Date : November 06, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20J29-PTH01
Customer identification : Lavender - L4011498R
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 : Lindsay Girard, M. Sc.
Analysis date : November 04, 2020

Checked and approved by :

Sylvain Mercier, M. Sc., chimiste 2014-005

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

This report is an update of the version first issued on November 05, 2020 to correct a mistake in the lot number and to indicatively present comparison to a standard.

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

PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4612 ± 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	1.0	Yes
Lavandulyl acetate		8	3	Yes
Terpinen-4-ol		8	3	Yes
Lavandulol		3.0	0.9	Yes
Linalyl acetate	25	47	28	Yes
Linalool	20	43	34	Yes
Camphor		1.5	0.2	Yes
Octan-3-one		3.0	1.7	Yes
(E)-β-Ocimene	tr	6	3	Yes
(Z)-β-Ocimene	1	10	4	Yes
β-Phellandrene		1.0	0.3	Yes
1,8-Cineole		3.0	0.9	Yes
Limonene		1.0	0.5	Yes
Refractive index	1.4600	1.4660	1.4612	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
Isovaleral	0.02	Aliphatic aldehyde
Isoamyl alcohol	0.01	Aliphatic alcohol
Toluene	0.01	Simple phenolic
Hexanal	0.01	Aliphatic aldehyde
Butyl acetate	0.02	Aliphatic ester
Methyl hexyl ether	0.13	Aliphatic ether
Hexanol	0.08	Aliphatic alcohol
Tricyclene	0.02	Monoterpene
α-Thujene	0.11	Monoterpene
α-Pinene	0.20	Monoterpene
Camphene	0.18	Monoterpene
Butyl isobutyrate	0.02	Aliphatic ester
β-Pinene	0.06	Monoterpene
Sabinene	0.04	Monoterpene
Octen-3-ol	0.30	Aliphatic alcohol
Octan-3-one	1.65	Aliphatic ketone
Myrcene	0.67	Monoterpene
Butyl butyrate	0.10	Aliphatic ester
Octan-3-ol	0.29	Aliphatic alcohol
α-Phellandrene	0.06	Monoterpene
Δ3-Carene	0.14	Monoterpene
α-Terpinene	0.05	Monoterpene
Hexyl acetate	0.61	Aliphatic ester
ortho-Cymene	0.05	Monoterpene
para-Cymene	0.17	Monoterpene
Limonene	0.49	Monoterpene
β-Phellandrene	0.31	Monoterpene
1,8-Cineole	0.87	Monoterpenic ether
(*Z*)-β-Ocimene	4.30	Monoterpene
(*E*)-β-Ocimene	2.64	Monoterpene
γ-Terpinene	0.17	Monoterpene
cis-Sabinene hydrate	0.05	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.11	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.13	Monoterpene
trans-Linalool oxide (fur.)	0.07	Monoterpenic alcohol
Rosefuran	0.04	Monoterpenic ether
Linalool	34.14	Monoterpenic alcohol
(*Z*)-6-Methyl-3,5-heptadien-2-one	0.06	Aliphatic ketone
Octen-3-yl acetate	0.75	Aliphatic ester
Unknown	0.04	Unknown
Octan-3-yl acetate	0.09	Aliphatic ester
allo-Ocimene	0.06	Monoterpene
(*Z*)-Myroxide	0.05	Monoterpenic ether
Camphor	0.22	Monoterpenic ketone

