Date : September 03, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20H24-BKB01
Customer identification : Kunzea - Australia - KA181201
Type : Essential oil
Source : *Kunzea ambigua*
Customer : Be Kind Botanicals, Inc.

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 : August 26, 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

Méthode certifiée ISO 17025:2017 Certified method

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4778 ± 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
Isovaleral	0.05	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	0.02	Aliphatic alcohol
Toluene	tr	Simple phenolic
2,4-Dimethyl-3-pentanone	0.09	Aliphatic ketone
Hexanal	tr	Aliphatic aldehyde
Octane	0.01	Alkane
(3*Z*)-Hexenol	0.04	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
Isoamyl acetate	0.03	Aliphatic ester
Styrene	0.01	Simple phenolic
Unknown	tr	Unknown
Tricyclene	tr	Monoterpene
α-Thujene	0.15	Monoterpene
α-Pinene	41.15	Monoterpene
Camphene	0.03	Monoterpene
α-Fenchene	0.01	Monoterpene
Thuja-2,4(10)-diene	0.03	Monoterpene
β-Pinene	0.61	Monoterpene
Sabinene	0.55	Monoterpene
Isoamyl propionate	0.08	Aliphatic ester
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
Myrcene	0.31	Monoterpene
α-Phellandrene	0.02	Monoterpene
Pseudolimonene	0.02	Monoterpene
Δ3-Carene	0.01	Monoterpene
(3*Z*)-Hexenyl acetate	0.08	Aliphatic ester
α-Terpinene	0.13	Monoterpene
Isoamyl isobutyrate	0.03	Aliphatic ester
para-Cymene	0.32	Monoterpene
Limonene	0.94	Monoterpene
1,8-Cineole	10.82	Monoterpenic ether
(*Z*)-β-Ocimene	0.10	Monoterpene
(*E*)-β-Ocimene	1.29	Monoterpene
γ-Terpinene	0.28	Monoterpene
Isoamyl butyrate	0.10	Aliphatic ester
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Octanol	0.04	Aliphatic alcohol
para-Cymenene	0.03	Monoterpene
Terpinolene	0.01	Monoterpene
trans-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
trans-Sabinene hydrate	0.01	Monoterpenic alcohol

Isoamyl 2-methylbutyrate	0.14	Aliphatic ester
Linalool	1.31	Monoterpenic alcohol
Isoamyl isovalerate	0.32	Aliphatic ester
cis-Rose oxide	0.07	Monoterpenic ether
endo-Fenchol	0.02	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
α-Campholenal	0.07	Monoterpenic aldehyde
trans-Rose oxide	0.03	Monoterpenic ether
trans-Pinocarveol	0.09	Monoterpenic alcohol
cis-Verbenol	0.02	Monoterpenic alcohol
Unknown	0.05	Oxygenated monoterpene
Unknown	0.02	Unknown
Citronellal	0.12	Monoterpenic aldehyde
Pinocarvone	0.02	Monoterpenic ketone
Borneol	0.01	Monoterpenic alcohol
δ-Terpineol	0.13	Monoterpenic alcohol
Terpinen-4-ol	0.44	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	1.44	Monoterpenic alcohol
Myrtenal	0.14	Monoterpenic aldehyde
Myrtenol	0.05	Monoterpenic alcohol
Verbenone	0.05	Monoterpenic ketone
trans-Carveol	0.04	Monoterpenic alcohol
Citronellol	1.39	Monoterpenic alcohol
Carvone	0.14	Monoterpenic ketone
Neral	0.02	Monoterpenic aldehyde
Isoamyl hexanoate	0.03	Aliphatic ester
Geraniol	0.22	Monoterpenic alcohol
(2*E*)-Decenal	0.02	Aliphatic aldehyde
Geranial	0.17	Monoterpenic aldehyde
(2*E*)-Decenol	0.05	Aliphatic alcohol
Unknown	tr	Oxygenated monoterpene
Methyl geranate	0.02	Monoterpenic ester
Bicycloelemene	0.04	Sesquiterpene
α-Cubebene	0.10	Sesquiterpene
Geranic acid	0.11	Aliphatic acid
α-Copaene	0.07	Sesquiterpene
7-Cubebene	0.11	Sesquiterpene
cis-β-Elemene	0.02	Sesquiterpene
β-Elemene	0.22	Sesquiterpene
α-Gurjunene	0.54	Sesquiterpene
β-Caryophyllene	0.66	Sesquiterpene
β-Gurjunene	0.02	Sesquiterpene
Aromadendrene	0.15	Sesquiterpene
trans-α-Bergamotene	0.19	Sesquiterpene
Cadina-3,5-diene isomer I?	0.10	Sesquiterpene
6,9-Guaiadiene	0.17	Sesquiterpene
Cadina-3,5-diene?	0.46	Sesquiterpene
α-Humulene	0.15	Sesquiterpene
allo-Aromadendrene	0.82	Sesquiterpene
Valerena-4,7(11)-diene	0.07	Sesquiterpene
trans-Cadina-1(6),4-diene	0.03	Sesquiterpene

