Date : January 20, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20A17-PTH03
Customer identification : Rosalina - Australia - R20104711R
Type : Essential oil
Source : *Melaleuca ericifolia* ct. Linalool
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 : Sarah-Eve Tremblay, M. Sc. A., Chimiste
Analysis date : January 20, 2020

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4693 ± 0.0003 (20 °C)

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	%	Classe
Isobutanol	0.01	Aliphatic alcohol
Isovaleral	0.01	Aliphatic aldehyde
3-Methyl-2-butanone	0.03	Aliphatic ketone
2-Methylbutyral	0.01	Aliphatic aldehyde
Isoamyl alcohol	0.01	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Isobutyric acid	tr	Aliphatic acid
Octane	tr	Alkane
(3*Z*)-Hexenol	tr	Aliphatic alcohol
Isoamyl acetate	tr	Aliphatic ester
Tricyclene	0.02	Monoterpene
α-Thujene	0.24	Monoterpene
α-Pinene	8.00	Monoterpene
Camphene	0.01	Monoterpene
α-Fenchene	tr	Monoterpene
Thuja-2,4(10)-diene	tr	Monoterpene
β-Pinene	0.70	Monoterpene
Sabinene	0.01	Monoterpene
trans-Dehydroxylinalool oxide	0.03	Monoterpenic ether
Myrcene	0.14	Monoterpene
α-Phellandrene	0.10	Monoterpene
Pseudolimonene	0.03	Monoterpene
cis-Dehydroxylinalool oxide	0.04	Monoterpenic ether
α-Terpinene	0.96	Monoterpene
para-Cymene	1.99	Monoterpene
1,8-Cineole	14.86	Monoterpenic ether
Limonene	2.05	Monoterpene
(*Z*)-β-Ocimene	0.02	Monoterpene
(*E*)-β-Ocimene	0.08	Monoterpene
γ-Terpinene	3.06	Monoterpene
Unknown	tr	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.84	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
para-Cymenene	0.05	Monoterpene
Terpinolene	0.86	Monoterpene
trans-Linalool oxide (fur.)	0.66	Monoterpenic alcohol
α-Pinene oxide	0.01	Monoterpenic ether
Linalool	38.21	Monoterpenic alcohol
Hotrienol	0.26	Monoterpenic alcohol
endo-Fenchol	0.04	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.03	Monoterpenic alcohol
α-Campholenal	0.03	Monoterpenic aldehyde