(*E*)-Myroxide	0.05	Monoterpenic ether
Hexyl isobutyrate	0.10	Aliphatic ester
Borneol	0.59	Monoterpenic alcohol
Lavandulol	0.91	Monoterpenic alcohol
Terpinen-4-ol	3.40	Monoterpenic alcohol
meta-Cymen-8-ol	0.04	Monoterpenic alcohol
Cryptone	0.28	Normonoterpenic ketone
para-Cymen-8-ol	0.05	Monoterpenic alcohol
α-Terpineol	1.00	Monoterpenic alcohol
Hodiendiol	0.02	Monoterpenic alcohol
Hexyl butyrate	0.34	Aliphatic ester
Unknown	0.03	Unknown
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.05	Monoterpenic alcohol
Bornyl formate	0.03	Monoterpenic ester
Nerol	0.17	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.13	Aliphatic ester
Hexyl isovalerate	0.01	Aliphatic ester
Geraniol	0.36	Monoterpenic alcohol
Linalyl acetate	27.93	Monoterpenic ester
(*trans*?)-Linalool oxide acetate (fur.)?	0.01	Monoterpenic ester
Geranial	0.06	Monoterpenic aldehyde
Bornyl acetate	0.12	Monoterpenic ester
Lavandulyl acetate	2.54	Monoterpenic ester
Hexyl tiglate	0.05	Aliphatic ester
Hodiendiol derivative	0.02	Oxygenated monoterpene
Unknown	0.03	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Neryl acetate	0.30	Monoterpenic ester
Geranyl acetate	0.49	Monoterpenic ester
Hexyl hexanoate	0.22	Aliphatic ester
7-epi-Sesquithujene	0.07	Sesquiterpene
Isocaryophyllene	0.03	Sesquiterpene
β-Caryophyllene	4.08	Sesquiterpene
α-Santalene	0.39	Sesquiterpene
Coumarin	0.04	Coumarin
trans-α-Bergamotene	0.12	Sesquiterpene
Lavandulyl butyrate?	0.11	Monoterpenic ester
(*E*)-β-Farnesene	2.99	Sesquiterpene
Germacrene D	0.39	Sesquiterpene
trans-β-Bergamotene	0.05	Sesquiterpene
γ-Cadinene	0.22	Sesquiterpene
β-Bisabolene	0.02	Sesquiterpene
δ-Cadinene	0.02	Sesquiterpene
Isocaryophyllene epoxide B	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.22	Sesquiterpenic ether
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
τ-Cadinol	0.06	Sesquiterpenic alcohol
Consolidated total	**97.78%**	

