Date : May 11, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20E08-PTH02
Customer identification : Laurel Leaf - Albania - L1010688R
Type : Essential oil
Source : *Laurus nobilis*
Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-007 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Sylvain Mercier, M. Sc., Chimiste
Analysis date : May 10, 2020

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4673 ± 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
Methylcyclopentadiene isomer I	tr	Alkene
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
2-Ethylfuran	0.01	Furan
2-Methylbutanol	0.02	Aliphatic alcohol
Toluene	0.01	Simple phenolic
Hexanal	0.08	Aliphatic aldehyde
Ethyl 2-methylbutyrate	0.09	Aliphatic ester
Ethyl isovalerate	0.04	Aliphatic ester
(3*Z*)-Hexenol	0.10	Aliphatic alcohol
Hexanol	0.02	Aliphatic alcohol
Isopropyl 2-methylbutyrate	0.02	Aliphatic ester
2-Heptanol	0.03	Aliphatic alcohol
Isobutyl isobutyrate	0.05	Aliphatic ester
Tricyclene	0.01	Monoterpene
α-Thujene	0.21	Monoterpene
α-Pinene	5.92	Monoterpene
Camphene	0.48	Monoterpene
α-Fenchene	0.03	Monoterpene
Thujadiene isomer	0.03	Monoterpene
β-Pinene	4.91	Monoterpene
Sabinene	8.27	Monoterpene
Dehydro-1,8-cineole	0.11	Monoterpenic ether
Myrcene	0.58	Monoterpene
α-Phellandrene	0.11	Monoterpene
Pseudolimonene	0.04	Monoterpene
Isobutyl 2-methylbutyrate	0.09	Aliphatic ester
Δ3-Carene	0.04	Monoterpene
(3*Z*)-Hexenyl acetate	0.02	Aliphatic ester
α-Terpinene	0.49	Monoterpene
para-Cymene	1.71	Monoterpene
Limonene	2.40	Monoterpene
1,8-Cineole	43.49	Monoterpenic ether
(*Z*)-β-Ocimene	0.13	Monoterpene
Unknown	0.01	Unknown
(*E*)-β-Ocimene	0.20	Monoterpene
γ-Terpinene	1.88	Monoterpene
cis-Sabinene hydrate	0.09	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
para-Cymenene	0.01	Monoterpene
Terpinolene	0.09	Monoterpene
trans-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
2-Nonanone	0.05	Aliphatic ketone
trans-Sabinene hydrate	0.07	Monoterpenic alcohol
