Date : November 16, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20K13-PTH03
Customer identification : Lavender Organic - L50113207R
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 16, 2020

Checked and approved by :

Alexis St-Gelais, M. Sc., chimiste 2013-174

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Méthode certifiée ISO 17025:2017 Certified method

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4625 ± 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	1.5	Yes
Lavandulyl acetate		8	3	Yes
Terpinen-4-ol		8	6	Yes
Lavandulol		3.0	0.8	Yes
Linalyl acetate	25	47	27	Yes
Linalool	20	43	29	Yes
Camphor		1.5	0.2	Yes
Octan-3-one		3.0	0.9	Yes
(E)-β-Ocimene	tr	6	4	Yes
(Z)-β-Ocimene	1	10	7	Yes
β-Phellandrene		1.0	0.1	Yes
1,8-Cineole		3.0	0.7	Yes
Limonene		1.0	0.2	Yes
Refractive index	1.4600	1.4660	1.4625	Yes

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
Acetone	0.03	Aliphatic ketone
Isovaleral	0.02	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	0.01	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	tr	Simple phenolic
Prenal	tr	Aliphatic aldehyde
Butyl acetate	0.02	Aliphatic ester
Methyl hexyl ether	0.07	Aliphatic ether
(3*Z*)-Hexenol	0.01	Aliphatic alcohol
Hexanol	0.06	Aliphatic alcohol
Tricyclene	0.02	Monoterpene
α-Thujene	0.12	Monoterpene
α-Pinene	0.26	Monoterpene
Camphene	0.13	Monoterpene
α-Fenchene	tr	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Butyl isobutyrate	0.02	Aliphatic ester
β-Pinene	0.03	Monoterpene
Sabinene	0.03	Monoterpene
Octen-3-ol	0.15	Aliphatic alcohol
Octan-3-one	0.90	Aliphatic ketone
Myrcene	0.78	Monoterpene
Octan-3-ol	0.13	Aliphatic alcohol
Butyl butyrate	0.10	Aliphatic ester
α-Phellandrene	0.06	Monoterpene
Δ3-Carene	0.10	Monoterpene
α-Terpinene	0.08	Monoterpene
Hexyl acetate	0.49	Aliphatic ester
ortho-Cymene	0.04	Monoterpene
para-Cymene	0.13	Monoterpene
Limonene	0.24	Monoterpene
1,8-Cineole	0.70	Monoterpenic ether
β-Phellandrene	0.08	Monoterpene
(*Z*)-β-Ocimene	6.75	Monoterpene
(*E*)-β-Ocimene	3.94	Monoterpene
γ-Terpinene	0.25	Monoterpene
cis-Sabinene hydrate	0.04	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.10	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.15	Monoterpene
trans-Linalool oxide (fur.)	0.07	Monoterpenic alcohol
Rosefuran	0.04	Monoterpenic ether
Linalool	29.16	Monoterpenic alcohol
(*Z*)-6-Methyl-3,5-heptadien-2-one	0.03	Aliphatic ketone