Unknown	0.03	Unknown
trans-Pinocarveol	0.06	Monoterpenic alcohol
Unknown	0.06	Unknown
trans-para-Menth-2-en-1-ol	0.01	Monoterpenic alcohol
Camphor	0.03	Monoterpenic ketone

Unknown	0.08	Oxygenated monoterpene
Borneol	0.03	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.07	Monoterpenic alcohol
δ-Terpineol	0.07	Monoterpenic alcohol
Terpinen-4-ol	6.20	Monoterpenic alcohol
trans-Linalool oxide (pyr.)	0.01	Monoterpenic alcohol
para-Cymen-8-ol	0.09	Monoterpenic alcohol
α-Terpineol	2.68	Monoterpenic alcohol
cis-Piperitol	0.03	Monoterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.01	Oxygenated monoterpene
trans-Piperitol	0.02	Monoterpenic alcohol
trans-Carveol	0.02	Monoterpenic alcohol
Nerol	0.08	Monoterpenic alcohol
Citronellol	0.01	Monoterpenic alcohol
Carvone	0.02	Monoterpenic ketone
Neral	0.05	Monoterpenic aldehyde
Unknown	0.01	Unknown
Geraniol	0.13	Monoterpenic alcohol
Chavicol	0.01	Phenylpropanoid
trans-Ascaridole glycol	0.02	Monoterpenic alcohol
Geranial	0.06	Monoterpenic aldehyde
cis-Ascaridole glycol	0.01	Monoterpenic alcohol
Geranyl formate	0.02	Monoterpenic ester
Methyl (4*Z*)-decenoate?	0.03	Aliphatic ester
Unknown	0.02	Monoterpenic alcohol
Methyl geranate	0.10	Monoterpenic ester
α-Cubebene	0.02	Sesquiterpene
Isoledene	0.16	Sesquiterpene
α-Copaene	0.08	Sesquiterpene
7-Cubebene	0.13	Sesquiterpene
cis-β-Elemene	0.03	Sesquiterpene
Geranyl acetate	0.02	Monoterpenic ester
β-Elemene	0.02	Sesquiterpene
Unknown	0.23	Sesquiterpene
Phenylethyl isobutyrate	0.02	Phenolic ester
α-Gurjunene	0.48	Sesquiterpene
Unknown	0.01	Sesquiterpene
β-Caryophyllene	0.58	Sesquiterpene
γ-Maaliene	0.13	Sesquiterpene
β-Gurjunene	0.36	Sesquiterpene
α-Maaliene	0.14	Sesquiterpene
Aromadendrene	3.05	Sesquiterpene
Selina-5,11-diene	0.25	Sesquiterpene
trans-Muurola-3,5-diene	0.06	Sesquiterpene
α-Humulene	0.14	Sesquiterpene
allo-Aromadendrene	1.35	Sesquiterpene
Valerena-4,7(11)-diene	0.01	Sesquiterpene
γ-Gurjunene	0.06	Sesquiterpene