Linalool	4.77	Monoterpenic alcohol

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Unknown	0.05	Unknown
cis-para-Menth-2-en-1-ol	0.05	Monoterpenic alcohol
trans-Pinocarveol	0.07	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.04	Monoterpenic alcohol
trans-Verbenol	0.03	Monoterpenic alcohol
Sabinaketone	tr	Normonoterpenic ketone
Pinocarvone	0.03	Monoterpenic ketone
(*E*)-2,6-Dimethyl-1,5,7-octatrien-3-ol	0.02	Monoterpenic alcohol
Borneol	0.03	Monoterpenic alcohol
δ-Terpineol	0.14	Monoterpenic alcohol
Isopinocamphone	0.02	Monoterpenic ketone
Terpinen-4-ol	2.39*	Monoterpenic alcohol
Rosefuran oxide	[2.39]*	Monoterpenic ether
Thuj-3-en-10-al	0.03	Monoterpenic aldehyde
para-Cymen-8-ol	0.02	Monoterpenic alcohol
β-Phellandren-8-ol	0.02	Monoterpenic alcohol
Methyl salicylate	0.03	Phenolic ester
Myrtenal	0.05	Monoterpenic aldehyde
α-Terpineol	2.37	Monoterpenic alcohol
Myrtenol	0.11	Monoterpenic alcohol
cis-Piperitol	0.02	Monoterpenic alcohol
Methylchavicol	0.27	Phenylpropanoid
trans-Piperitol	0.02	Monoterpenic alcohol
trans-Carveol	0.01	Monoterpenic alcohol
cis-Isocarveol	0.01	Monoterpenic alcohol
Nerol	0.37	Monoterpenic alcohol
Cuminal	0.01	Monoterpenic aldehyde
Citronellol	0.01	Monoterpenic alcohol
Neral	tr	Monoterpenic aldehyde
Carvone	0.01	Monoterpenic ketone
Linalyl acetate	0.14	Monoterpenic ester
Geraniol	0.02	Monoterpenic alcohol
4-Thujen-2α-yl acetate	0.03	Monoterpenic ester
Bornyl acetate	0.39	Monoterpenic ester
para-Cymen-7-ol	0.01	Monoterpenic alcohol
2-Undecanone	0.14	Aliphatic ketone
δ-Terpinyl acetate	0.25	Monoterpenic ester
Unknown	0.02	Unknown
exo-2-Hydroxycineole acetate	0.06	Monoterpenic ester
α-Terpinyl acetate	9.84	Monoterpenic ester
α-Cubebene	0.02	Sesquiterpene
Eugenol	0.89	Phenylpropanoid
Neryl acetate	0.16	Monoterpenic ester
α-Ylangene	0.03	Sesquiterpene
α-Copaene	0.01	Sesquiterpene
β-Bourbonene	0.01	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
β-Cubebene	0.01	Sesquiterpene
β-Elemene	0.11	Sesquiterpene
