-Muurol-5-en-4-one?	13.57	1672	0.01	15.21	2190	0.01
Total identified		**98.74%**			**97.42%**	
Total reported		**98.86%**			**97.52%**	

*: 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