β-Thujone	0.04	Monoterpenic ketone
Octen-3-yl acetate	0.90	Aliphatic ester
Unknown	0.03	Unknown
Octan-3-yl acetate	0.10	Aliphatic ester
allo-Ocimene	0.08	Monoterpene
(*Z*)-Myroxide	0.02	Monoterpenic ether
Camphor	0.25	Monoterpenic ketone
(*E*)-Myroxide	0.02	Monoterpenic ether
Unknown	0.01	Oxygenated monoterpene
Hexyl isobutyrate	0.07	Aliphatic ester
Nerol oxide	0.01	Aliphatic ether
Borneol	0.51	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.02	Monoterpenic alcohol
Lavandulol	0.78	Monoterpenic alcohol
Terpinen-4-ol	5.93	Monoterpenic alcohol
(3*E*,5*Z*)-Undeca-1,3,5-triene	0.01	Alkene
meta-Cymen-8-ol	0.02	Monoterpenic alcohol
Cryptone	0.02	Normonoterpenic ketone
para-Cymen-8-ol	0.16	Monoterpenic alcohol
α-Terpineol	1.53	Monoterpenic alcohol
Hodiendiol	0.06	Monoterpenic alcohol
Hexyl butyrate	0.30	Aliphatic ester
Verbenone	0.02	Monoterpenic ketone
Unknown	0.02	Unknown
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.03	Monoterpenic alcohol
Bornyl formate	0.05	Monoterpenic ester
Nerol	0.25	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.06	Aliphatic ester
Carvone	0.02	Monoterpenic ketone
Neral	0.02	Monoterpenic aldehyde
Geraniol	0.50	Monoterpenic alcohol
Linalyl acetate	27.24	Monoterpenic ester
trans-Ascaridole glycol	0.01	Monoterpenic alcohol
Geranial	0.03	Monoterpenic aldehyde
Bornyl acetate	0.17	Monoterpenic ester
Lavandulyl acetate	3.47	Monoterpenic ester
Hexyl tiglate	0.05	Aliphatic ester
Hodiendiol derivative	0.01	Oxygenated monoterpene
Unknown	0.04	Oxygenated monoterpene
Unknown	0.03	Oxygenated monoterpene
Hodiendiol derivative III	0.01	Oxygenated monoterpene
Neryl acetate	0.42	Monoterpenic ester
α-Copaene	0.02	Sesquiterpene
β-Bourbonene	0.02	Sesquiterpene
Geranyl acetate	0.73	Monoterpenic ester
7-epi-Sesquithujene	0.07	Sesquiterpene
Hexyl hexanoate	0.04	Aliphatic ester
Isocaryophyllene	0.01	Sesquiterpene
Sesquithujene	0.01	Sesquiterpene
β-Caryophyllene	3.36	Sesquiterpene
α-Santalene	0.42	Sesquiterpene
Coumarin	0.01	Coumarin

trans-α-Bergamotene	0.13	Sesquiterpene
Sesquisabinene A	0.05	Sesquiterpene
α-Humulene	0.11	Sesquiterpene
Lavandulyl butyrate?	0.10	Monoterpenic ester
(*E*)-β-Farnesene	2.85	Sesquiterpene
Germacrene D	0.33	Sesquiterpene
trans-β-Bergamotene	0.05	Sesquiterpene
Isodaucene	0.02	Sesquiterpene
β-Bisabolene	0.02	Sesquiterpene
Lavandulyl isovalerate	0.01	Monoterpenic ester
γ-Cadinene	0.07	Sesquiterpene
δ-Cadinene	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.01	Sesquiterpenic ether
(*E*)-Nerolidol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.13	Sesquiterpenic ether
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
τ-Cadinol	0.03	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.01	Sesquiterpenic alcohol
Hexahydrofarnesyl acetone	0.01	Terpene derivative
Consolidated total	**97.37%**	