Methyleugenol	2.75	Phenylpropanoid
β-Caryophyllene	0.15	Sesquiterpene
α-Guaiene	0.01	Sesquiterpene

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6,9-Guaiadiene	0.01	Sesquiterpene
(*E*)-Cinnamyl acetate	0.08	Phenylpropanoid ester
α-Humulene	0.03	Sesquiterpene
Selina-4(15),7-diene	0.02	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
cis-Muurola-4(15),5-diene	0.01	Sesquiterpene
Unknown	0.02	Unknown
Germacrene D	0.04	Sesquiterpene
β-Selinene	0.04	Sesquiterpene
α-Selinene	0.03	Sesquiterpene
Bicyclogermacrene	0.02	Sesquiterpene
Viridiflorene	0.02	Sesquiterpene
Methyl (*E*)-isoeugenol	0.13	Phenylpropanoid
(3*Z*,6*E*)-α-Farnesene	0.05	Sesquiterpene
γ-Cadinene	0.05	Sesquiterpene
δ-Cadinene	0.05	Sesquiterpene
α-Calacorene	0.02	Sesquiterpene
(*E*)-α-Bisabolene	0.04	Sesquiterpene
Elemicin	0.02	Phenylpropanoid
Spathulenol	0.04	Sesquiterpenic alcohol
Caryophyllene oxide	0.08	Sesquiterpenic ether
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Viridiflorol	0.01	Sesquiterpenic alcohol
Ledol	0.01	Sesquiterpenic alcohol
Humulene epoxide II	0.01	Sesquiterpenic ether
Junenol	0.03	Sesquiterpenic alcohol
Caryophylladienol II	0.02	Sesquiterpenic alcohol
τ-Cadinol	0.02	Sesquiterpenic alcohol
Unknown	0.05	Oxygenated sesquiterpene
β-Eudesmol	0.02	Sesquiterpenic alcohol
α-Eudesmol	0.03	Sesquiterpenic alcohol
Unknown	0.02	Oxygenated sesquiterpene
Shyobunol	0.01	Sesquiterpenic alcohol
Gazaniolide	0.01	Sesquiterpenic lactone
Eremanthin	0.01	Sesquiterpenic lactone
Consolidated total	**99.14%**	

*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total
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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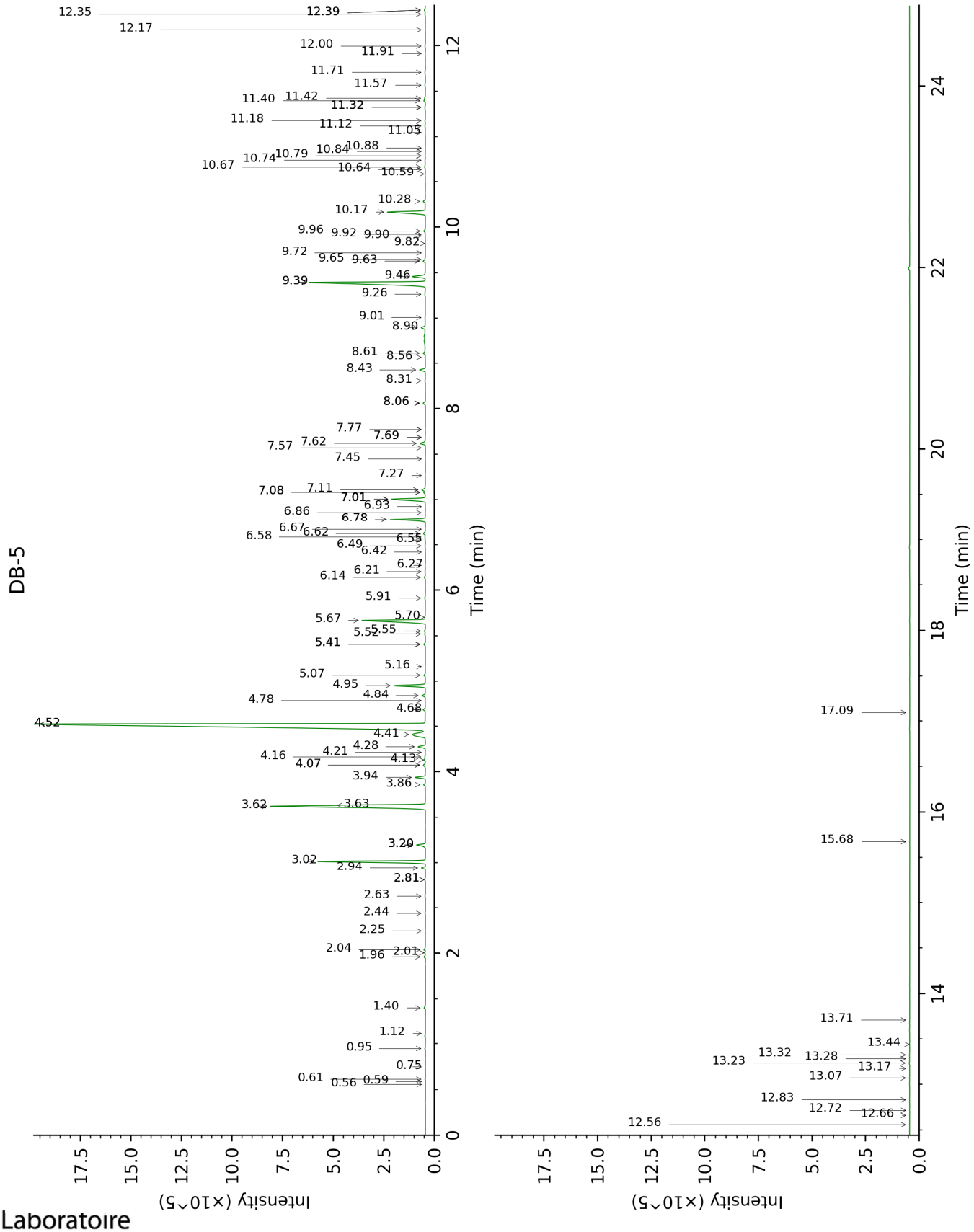
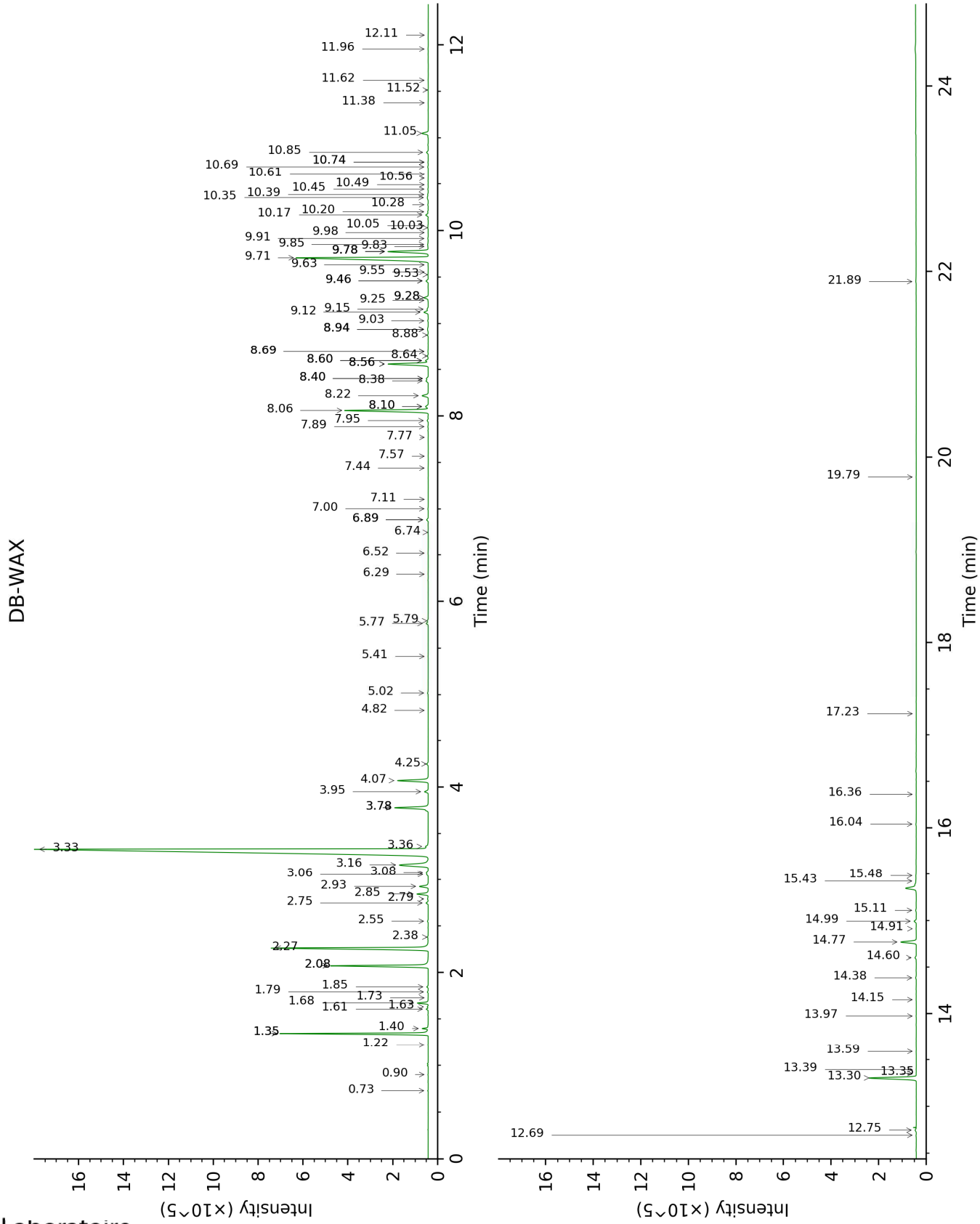

DB-5
Time (min)
Intensity (×10^5)
12.35
12.39
12.17
12.00
11.91
11.71
11.57
11.40
11.42
11.32
11.18
11.12
11.05
10.88
10.84
10.79
10.74
10.67
10.64
10.59
10.28
10.17
9.96
9.92
9.90
9.82
9.72
9.65
9.63
9.46