trans-Cadina-1(6),4-diene	0.20	Sesquiterpene
Selina-4,11-diene	0.03	Sesquiterpene
Germacrene D	0.04	Sesquiterpene

β-Selinene	0.25	Sesquiterpene
allo-Aromadendr-9-ene	0.23	Sesquiterpene
δ-Selinene	0.17	Sesquiterpene
α-Selinene	0.05	Sesquiterpene
Bicyclogermacrene	0.38	Sesquiterpene
Viridiflorene	1.12	Sesquiterpene
α-Muurolene	0.16	Sesquiterpene
δ-Guaiene	0.08	Sesquiterpene
γ-Cadinene	0.09	Sesquiterpene
trans-Calamenene	0.08	Sesquiterpene
δ-Cadinene	1.14*	Sesquiterpene
Zonarene	[1.14]*	Sesquiterpene
trans-Cadina-1,4-diene	0.16	Sesquiterpene
α-Calacorene	0.04	Sesquiterpene
α-Elemol	0.04	Sesquiterpenic alcohol
Epiglobulol	0.17	Sesquiterpenic alcohol
Maaliol	0.06	Sesquiterpenic alcohol
Palustrol	0.12	Sesquiterpenic alcohol
Spathulenol	0.35	Sesquiterpenic alcohol
Caryophyllene oxide	0.17	Sesquiterpenic ether
Caryophyllene oxide isomer	tr	Sesquiterpenic ether
Globulol	0.75	Sesquiterpenic alcohol
Viridiflorol	0.26	Sesquiterpenic alcohol
Cubeban-11-ol	0.23	Sesquiterpenic alcohol
Guaiol	0.02	Sesquiterpenic alcohol
Ledol	0.22	Sesquiterpenic alcohol
Eudesm-5-en-11-ol analog	0.01	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated sesquiterpene
Rosifoliol	0.27	Sesquiterpenic alcohol
1-epi-Cubenol	0.19	Sesquiterpenic alcohol
Eremoligenol?	0.02	Sesquiterpenic alcohol
γ-Eudesmol	0.01	Sesquiterpenic alcohol
Isospathulenol	0.10	Sesquiterpenic alcohol
Cubenol	0.08	Sesquiterpenic alcohol
τ-Cadinol	0.02	Sesquiterpenic alcohol
α-Muurolol	0.08	Sesquiterpenic alcohol
β-Eudesmol	0.02	Sesquiterpenic alcohol
α-Eudesmol	0.02	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.01	Sesquiterpenic alcohol
Methyl eudesmate	0.01	Phenolic ester
Consolidated total	**98.32%**	

*: 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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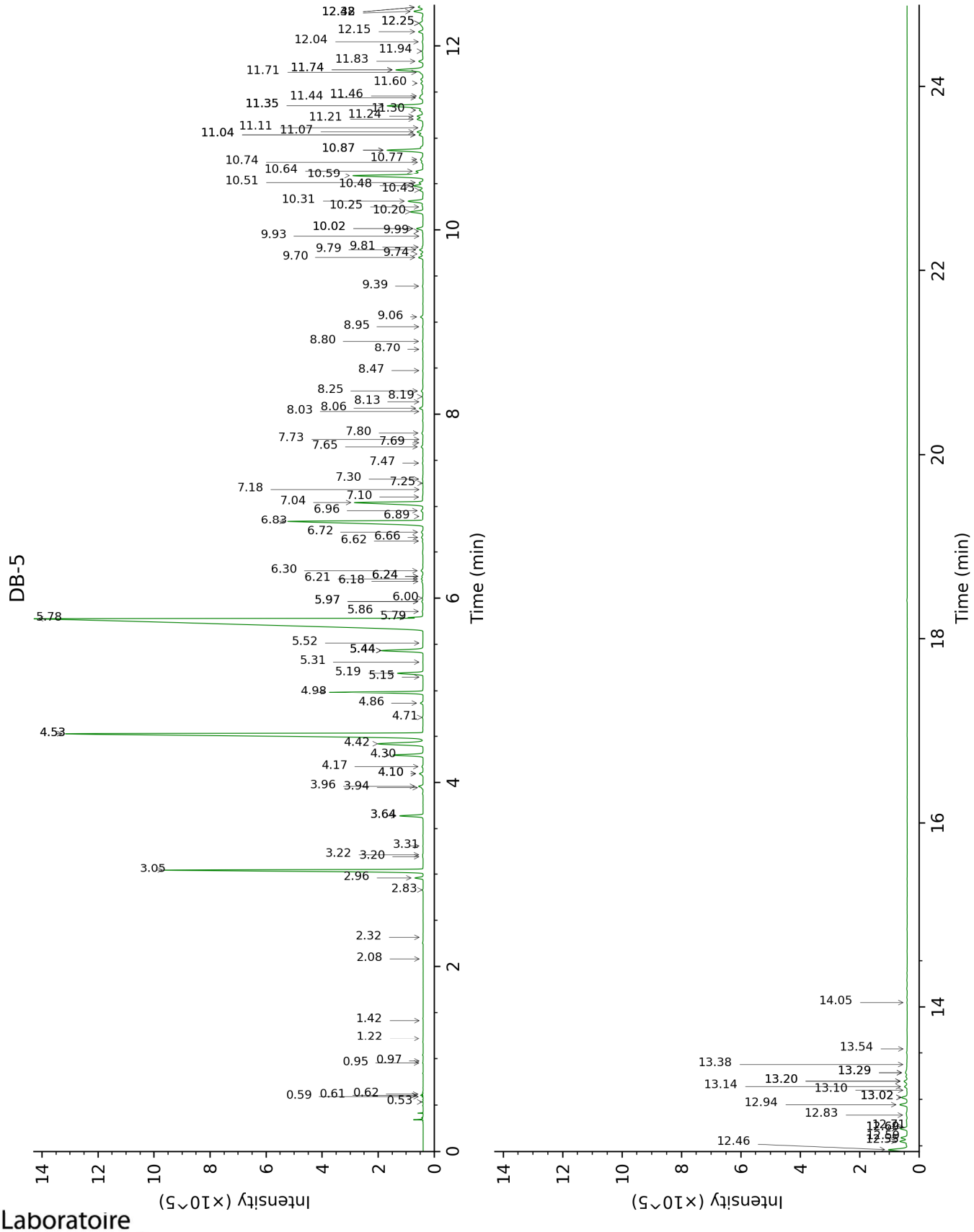
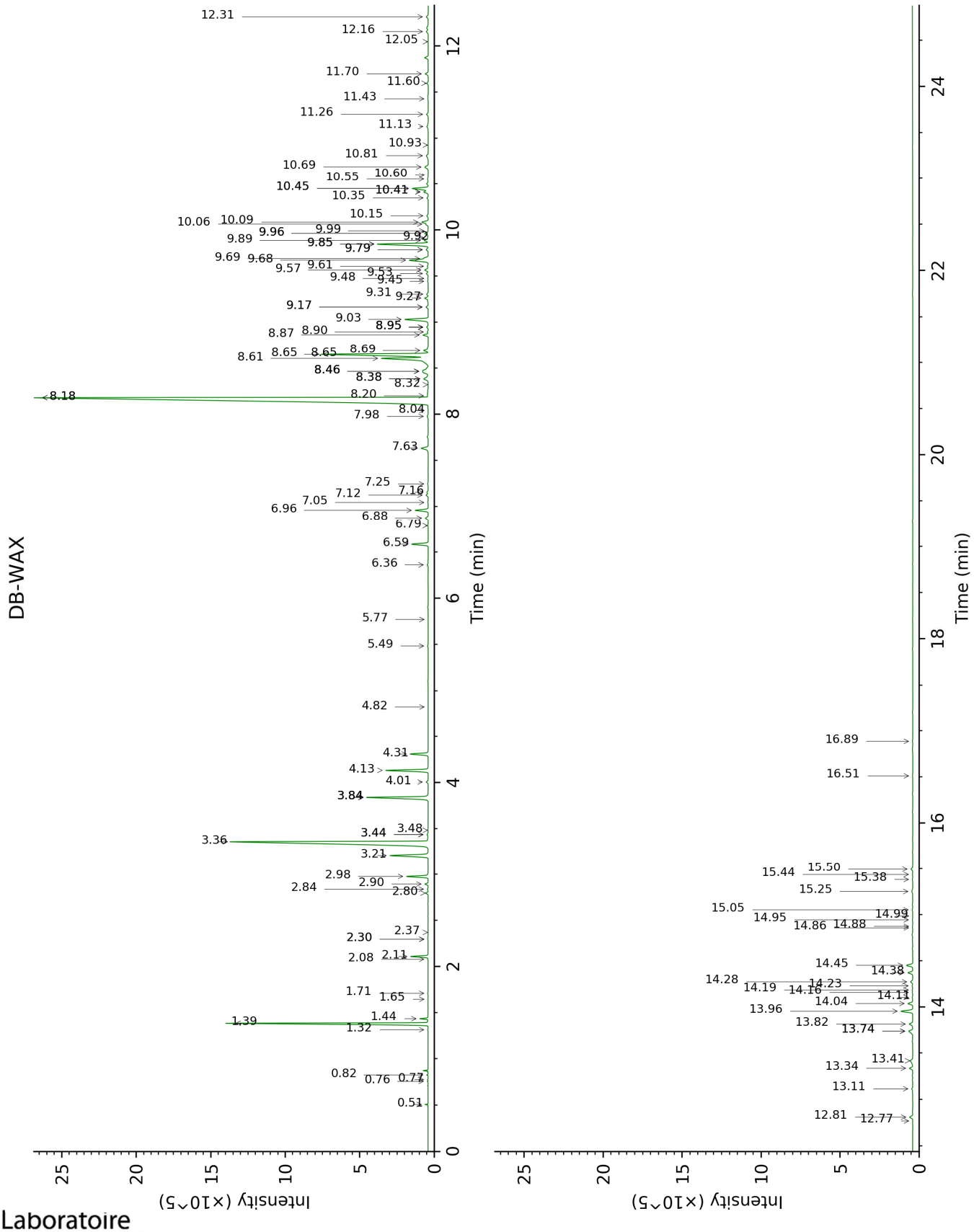

DB-5
Time (min)
Intensity (×10^5)
12.48
12.25
12.15
12.04
11.94
11.83
11.71
11.74
11.60
11.44