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

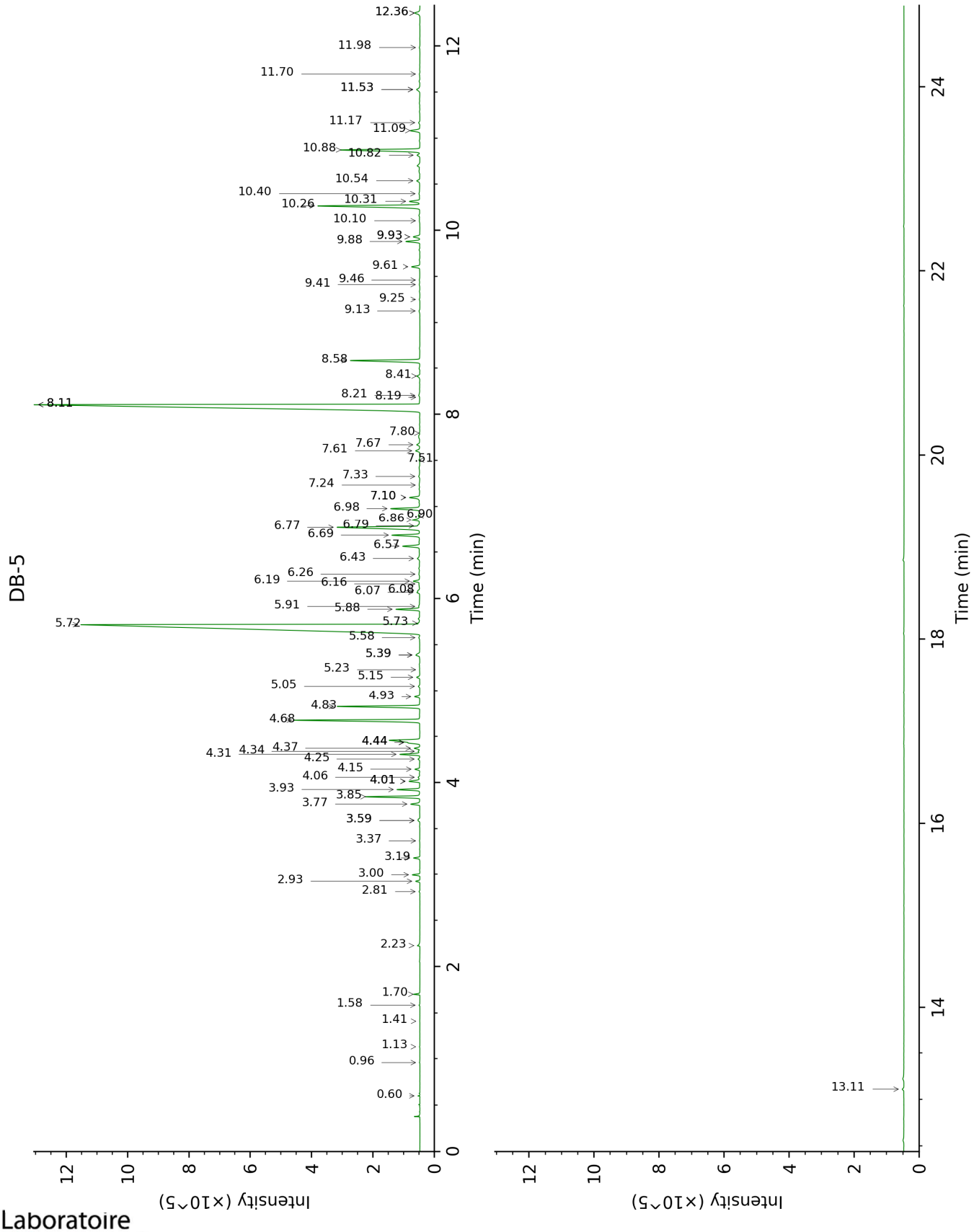
between columns, the algorithm is set to prioritize data from the most standard DB-5 column, and smallest values so as to avoid overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report to access the full untreated data and perform their own calculations if needed.