γ-Muurolene	0.04	Sesquiterpene
Germacrene D	0.05	Sesquiterpene
β-Selinene	0.23	Sesquiterpene
allo-Aromadendr-9-ene	0.21	Sesquiterpene
Bicyclogermacrene	3.09	Sesquiterpene
Viridiflorene	1.78	Sesquiterpene
Unknown	0.13	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
γ-Cadinene	0.23	Sesquiterpene
trans-Calamenene	1.13	Sesquiterpene
δ-Cadinene	1.19	Sesquiterpene
trans-Cadina-1,4-diene	0.40	Sesquiterpene
α-Cadinene	0.09	Sesquiterpene
α-Calacorene	0.07	Sesquiterpene
Isocaryophyllene epoxide B	0.03	Sesquiterpenic ether
Unknown	0.06	Oxygenated sesquiterpene
Palustrol	0.46	Sesquiterpenic alcohol
Spathulenol	0.69	Sesquiterpenic alcohol
Caryophyllene oxide	0.14	Sesquiterpenic ether
Globulol	1.81	Sesquiterpenic alcohol
Viridiflorol	14.41	Sesquiterpenic alcohol
Ledol	1.86	Sesquiterpenic alcohol
1-epi-Cubenol	0.30	Sesquiterpenic alcohol
γ-Eudesmol	0.14	Sesquiterpenic alcohol
τ-Cadinol	0.11	Sesquiterpenic alcohol
τ-Muurolol	0.17	Sesquiterpenic alcohol
α-Muurolol	0.10	Sesquiterpenic alcohol
β-Eudesmol	0.03	Sesquiterpenic alcohol
α-Eudesmol	0.04	Sesquiterpenic alcohol
α-Cadinol	0.24	Sesquiterpenic alcohol
Unknown	0.03	Oxygenated sesquiterpene
Shyobunol	0.06	Sesquiterpenic alcohol
1,10-seco-Aromadendrane-1,10-dione?	0.03	Sesquiterpenic ketone
Unknown	0.01	Oxygenated sesquiterpene
Consolidated total	**97.65%**	