11.46
11.35
11.30
11.21
11.24
11.11
11.07
11.04
10.87
10.77
10.74
10.64
10.59
10.51
10.48
10.43
10.31
10.25
10.20
10.02
9.99
9.93
9.79
9.81
9.74
9.70
9.39
9.06
8.95
8.80
8.70
8.47
8.25
8.19
8.13
8.06
8.03
7.80
7.73
7.69
7.65
7.47
7.30
7.25
7.18
7.10
7.04
6.96
6.89
6.83
6.72
6.66
6.62
6.30
6.24
6.21
6.18
6.00
5.97
5.86
5.79
5.78
5.52
5.44
5.31
5.19
5.15
4.98
4.86
4.71
4.53
4.42
4.30
4.17
4.10
3.96
3.94
3.64
3.31
3.22
3.20
3.05
2.96
2.83
2.32
2.08
1.42
1.22
0.95
0.97
0.59
0.61
0.62
0.53
14.05
13.54
13.38
13.29
13.20
13.14
13.10
13.02
12.94
12.83
12.46



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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isobutanol	0.53	616	0.01	2.08	1064	0.01
Isovaleral	0.59	639	0.01	0.77	888	0.01
3-Methyl-2-butanone	0.61	645	0.03	0.82	902	0.03
2-Methylbutyral	0.62	650	0.01	0.76	882	0.01
Isoamyl alcohol	0.95	736	0.01	3.44*	1177	0.06
2-Methylbutanol	0.97	739	tr	3.48	1180	tr
Isobutyric acid	1.22	773	tr	8.04	1513	0.01
Octane	1.42	801	tr	0.51	780	0.05
(3*Z*)-Hexenol	2.08	858	tr	5.77	1346	0.01
Isoamyl acetate	2.32	877	tr	2.37	1093	tr
Tricyclene	2.83	917	0.02	1.32	983	0.01
α-Thujene	2.96	925	0.24	1.44	1000	0.25
α-Pinene	3.05	931	8.00	1.39	994	8.04
Camphene	3.20†	941	0.03	1.71	1028	0.01
α-Fenchene	3.22†	942	[0.03]	1.65	1021	tr
Thuja-2,4(10)-diene	3.31	948	tr	2.30*	1086	0.01
β-Pinene	3.64*	970	0.68	2.11	1067	0.70
Sabinene	3.64*	970	[0.68]	2.30*	1086	[0.01]
trans-Dehydroxylinalool oxide	3.94	990	0.03	3.44*	1177	[0.06]
Myrcene	3.96	991	0.14	2.90	1134	0.14
α-Phellandrene	4.10*	1000	0.13	2.80	1127	0.10
Pseudolimonene	4.10*	1000	[0.13]	2.84	1130	0.03
cis-Dehydroxylinalool oxide	4.17	1005	0.04	3.84*	1207	3.15
α-Terpinene	4.30	1013	0.96	2.98	1141	0.97
para-Cymene	4.42	1021	1.99	4.13	1228	2.00
1,8-Cineole	4.53*	1028	17.15	3.36	1171	14.86
Limonene	4.53*	1028	[17.15]	3.21	1159	2.05
(*Z*)-β-Ocimene	4.70	1039	0.02	3.84*	1207	[3.15]
(*E*)-β-Ocimene	4.86	1049	0.08	4.01	1219	0.09
γ-Terpinene	4.98	1057	3.06	3.84*	1207	[3.15]