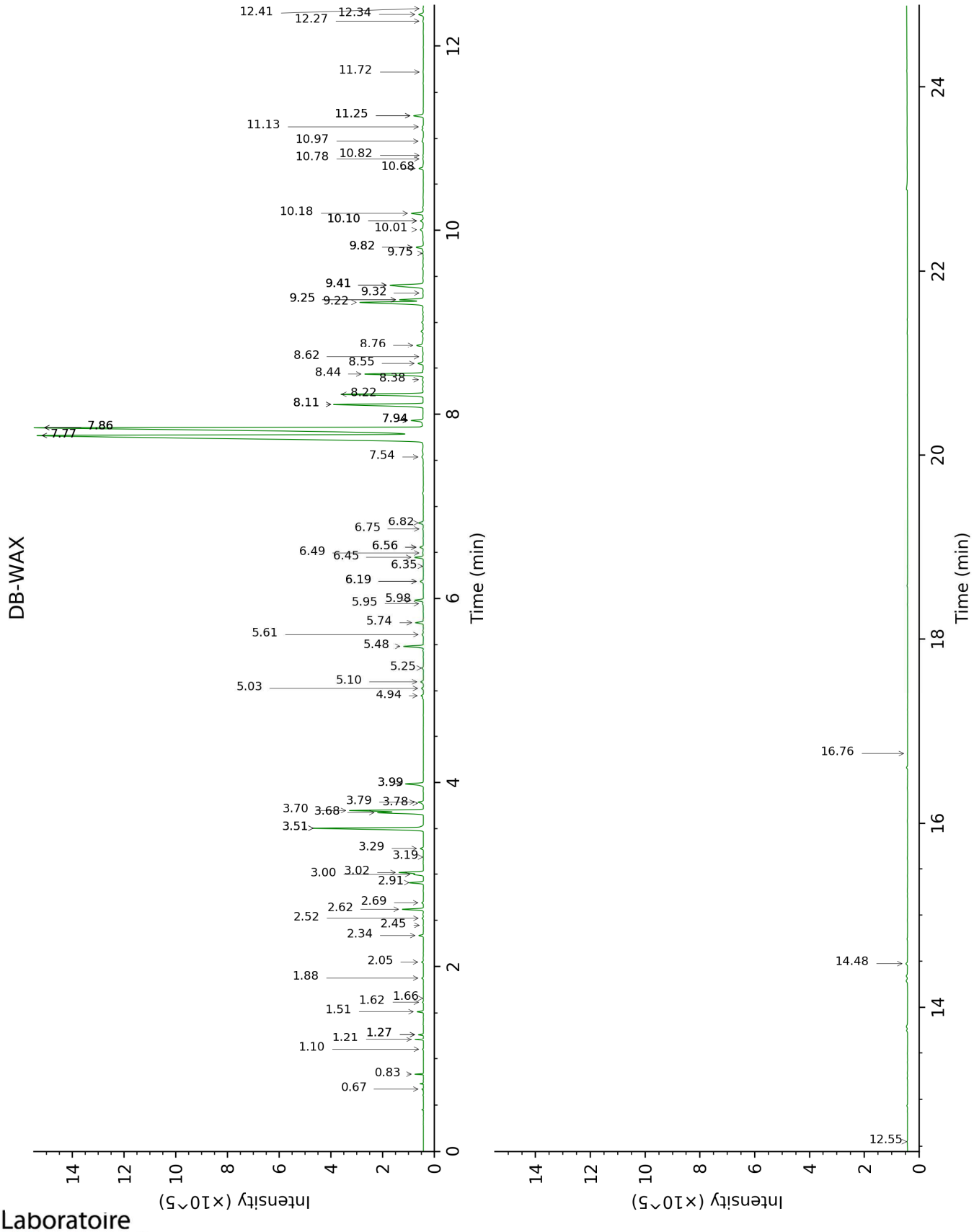
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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

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
12.36
11.98
11.70
11.53
11.17
11.09
10.88
10.82
10.54
10.40
10.31
10.26
10.10
9.93
9.88
9.61
9.46
9.41
9.25
9.13
8.58
8.41
8.21
8.19
8.11
7.80
7.67
7.61
7.51
7.33
7.24
7.10
6.98
6.90
6.86
6.79
6.77
6.69
6.57
6.43
6.26
6.19
6.16
6.08
6.07
5.91
5.88
5.73
5.72
5.58
5.39
5.23
5.15
5.05
4.93
4.83
4.68
4.44
4.37
4.34
4.31
4.25
4.15
4.06
4.01
3.93
3.85
3.77
3.59
3.37
3.19
3.00
2.93
2.81
2.23
1.70
1.58
1.41
1.13
0.96
0.60
13.11
Time (min)
Intensity (×10^5)


DB-WAX
Time (min)
Intensity (×10^5)
12.41
12.34
12.27
11.72
11.25
11.13
10.97
10.82
10.78
10.68
10.18
10.10
10.01
9.82
9.75
9.41
9.32
9.25
9.22
8.76
8.62
8.55
8.44
8.38
8.22
8.11
7.94
7.86
7.77
7.54
6.82
6.75
6.56
6.49
6.45
6.35
6.19
5.98
5.95
5.74
5.61
5.48
5.25
5.10
5.03
4.94
3.99
3.79
3.78
3.70
3.68
3.51
3.29
3.19
3.02
3.00
2.91
2.69
2.62
2.52
2.45
2.34
2.05
1.88
1.66
1.62
1.51
1.27
1.21
1.10
0.83
0.67
16.76
14.48
12.55