9.39
9.26
9.01
8.90
8.61
8.56
8.43
8.31
8.06
7.77
7.69
7.62
7.57
7.45
7.27
7.11
7.08
7.01
6.93
6.86
6.78
6.67
6.62
6.58
6.55
6.49
6.42
6.27
6.21
6.14
5.91
5.70
5.67
5.55
5.52
5.41
5.16
5.07
4.95
4.84
4.78
4.68
4.52
4.41
4.28
4.21
4.16
4.13
4.07
3.94
3.86
3.63
3.62
3.20
3.02
2.94
2.81
2.63
2.44
2.25
2.04
2.01
1.96
1.40
1.12
0.95
0.75
0.61
0.59
0.56
17.09
15.68
13.71
13.44
13.32
13.28
13.23
13.17
13.07
12.83
12.72
12.66
12.56


DB-WAX
Intensity (×10^5)
Time (min)
12.11
11.96
11.62
11.52
11.38
11.05
10.85
10.74
10.69
10.61
10.56
10.49
10.45
10.39
10.35
10.28
10.20
10.17
10.05
10.03
9.98
9.91
9.85
9.83
9.78
9.71
9.63
9.55
9.53
9.46
9.28
9.25
9.15
9.12
9.03
8.94
8.88
8.69
8.64
8.60
8.56
8.40
8.38
8.22
8.10
8.06
7.95
7.89
7.77
7.57
7.44
7.11
7.00
6.89
6.74
6.52
6.29
5.79
5.77
5.41
5.02
4.82
4.25
4.07
3.95
3.78
3.36
3.33
3.16
3.08
3.06
2.93
2.85
2.79
2.75
2.55
2.38
2.27
2.08
1.85
1.79
1.73
1.68
1.63
1.61
1.40
1.35
1.22
0.90
0.73
21.89
19.79
17.23
16.36
16.04
15.48
15.43
15.11
14.99
14.91
14.77
14.60
14.38
14.15
13.97
13.59
13.39
13.35
13.30
12.75
12.69

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Methylcyclopentadiene isomer I	0.56	627	tr			
Isovaleral	0.59	640	tr			
2-Methylbutyral	0.61	651	0.01	0.73	880	0.01
2-Ethylfuran	0.75	707	0.01	0.90	918	0.01
2-Methylbutanol	0.95	738	0.02	3.36	1172	0.15
Toluene	1.12	762	0.01	1.35*	991	5.81
Hexanal	1.40	801	0.08	1.85	1042	0.06
Ethyl 2-methylbutyrate	1.96	850	0.09	1.61	1019	0.08
Ethyl isovalerate	2.01	854	0.04	1.79	1037	0.03
(3*Z*)-Hexenol	2.04	856	0.10	5.77	1346	0.11
Hexanol	2.25	873	0.02	5.41	1320	0.01
Isopropyl 2-methylbutyrate	2.44	889	0.02	1.73	1031	0.01
2-Heptanol	2.63	905	0.03	5.02	1296	0.05
Isobutyl isobutyrate	2.81*†	917	0.05	2.08*	1065	4.86
Tricyclene	2.81*†	917	[0.05]	1.22	970	0.01
α-Thujene	2.94	925	0.21	1.40	998	0.24
α-Pinene	3.02	930	5.92	1.35*	991	[5.81]
Camphene	3.20*	942	0.57	1.68	1025	0.48
α-Fenchene	3.20*	942	[0.57]	1.63	1021	0.03
Thujadiene isomer	3.20*	942	[0.57]	2.38	1096	0.03