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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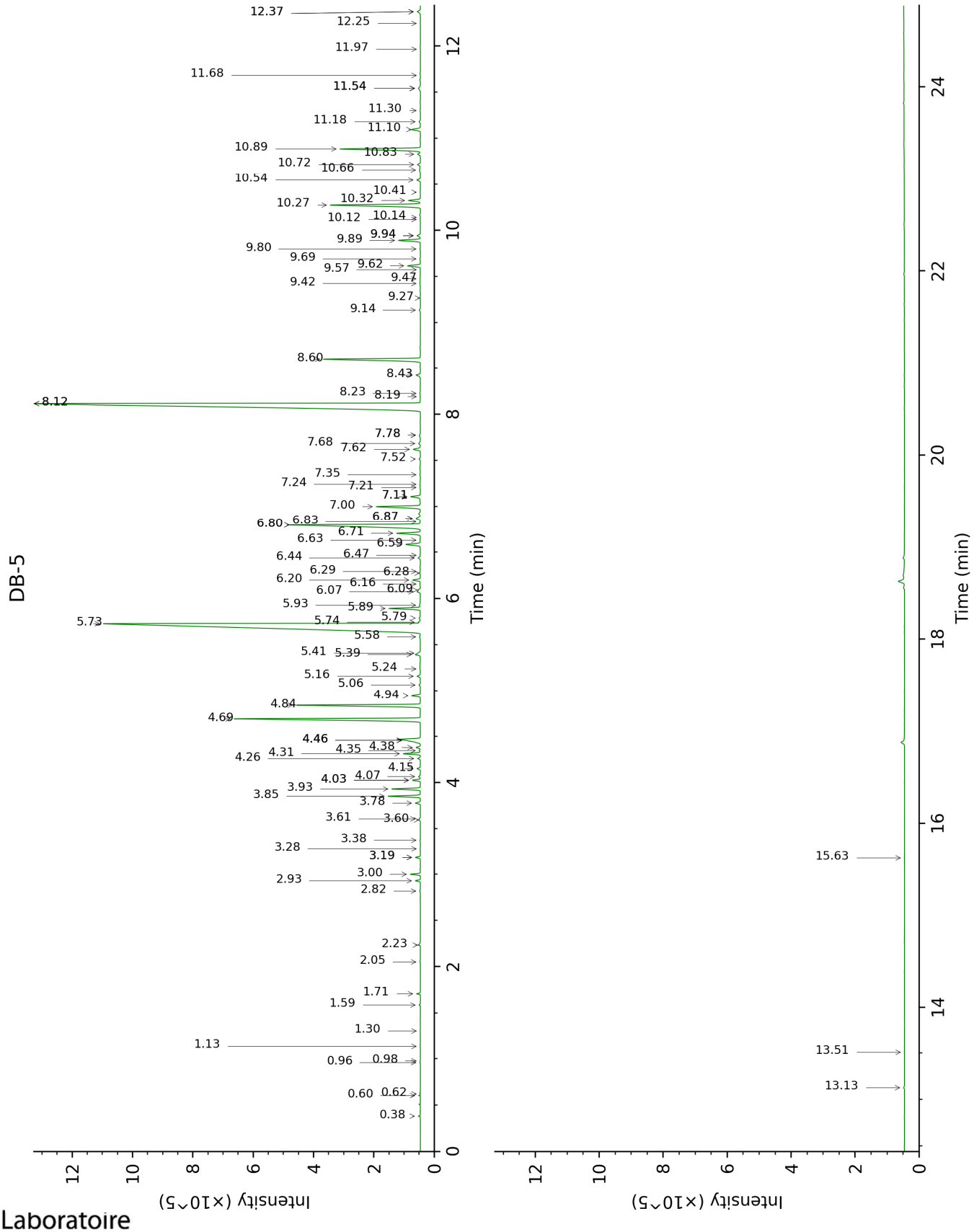
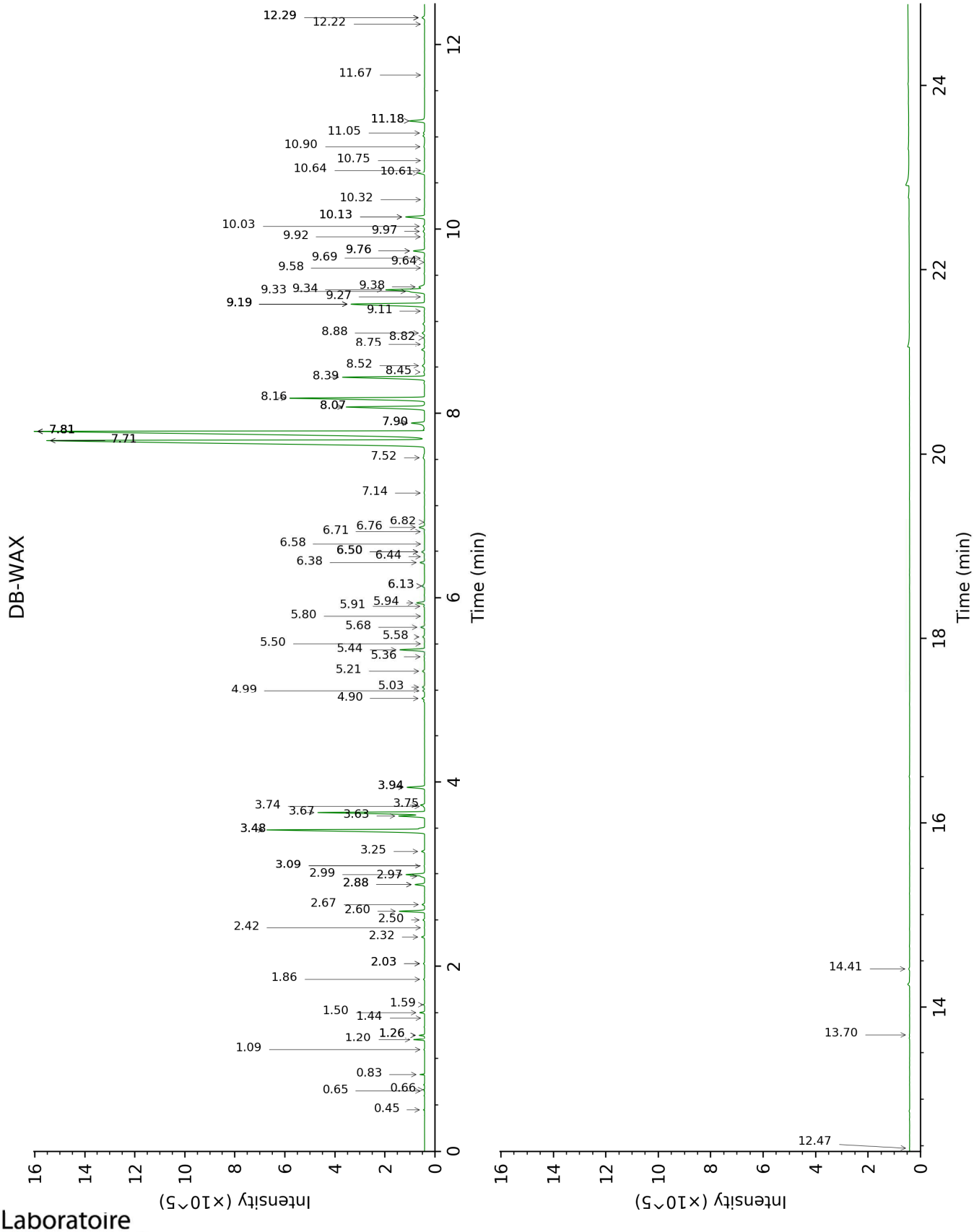