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.60	642	0.02	0.67	884	0.02
Isoamyl alcohol	0.96	734	0.01	3.20	1180	0.01
Toluene	1.13	759	0.01	1.27*	1000	0.12
Hexanal	1.41	800	0.01	1.66	1041	0.01
Butyl acetate	1.58	817	0.02	1.62	1036	0.02
Methyl hexyl ether	1.70	827	0.13	0.83	922	0.14
Hexanol	2.23	872	0.08	5.10	1319	0.11
Tricyclene	2.81	917	0.02	1.10	970	0.02
α-Thujene	2.93	925	0.11	1.27*	1000	[0.12]
α-Pinene	3.00	930	0.20	1.21	990	0.21
Camphene	3.19	942	0.18	1.51	1026	0.17
Butyl isobutyrate	3.37	955	0.02	2.45	1119	0.01
β-Pinene	3.59*†	970	0.09	1.88	1064	0.06
Sabinene	3.59*†	970	[0.09]	2.05	1082	0.04
Octen-3-ol	3.77	981	0.30	6.45	1418	0.32
Octan-3-one	3.85	987	1.65	3.68	1218	1.72
Myrcene	3.93	992	0.67	2.62	1133	0.67
Butyl butyrate	4.02*	998	0.37	3.29	1187	0.10
Octan-3-ol	4.02*	998	[0.37]	5.74	1366	0.29
α-Phellandrene	4.06	1001	0.06	2.52	1125	0.05
Δ3-Carene	4.15	1006	0.14	2.34	1110	0.14
α-Terpinene	4.26	1013	0.05	2.69	1138	0.06
Hexyl acetate	4.31	1017	0.61	3.99*	1241	0.73
ortho-Cymene	4.34	1019	0.05	3.78	1225	0.04
para-Cymene	4.37	1021	0.17	3.79	1226	0.18
Limonene	4.44*†	1025	1.66	2.91	1156	0.49
β-Phellandrene	4.44*†	1025	[1.66]	3.00	1164	0.31
1,8-Cineole	4.44*†	1025	[1.66]	3.02	1165	0.87
(*Z*)-β-Ocimene	4.68	1040	4.30	3.51*	1205	4.46
(*E*)-β-Ocimene	4.83	1050	2.64	3.70	1219	2.57
γ-Terpinene	4.93	1056	0.17	3.51*	1205	[4.46]
cis-Sabinene hydrate	5.05	1064	0.05	6.49	1422	0.05
cis-Linalool oxide (fur.)	5.15	1070	0.11	6.19*	1398	0.14
Octanol	5.23	1075	0.01	7.86*†	1525	[62.23]
Terpinolene	5.39*	1085	0.19	3.99*	1241	[0.73]
trans-Linalool oxide (fur.)	5.39*	1085	[0.19]	6.56*	1426	0.14
Rosefuran	5.58	1097	0.04	5.61	1357	0.06
Linalool	5.72	1106	34.14	7.77*†	1518	62.23
(*Z*)-6-Methyl-3,5-heptadien-2-one	5.73	1107	0.06	7.94*	1531	0.45
Octen-3-yl acetate	5.88	1117	0.75	5.48	1347	0.74
Unknown [m/z 82, 81 (72), 43	5.91	1119	0.04	9.25*	1636	0.90