β-Pinene	3.62†	970	13.18	2.08*	1065	[4.86]
Sabinene	3.63†	971	[13.18]	2.26	1084	8.27
Dehydro-1,8-cineole	3.86	986	0.11	3.08†	1150	[0.18]
Myrcene	3.94	991	0.58	2.85	1132	0.59
α-Phellandrene	4.07*	1000	0.14	2.75	1124	0.11
Pseudolimonene	4.07*	1000	[0.14]	2.79	1128	0.04
Isobutyl 2-methylbutyrate	4.13	1004	0.09	3.06†	1148	0.18
Δ3-Carene	4.16	1006	0.04	2.55	1109	0.04
(3*Z*)-Hexenyl acetate	4.21	1009	0.02	4.82	1281	0.01
α-Terpinene	4.28	1013	0.49	2.93	1138	0.49
para-Cymene	4.41	1021	1.71	4.07	1226	1.74
Limonene	4.52*	1029	46.06	3.16	1157	2.40
1,8-Cineole	4.52*	1029	[46.06]	3.33	1170	43.49
(*Z*)-β-Ocimene	4.68	1039	0.13	3.78*	1205	2.02
Unknown [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	4.78	1045	0.01			
(*E*)-β-Ocimene	4.84	1048	0.20	3.95	1217	0.21
γ-Terpinene	4.95	1056	1.88	3.78*	1205	[2.02]
cis-Sabinene hydrate	5.07	1063	0.09	6.89*	1428	0.10
cis-Linalool oxide (fur.)	5.16	1069	0.01	6.52	1400	0.02
para-Cymenene	5.41*	1084	0.10	6.29	1384	0.01
Terpinolene	5.41*	1084	[0.10]	4.25	1239	0.09

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trans-Linalool oxide (fur.)	5.41*	1084	[0.10]	6.89*	1428	[0.10]
2-Nonanone	5.52	1092	0.05	5.79	1348	0.06
trans-Sabinene hydrate	5.55	1094	0.07	7.95	1507	0.07
Linalool	5.67	1101	4.77	8.06	1516	4.79
Unknown [m/z 43, 59 (37), 79 (33), 91 (32), 119 (31)...]	5.70	1103	0.05	9.03	1591	0.03
cis-para-Menth-2-en-1-ol	5.91	1117	0.05	8.10*	1519	0.19
trans-Pinocarveol	6.14	1132	0.07	9.16	1601	0.08
trans-para-Menth-2-en-1-ol	6.20	1136	0.04	8.94*	1584	0.08
trans-Verbenol	6.27	1140	0.03	9.53	1631	0.03
Sabinaketone	6.42	1150	tr	8.69*	1565	0.04
Pinocarvone	6.49	1154	0.03	7.89	1502	0.03
(*E*)-2,6-Dimethyl-1,5,7-octatrien-3-ol	6.55	1158	0.02	10.28	1692	0.03
Borneol	6.58	1160	0.03	9.78*	1651	2.44
δ-Terpineol	6.62	1163	0.14	9.46*	1625	0.15
Isopinocamphone	6.67	1166	0.02	7.57	1478	0.01
Terpinen-4-ol	6.78*	1173	2.39	8.56*	1554	2.40
Rosefuran oxide	6.78*	1173	[2.39]	8.56*	1554	[2.40]
Thuj-3-en-10-al	6.86	1178	0.03	8.69*	1565	[0.04]