DB-5
Intensity (×10^5)
Time (min)
12.37
12.25
11.97
11.68
11.54
11.30
11.18
11.10
10.89
10.83
10.72
10.66
10.54
10.41
10.32
10.27
10.14
10.12
9.94
9.89
9.80
9.69
9.62
9.57
9.47
9.42
9.27
9.14
8.60
8.43
8.23
8.19
8.12
7.78
7.68
7.62
7.52
7.35
7.24
7.21
7.11
7.00
6.87
6.83
6.80
6.71
6.63
6.59
6.47
6.44
6.29
6.28
6.20
6.16
6.09
6.07
5.93
5.89
5.79
5.74
5.73
5.58
5.41
5.39
5.24
5.16
5.06
4.94
4.84
4.69
4.46
4.38
4.35
4.31
4.26
4.15
4.07
4.03
3.93
3.85
3.78
3.61
3.60
3.38
3.28
3.19
3.00
2.93
2.82
2.23
2.05
1.71
1.59
1.30
1.13
0.98
0.96
0.62
0.60
0.38
15.63
13.51
13.13


DB-WAX
Time (min)
Intensity (×10^5)
12.29
12.22
11.67
11.18
11.05
10.90
10.75
10.64
10.61
10.32
10.13
10.03
9.97
9.92
9.76
9.69
9.64
9.58
9.38
9.33
9.34
9.27
9.19
9.11
8.88
8.82
8.75
8.52
8.45
8.39
8.16
8.07
7.90
7.81
7.71
7.52
7.14
6.82
6.76
6.71
6.58
6.50
6.44
6.38
6.13
5.94
5.91
5.80
5.68
5.58
5.50
5.44
5.36
5.21
5.03
4.99
4.90
3.94
3.75
3.74
3.67
3.63
3.48
3.25
3.09
2.99
2.97
2.88
2.67
2.60
2.50
2.42
2.32
2.03
1.86
1.59
1.50
1.44
1.26
1.20
1.09
0.83
0.66
0.65
0.45
14.41
13.70
12.47