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.15	1067	tr	4.82	1277	0.01
cis-Linalool oxide (fur.)	5.19	1070	0.84	6.59	1405	0.85
Octanol	5.31	1077	0.01	8.20	1526	0.09
para-Cymenene	5.44*	1085	1.54	6.36	1389	0.05
Terpinolene	5.44*	1085	[1.54]	4.31	1241	0.86
trans-Linalool oxide (fur.)	5.44*	1085	[1.54]	6.96	1433	0.66

α-Pinene oxide	5.52	1090	0.01	5.49	1326	0.03
Linalool	5.78	1107	38.21	8.18*	1524	38.02
Hotrienol	5.79	1108	0.26	8.86	1577	0.26
endo-Fenchol	5.86	1112	0.04	8.38*	1540	0.37
cis-para-Menth-2-en-1-ol	5.97*	1120	0.05	8.18*	1524	[38.02]
α-Campholenal	5.97*	1120	[0.05]	7.05	1439	0.03
Unknown [m/z 43, 70 (95), 81 (71), 55 (55), 41 (47)...]	6.00	1122	0.03			
trans-Pinocarveol	6.18	1134	0.06	9.17*	1601	0.12
Unknown [Not seen in MS]	6.21	1135	0.06	7.98	1508	0.07
trans-para-Menth-2-en-1-ol	6.24*	1137	0.04	8.95*	1584	0.08
Camphor	6.24*	1137	[0.04]	7.25	1454	0.03
Unknown [m/z 83, 55 (69), 41 (60), 71 (59), 81 (57), 95 (56), 69 (56)...154 (3)]	6.30	1141	0.08			
Borneol	6.62	1162	0.03	9.85*	1656	2.72
cis-Linalool oxide (pyr.)	6.66	1165	0.07	10.35	1696	0.06
δ-Terpineol	6.72	1168	0.07	9.53	1630	0.10
Terpinen-4-ol	6.83	1176	6.20	8.65*†	1560	[9.08]
trans-Linalool oxide (pyr.)	6.90	1180	0.01	10.60	1717	0.01
para-Cymen-8-ol	6.96	1184	0.09	11.60	1802	0.08
α-Terpineol	7.04	1190	2.68	9.85*	1656	[2.72]
cis-Piperitol	7.10	1194	0.03	9.61	1636	0.05
Unknown [m/z 43, 71 (80), 67 (55), 59 (51), 68 (44), 41 (43)...]	7.18	1199	0.01	10.93	1745	0.01
Unknown [m/z 84, 41 (83), 83 (79), 91 (76), 93 (67), 119 (64), 137 (63), 109 (54), 108 (54)... 152 (4)]	7.25	1204	0.01			
trans-Piperitol	7.30	1207	0.02	10.41*†	1702	1.19
trans-Carveol	7.47	1219	0.02	11.43	1787	0.03
Nerol	7.65	1231	0.08	11.13	1762	0.08
Citronellol	7.69	1234	0.01	10.81	1735	0.16
Carvone	7.73	1236	0.02	9.99	1667	0.01
Neral	7.80	1241	0.05	9.48	1626	0.03
Unknown [m/z 69, 41 (75), 109 (35), 95 (34), 55 (28), 43 (27), 110 (26)...]	8.03	1257	0.01			