(64), 54 (32), 41 (20)...]						
Octan-3-yl acetate	6.07	1129	0.09	4.94	1308	0.09
allo-Ocimene	6.08	1130	0.06	5.25	1330	0.06
(*Z*)-Myroxide	6.16	1135	0.05	6.56*	1426	[0.14]
Camphor	6.19	1136	0.22	6.82	1446	0.20
(*E*)-Myroxide	6.26	1141	0.05	6.75	1441	0.02
Hexyl isobutyrate	6.43	1152	0.10	5.03	1314	0.07
Borneol	6.57	1161	0.59	9.41*	1648	2.00
Lavandulol	6.69	1169	0.91	9.25*	1636	[0.90]
Terpinen-4-ol	6.77	1174	3.40	8.22	1553	3.39
meta-Cymen-8-ol	6.79	1175	0.04	11.13	1793	0.05
Cryptone	6.86	1180	0.28	8.76	1595	0.33
para-Cymen-8-ol	6.90	1183	0.05	11.25*	1804	0.41
α-Terpineol	6.98	1188	1.00	9.41*	1648	[2.00]
Hodiendiol	7.10*	1196	0.37	12.41	1908	0.02
Hexyl butyrate	7.10*	1196	[0.37]	5.98	1384	0.34
Unknown [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.24	1204	0.03	5.94	1381	0.04
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.33	1211	0.05	10.97	1780	0.06
Bornyl formate	7.51	1223	0.03	7.77*†	1518	[62.23]
Nerol	7.61	1230	0.17	10.68	1755	0.20
Hexyl 2-methylbutyrate	7.67	1234	0.13	6.19*	1398	[0.14]
Hexyl isovalerate	7.80	1242	0.01	6.35	1411	0.02
Geraniol	8.11*	1264	29.01	11.25*	1804	[0.41]
Linalyl acetate	8.11*	1264	[29.01]	7.86*†	1525	[62.23]
(*trans*?)-Linalool oxide acetate (fur.)?	8.18	1269	0.01	8.38	1566	0.04
Geranial	8.20	1270	0.06	9.82*	1682	0.33
Bornyl acetate	8.42	1284	0.12	7.86*†	1525	[62.23]
Lavandulyl acetate	8.58	1296	2.54	8.44	1570	2.52
Hexyl tiglate	9.13	1331	0.05	8.62	1585	0.03
Hodiendiol derivative	9.25	1340	0.02	12.55	1921	0.02
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.41	1351	0.03	10.82	1767	0.02
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41	9.46	1355	0.02	10.78	1764	0.03

(23), 81 (21)... 197 (0)]						
Neryl acetate	9.61	1365	0.30	9.82*	1682	[0.33]
Geranyl acetate	9.88	1384	0.49	10.18	1713	0.52
Hexyl hexanoate	9.93*	1388	0.25	8.55	1580	0.22
7-epi-Sesquithujene	9.93*	1388	[0.25]	7.54	1500	0.07
Isocaryophyllene	10.10	1400	0.03	7.94*	1531	[0.45]
β-Caryophyllene	10.26	1412	4.08	8.11*	1545	4.11
α-Santalene	10.31	1416	0.39	7.94*	1531	[0.45]
Coumarin	10.40	1422	0.04	16.76	2342	0.01
trans-α-Bergamotene	10.54	1432	0.12	8.11*	1545	[4.11]
Lavandulyl butyrate?	10.82	1454	0.11	10.10*	1706	0.12
(*E*)-β-Farnesene	10.88	1458	2.99	9.22	1633	3.03
Germacrene D	11.09	1473	0.39	9.41*	1648	[2.00]
trans-β-Bergamotene	11.17	1480	0.05	9.32	1642	0.02
γ-Cadinene	11.53*	1507	0.17	10.01	1698	0.22
β-Bisabolene	11.53*	1507	[0.17]	9.75	1677	0.02
δ-Cadinene	11.70	1520	0.02	10.10*	1706	[0.12]
Isocaryophyllene epoxide B	11.98	1543	0.02	11.72	1846	0.03
Caryophyllene oxide	12.36*	1572	0.26	12.34	1902	0.22
Caryophyllene oxide isomer	12.36*	1572	[0.26]	12.27	1896	0.03
τ-Cadinol	13.11	1633	0.06	14.48	2105	0.08
Total identified		**98.25%**			**97.56%**	
Total reported		**98.38%**			**97.64%**	

*: 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

Note: no correction factor was applied
R.T.: Retention time (minutes)
R.I.: Retention index