para-Cymen-8-ol	6.93	1183	0.02	11.52	1796	0.01
β-Phellandren-8-ol	7.01*	1188	2.41	10.74*	1731	0.02
Methyl salicylate	7.01*	1188	[2.41]	10.44	1706	0.03
Myrtenal	7.01*	1188	[2.41]	8.64	1561	0.05
α-Terpineol	7.01*	1188	[2.41]	9.78*	1651	[2.44]
Myrtenol	7.08*	1193	0.12	10.85	1740	0.11
cis-Piperitol	7.08*	1193	[0.12]	9.55	1633	0.02
Methylchavicol	7.11	1195	0.27	9.28*	1611	0.26
trans-Piperitol	7.27	1205	0.02	10.49	1710	0.02
trans-Carveol	7.45	1218	0.01	11.38	1784	0.01
cis-Isocarveol	7.57	1226	0.01	11.96	1835	0.02
Nerol	7.62	1229	0.37	11.05	1757	0.38
Cuminal	7.69*	1234	0.02	10.61	1719	0.01
Citronellol	7.69*	1234	[0.02]	10.74*	1731	[0.02]
Neral	7.77*	1240	0.02	9.46*	1625	[0.15]
Carvone	7.77*	1240	[0.02]	9.98	1667	0.01
Linalyl acetate	8.06*	1260	0.16	8.10*	1519	[0.19]
Geraniol	8.06*	1260	[0.16]	11.62	1805	0.02
4-Thujen-2α-yl acetate	8.31	1277	0.03	8.88	1579	0.04
Bornyl acetate	8.43	1285	0.39	8.22	1528	0.41
para-Cymen-7-ol	8.56	1295	0.01	14.15	2036	0.01
2-Undecanone	8.61	1298	0.14	8.60*	1557	0.16
δ-Terpinyl acetate	8.90	1313	0.25	9.12	1598	0.28
Unknown [m/z 119, 43 (99), 93 (52), 59 (44), 91 (41), 134 (34)...]	9.01	1321	0.02	9.83	1655	0.02
exo-2-Hydroxycineole acetate	9.26	1339	0.06	10.03	1672	0.04

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α-Terpinyl acetate	9.40*	1348	9.91	9.71	1645	9.84
α-Cubebene	9.40*	1348	[9.91]	6.74	1417	0.02
Eugenol	9.46	1352	0.89	14.77	2096	0.91
Neryl acetate	9.63	1364	0.16	10.17	1683	0.15
α-Ylangene	9.65	1366	0.03	7.00	1436	0.03
α-Copaene	9.72	1371	0.01	7.11	1444	0.01
β-Bourbonene	9.82	1378	0.01	7.44	1469	0.01
Geranyl acetate	9.90	1384	0.01	10.56	1716	0.01
β-Cubebene	9.92	1385	0.01	7.77	1493	0.01
β-Elemene	9.96	1388	0.11	8.40*†	1542	[0.27]
Methyleugenol	10.17	1402	2.75	13.30	1957	2.77
β-Caryophyllene	10.28	1411	0.15	8.38†	1540	0.27
α-Guaiene	10.59	1434	0.01	8.40*†	1542	[0.27]
6,9-Guaiadiene	10.64	1438	0.01	8.60*	1557	[0.16]
(*E*)-Cinnamyl acetate	10.67	1440	0.08	14.60	2079	0.08