Geraniol	8.06	1260	0.13	11.70	1811	0.18

Chavicol	8.13	1265	0.01	16.51	2270	0.02
trans-Ascaridole glycol	8.19	1268	0.02	14.23	2042	0.03
Geranial	8.25	1273	0.06	10.16	1680	0.08
cis-Ascaridole glycol	8.47	1288	0.01	14.86	2102	0.01
Geranyl formate	8.70	1304	0.02	9.92	1661	0.03
Methyl (4*Z*)-decenoate?	8.80	1311	0.03	8.95*	1584	[0.08]
Unknown [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	8.95	1316	0.02	15.05	2122	0.03
Methyl geranate	9.06	1324	0.10	9.79*	1651	0.12
α-Cubebene	9.39	1347	0.02	6.79	1420	0.02
Isoledene	9.70	1369	0.16	6.88	1426	0.17
α-Copaene	9.74	1372	0.08	7.16	1447	0.08
7-Cubebene	9.79	1375	0.13	7.12	1445	0.12
cis-β-Elemene	9.82	1377	0.03	8.32	1535	0.01
Geranyl acetate	9.93	1386	0.02	10.56	1714	0.05
β-Elemene	9.99	1389	0.02	8.46*	1546	0.72
Unknown [m/z 93, 122 (98), 161 (98), 107 (86), 95 (46), 105 (72)... 204 (34)]	10.02*	1392	0.25			
Phenylethyl isobutyrate	10.02*	1392	[0.25]	12.05	1841	0.02
α-Gurjunene	10.20	1404	0.48	7.63	1482	0.45
Unknown [m/z 119, 107 (86), 105 (85), 93 (78), 189 (66), 81 (65), 121 (64)... 204 (23)]	10.25	1408	0.01			
β-Caryophyllene	10.31	1413	0.58	8.46*	1546	[0.72]
γ-Maaliene	10.43	1422	0.13	8.46*	1546	[0.72]
β-Gurjunene	10.48	1425	0.36	8.38*	1540	[0.37]
α-Maaliene	10.51	1428	0.14	8.65*†	1560	[9.08]
Aromadendrene	10.59	1434	3.05	8.60†	1557	9.08
Selina-5,11-diene	10.64	1438	0.25	8.69	1564	0.24
trans-Muurola-3,5-diene	10.74	1445	0.06	8.90	1580	0.05
α-Humulene	10.77	1447	0.14	9.31	1612	0.09
allo-Aromadendrene	10.87*	1455	1.35	9.03	1590	1.35
Valerena-4,7(11)-diene	10.87*	1455	[1.35]	8.95*	1584	[0.08]
γ-Gurjunene	11.04*†	1467	0.41	9.17*	1601	[0.12]
trans-Cadina-1(6),4-diene	11.04*†	1467	[0.41]	9.26	1608	0.20
Selina-4,11-diene	11.07†	1469	[0.41]	9.45	1623	0.03
Germacrene D	11.11	1473	0.04	9.79*	1651	[0.12]
β-Selinene	11.21	1480	0.25	9.89	1659	0.23

allo-Aromadendr-9-ene	11.24	1482	0.23	9.57	1633	0.20
δ-Selinene	11.30	1487	0.17	9.69	1643	0.19
α-Selinene	11.35*	1490	1.56	9.96*	1665	0.21