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Acetone	0.38	507	0.03	0.45	785	0.02
Isovaleral	0.60	643	0.02	0.66	887	0.02
2-Methylbutyral	0.62	650	tr	0.65	881	0.01
Isoamyl alcohol	0.96	734	0.01	3.09*	1175	0.02
2-Methylbutanol	0.98	737	tr	3.09*	1175	[0.02]
Toluene	1.13	760	tr	1.26*	1003	0.13
Prenal	1.30	785	tr	2.88*	1158	0.32
Butyl acetate	1.59	817	0.02	1.59	1037	0.03
Methyl hexyl ether	1.71	827	0.07	0.83	926	0.08
(3*Z*)-Hexenol	2.05	857	0.01	5.36	1345	0.02
Hexanol	2.24	872	0.06	5.03	1321	0.08
Tricyclene	2.82	918	0.02	1.09	974	0.02
α-Thujene	2.93	925	0.12	1.26*	1003	[0.13]
α-Pinene	3.00	930	0.26	1.20	993	0.26
Camphene	3.19*	943	0.14	1.50	1028	0.13
α-Fenchene	3.19*	943	[0.14]	1.44	1022	tr
Thuja-2,4(10)-diene	3.28	949	0.01	2.03*†	1084	0.04
Butyl isobutyrate	3.38	955	0.02	2.42	1120	0.01
β-Pinene	3.60	970	0.03	1.86	1066	0.04
Sabinene	3.61	971	0.03	2.03*†	1084	[0.04]
Octen-3-ol	3.78	982	0.15	6.38	1419	0.16
Octan-3-one	3.85	987	0.90	3.63	1218	0.91
Myrcene	3.93	993	0.78	2.60	1134	0.78
Octan-3-ol	4.03*	999	0.23	5.68	1368	0.13
Butyl butyrate	4.03*	999	[0.23]	3.25	1188	0.10
α-Phellandrene	4.07	1002	0.06	2.50	1126	0.05
Δ3-Carene	4.15	1007	0.10	2.32	1112	0.09
α-Terpinene	4.26	1014	0.08	2.67	1140	0.08
Hexyl acetate	4.31	1017	0.49	3.94*	1242	0.64
ortho-Cymene	4.35	1020	0.04	3.74	1226	0.03
para-Cymene	4.38	1022	0.13	3.75	1227	0.14
Limonene	4.46*†	1026	1.02	2.88*	1158	[0.32]
1,8-Cineole	4.46*†	1026	[1.02]	2.99	1167	0.70
β-Phellandrene	4.46*†	1026	[1.02]	2.97	1165	0.08
(*Z*)-β-Ocimene	4.69	1041	6.75	3.48*†	1207	7.06
(*E*)-β-Ocimene	4.84	1051	3.94	3.67	1221	3.96
γ-Terpinene	4.94	1057	0.25	3.48*†	1207	[7.06]
cis-Sabinene hydrate	5.06	1065	0.04	6.44	1424	0.03
cis-Linalool oxide (fur.)	5.16	1071	0.10	6.13*	1400	0.10
Octanol	5.24	1076	0.02	7.81*†	1527	[56.90]
Terpinolene	5.39†	1086	0.22	3.94*	1242	[0.64]
trans-Linalool oxide (fur.)	5.41†	1087	[0.22]	6.50*	1428	0.12
Rosefuran	5.58	1098	0.04	5.58	1360	0.08
Linalool	5.73	1107	29.16	7.71*†	1519	56.90

(*Z*)-6-Methyl-3,5-heptadien-2-one	5.74	1108	0.03	7.90*	1534	0.58
β-Thujone	5.79	1111	0.04	5.91	1384	0.03
Octen-3-yl acetate	5.89	1118	0.90	5.44	1350	0.89
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	5.93	1120	0.03	9.19*	1636	3.63
Octan-3-yl acetate	6.07	1130	0.10	4.90	1312	0.10
allo-Ocimene	6.09	1131	0.08	5.21	1333	0.08
(*Z*)-Myroxide	6.16	1135	0.02	6.50*	1428	[0.12]
Camphor	6.20	1138	0.25	6.76	1447	0.22
(*E*)-Myroxide	6.28	1143	0.02	6.71	1444	0.03
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.29	1144	0.01	6.58	1434	0.01
Hexyl isobutyrate	6.44	1153	0.07	4.99	1318	0.07
Nerol oxide	6.47	1155	0.01	6.50*	1428	[0.12]
Borneol	6.59	1163	0.51	9.33	1647	0.45
cis-Linalool oxide (pyr.)	6.63	1166	0.02	9.92	1696	0.02
Lavandulol	6.71	1171	0.78	9.19*	1636	[3.63]
Terpinen-4-ol	6.80*	1177	6.00	8.16	1555	5.93
(3*E*,5*Z*)-Undeca-1,3,5-triene	6.80*	1177	[6.00]	5.50	1355	0.01
meta-Cymen-8-ol	6.83	1179	0.02	11.05	1792	0.05
Cryptone	6.87*	1182	0.18	8.75	1601	0.02
para-Cymen-8-ol	6.87*	1182	[0.18]	11.18*	1804	0.66
α-Terpineol	7.00	1190	1.53	9.34	1649	1.61
Hodiendiol	7.11*	1197	0.35	12.29*	1904	0.13
Hexyl butyrate	7.11*	1197	[0.35]	5.94	1387	0.30
Verbenone	7.21	1203	0.02	9.27	1643	0.02
Unknown [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.24	1206	0.02	5.80	1376	0.01
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.35	1213	0.03	10.90	1780	0.05
Bornyl formate	7.52	1224	0.05	7.71*†	1519	[56.90]
Nerol	7.62	1231	0.25	10.60	1755	0.25
Hexyl 2-methylbutyrate	7.68	1236	0.06	6.13*	1400	[0.10]
Carvone	7.78*	1242	0.05	9.64	1673	0.02
Neral	7.78*	1242	[0.05]	9.11	1630	0.02
Geraniol	8.12*	1265	28.44	11.18*	1804	[0.66]
Linalyl acetate	8.12*	1265	[28.44]	7.81*†	1527	[56.90]
trans-Ascaridole glycol	8.19	1270	0.01	13.70	2038	0.02
Geranial	8.23	1273	0.03	9.68	1677	0.03
Bornyl acetate	8.43	1286	0.17	7.90*	1534	[0.58]
Lavandulyl acetate	8.60	1298	3.47	8.39	1572	3.47
Hexyl tiglate	9.14	1332	0.05	8.52	1582	0.11