α-Humulene	10.74	1445	0.03	9.25	1608	0.01
Selina-4(15),7-diene	10.79	1449	0.02	8.94*	1584	[0.08]
allo-Aromadendrene	10.84	1453	0.01	8.94*	1584	[0.08]
cis-Muurola-4(15),5-diene	10.88	1456	0.01	9.28*	1611	[0.26]
Unknown [m/z 43, 67 (61), 79 (57), 81 (44), 54 (44)...]	11.05	1468	0.02			
Germacrene D	11.12	1473	0.04	9.78*	1651	[2.44]
β-Selinene	11.18	1478	0.04	9.85	1657	0.05
α-Selinene	11.32*	1489	0.07	9.91	1662	0.03
Bicyclogermacrene	11.32*	1489	[0.07]	10.05	1673	0.02
Viridiflorene	11.32*	1489	[0.07]	9.63	1639	0.02
Methyl (*E*)-isoeugenol	11.40	1494	0.13	14.99	2118	0.13
(3*Z*,6*E*)-α-Farnesene	11.42	1496	0.05	10.20	1685	0.04
γ-Cadinene	11.57	1507	0.05	10.35	1698	0.10
δ-Cadinene	11.71	1518	0.05	10.39	1701	0.04
α-Calacorene	11.92	1534	0.02	12.11	1848	0.01
(*E*)-α-Bisabolene	12.00	1541	0.04	10.69	1726	0.03
Elemicin	12.17	1555	0.02	15.48	2167	0.02
Spathulenol	12.35	1568	0.04	14.38	2059	0.04
Caryophyllene oxide	12.39*	1572	0.10	12.75	1905	0.08
Caryophyllene oxide isomer	12.39*	1572	[0.10]	12.69	1900	0.02
Viridiflorol	12.56	1585	0.01	13.97	2019	0.01
Ledol	12.66	1593	0.01	13.39	1965	0.01
Humulene epoxide II	12.72	1597	0.01	13.35	1961	0.01
Junenol	12.83	1606	0.03	13.59	1983	0.01
Caryophylladienol II	13.07	1626	0.02	16.04	2224	0.03
τ-Cadinol	13.17	1635	0.02	14.91	2110	0.02
Unknown [m/z 105, 59 (72), 161 (65), 147 (64), 91 (54), 43 (34), 189 (34)... 204 (30), 220 (1)]	13.23	1640	0.05	15.11	2130	0.04
β-Eudesmol	13.28	1644	0.02	15.42	2161	0.03
α-Eudesmol	13.32	1647	0.03			
Unknown [m/z 81, 79	13.44	1656	0.02	17.23	2348	0.01

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(81), 93 (79), 91 (72), 105 (67), 67 (55), 119 (52)...]						
Shyobunol	13.71	1679	0.01	16.36	2257	0.01
Gazaniolide	15.68	1851	0.01	19.79	2638	0.01
Eremanthin	17.09	1984	0.01	21.89	2899	0.05
Total identified		**99.14%**			**99.05%**	
Total reported		**99.30%**			**99.16%**	

*: 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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