Bicyclogermacrene	11.35*	1490	[1.56]	10.09	1675	0.38
Viridiflorene	11.35*	1490	[1.56]	9.68	1642	1.12
α-Muurolene	11.44	1497	0.16	10.06	1673	0.10
δ-Guaiene	11.46	1498	0.08	9.96*	1665	[0.21]
γ-Cadinene	11.60	1509	0.09	10.41*†	1702	[1.19]
trans-Calamenene	11.71	1518	0.08	11.26	1773	0.10
δ-Cadinene	11.74*	1520	1.14	10.45*†	1705	[1.19]
Zonarene	11.74*	1520	[1.14]	10.45*†	1705	[1.19]
trans-Cadina-1,4-diene	11.83	1527	0.16	10.69	1725	0.25
α-Calacorene	11.94	1536	0.04	12.16	1851	0.14
α-Elemol	12.04	1544	0.04	14.11	2030	0.03
Epiglobulol	12.15	1553	0.17	13.34	1958	0.17
Maaliol	12.25*	1560	0.23	13.11	1937	0.06
Palustrol	12.25*	1560	[0.23]	12.32	1865	0.12
Spathulenol	12.38	1570	0.35	14.45	2063	0.36
Caryophyllene oxide	12.42*	1574	0.18	12.81	1909	0.17
Caryophyllene oxide isomer	12.42*	1574	[0.18]	12.77	1906	tr
Globulol	12.46	1577	0.75	13.96	2016	0.63
Viridiflorol	12.55	1584	0.26	14.04	2024	0.26
Cubeban-11-ol	12.59	1587	0.23	13.74*	1995	0.30
Guaiol	12.69*	1594	0.23	14.16	2035	0.02
Ledol	12.69*	1594	[0.23]	13.42	1965	0.22
Eudesm-5-en-11-ol analog	12.71	1596	0.01	14.28	2046	0.13
Unknown [m/z 94, 91 (83), 105 (78), 79 (75), 107 (62), 120 (58)... 218 (11)]	12.83	1606	0.01	14.19	2038	0.02
Rosifoliol	12.94	1615	0.27	14.38	2056	0.26
1-epi-Cubenol	13.02*	1622	0.22	13.82	2002	0.19
Eremoligenol?	13.02*	1622	[0.22]	14.95	2111	0.02
γ-Eudesmol	13.10	1628	0.01	14.99	2115	0.01
Isospathulenol	13.14	1631	0.10	15.50	2166	0.10
Cubenol	13.20*	1636	0.13	13.74*	1995	[0.30]
τ-Cadinol	13.20*	1636	[0.13]	14.88	2104	0.02
α-Muurolol	13.29*	1643	0.12	15.25	2142	0.08
β-Eudesmol	13.29*	1643	[0.12]	15.44	2160	0.02
α-Eudesmol	13.38	1651	0.02	15.38	2155	0.02
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.54	1664	0.01	16.88	2309	0.02
Methyl eudesmate	14.05	1706	0.01			
Total identified		**98.48%**			**97.85%**	
Total reported		**98.73%**			**98.00%**	

*: 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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