Hodiendiol derivative	9.27	1342	0.01	12.48	1922	0.01
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.42	1353	0.04	10.64	1758	0.01
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.48	1356	0.03	10.75	1767	0.01
Hodiendiol derivative III	9.57	1363	0.01	12.29*	1904	[0.13]
Neryl acetate	9.62	1366	0.42	9.76*	1683	0.45
α-Copaene	9.69	1372	0.02	6.82	1452	0.02
β-Bourbonene	9.80	1379	0.02	7.14	1476	0.03
Geranyl acetate	9.89	1386	0.73	10.13*	1714	0.75
7-epi-Sesquithujene	9.94*	1389	0.12	7.52	1504	0.07
Hexyl hexanoate	9.94*	1389	[0.12]	8.45	1577	0.04
Isocaryophyllene	10.12	1402	0.01	7.81*†	1527	[56.90]
Sesquithujene	10.14	1404	0.01	7.81*†	1527	[56.90]
β-Caryophyllene	10.27	1413	3.36	8.07*	1547	3.44
α-Santalene	10.32	1417	0.42	7.81*†	1527	[56.90]
Coumarin	10.41	1424	0.01			
trans-α-Bergamotene	10.54	1434	0.13	8.07*	1547	[3.44]
Sesquisabinene A	10.66	1442	0.05	8.82	1606	0.04
α-Humulene	10.72	1447	0.11	8.88	1611	0.10
Lavandulyl butyrate?	10.83	1455	0.10	10.13*	1714	[0.75]
(*E*)-β-Farnesene	10.89	1459	2.85	9.19*	1636	[3.63]
Germacrene D	11.10	1475	0.33	9.38	1651	0.29
trans-β-Bergamotene	11.18	1481	0.05	9.19*	1636	[3.63]
Isodaucene	11.30	1490	0.02	9.58	1668	0.01
β-Bisabolene	11.54*	1509	0.12	9.76*	1683	[0.45]
Lavandulyl isovalerate	11.54*	1509	[0.12]	10.32	1730	0.01
γ-Cadinene	11.54*	1509	[0.12]	9.98	1701	0.07
δ-Cadinene	11.68	1520	0.01	10.03	1705	0.07
Isocaryophyllene epoxide B	11.97	1542	0.01	11.67	1848	0.01
(*E*)-Nerolidol	12.25	1564	0.01			
Caryophyllene oxide	12.37*	1574	0.14	12.29*	1904	[0.13]
Caryophyllene oxide isomer	12.37*	1574	[0.14]	12.22	1898	0.02
τ-Cadinol	13.13	1635	0.03	14.41	2109	0.05
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.51	1667	0.01			
Hexahydrofarnesyl acetone	15.63	1851	0.01			

Total identified	**98.03%**	**97.61%**
Total reported	**98.16%**	**97.65%**

*: 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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