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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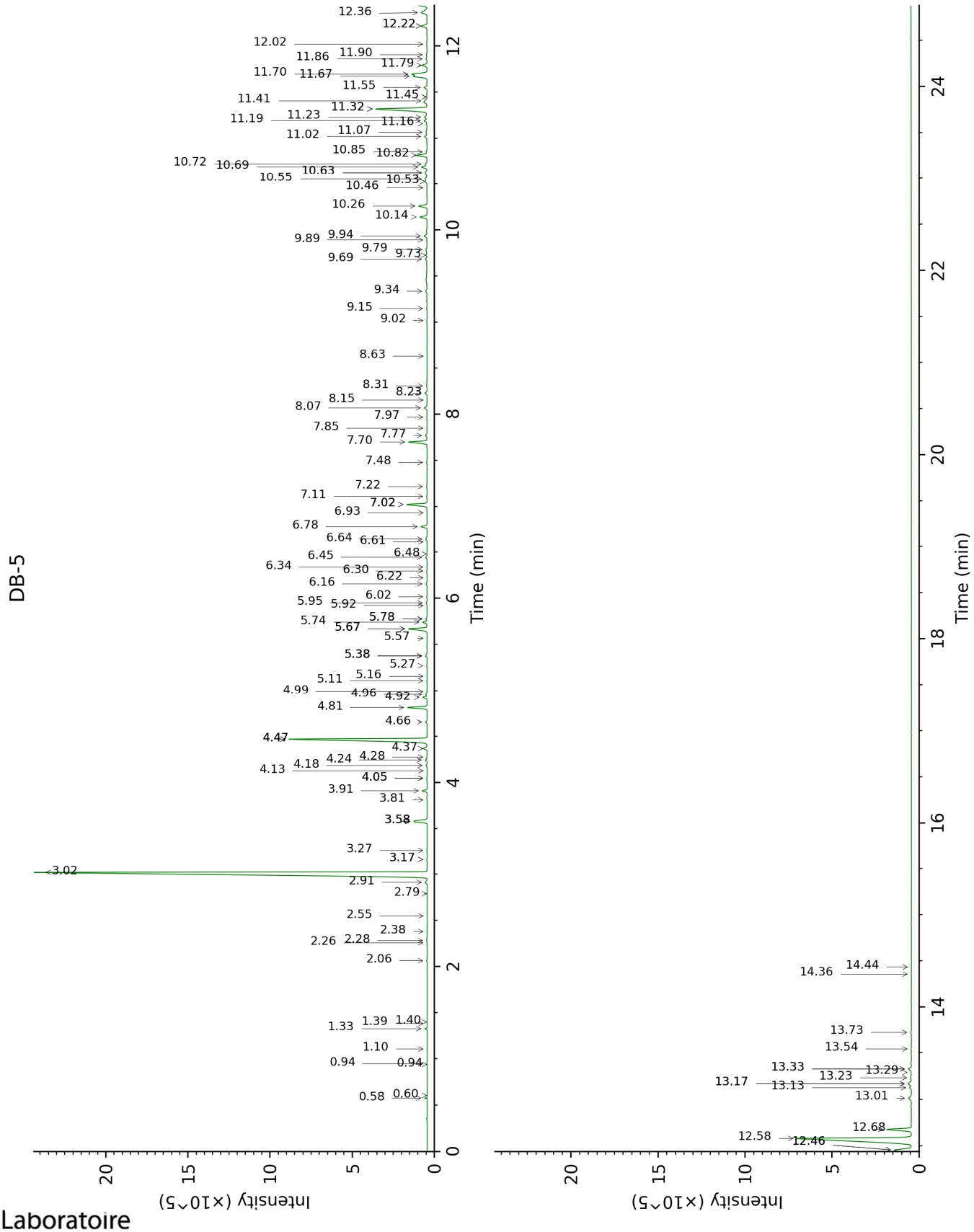
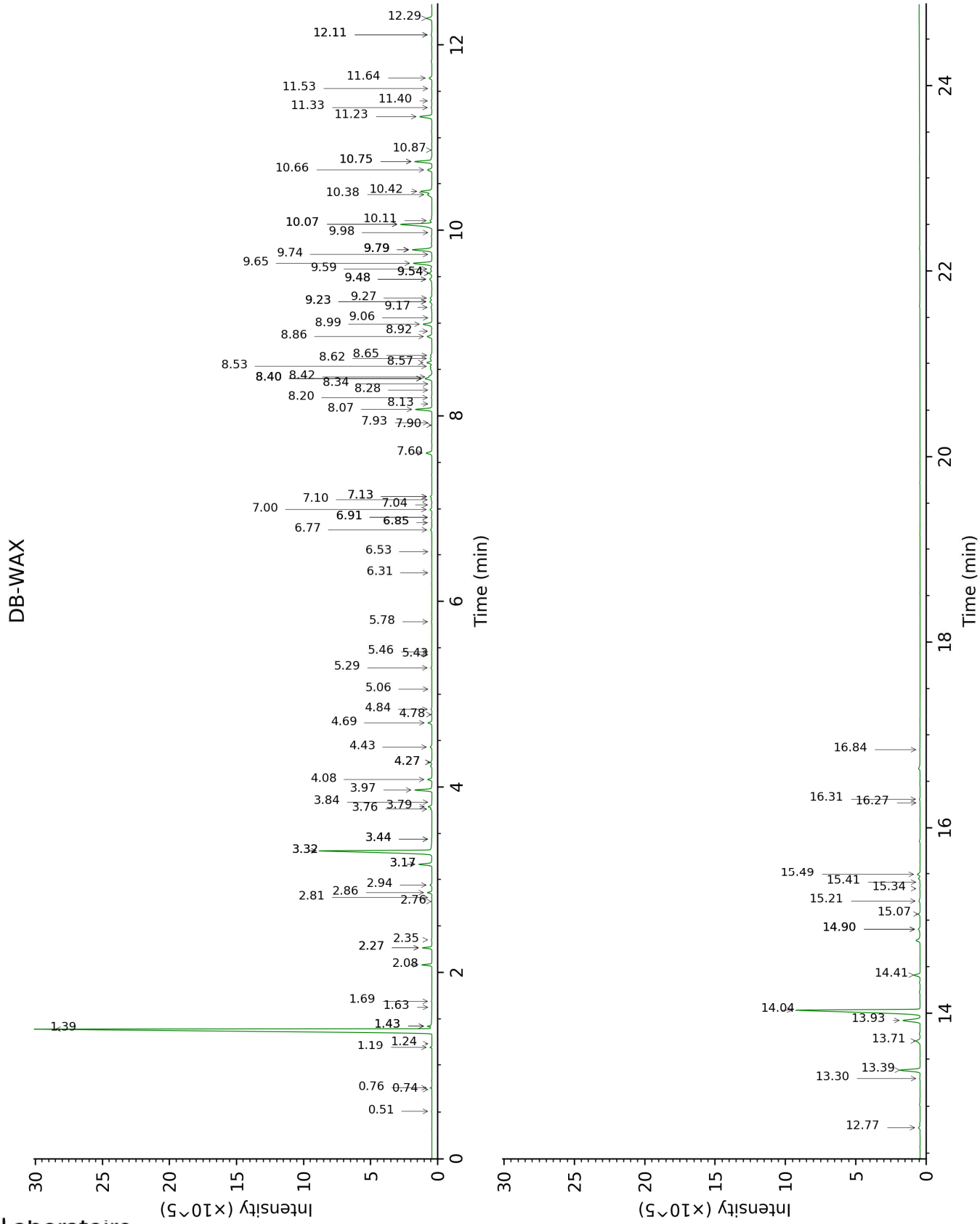

DB-5
Intensity (×10^5)
Time (min)
12.36
12.22
12.02
11.86
11.90
11.79
11.70
11.67
11.55
11.45
11.41
11.32
11.19
11.23
11.16
11.02
11.07
10.85
10.82
10.72
10.69
10.55
10.63
10.53
10.46
10.26
10.14
9.89
9.94
9.79
9.73
9.69
9.34
9.15
9.02
8.63
8.31
8.23
8.07
8.15
7.97
7.85
7.77
7.70
7.48
7.22
7.11
7.02
6.93
6.78
6.64
6.61
6.45
6.48
6.34
6.30
6.22
6.16
5.95
5.92
6.02
5.74
5.67
5.78
5.57
5.38
5.27
5.11
5.16
4.99
4.96
4.92
4.81
4.66
4.47
4.37
4.13
4.18
4.24
4.28
4.05
3.91
3.81
3.58
3.27
3.17
3.02
2.91
2.79
2.55
2.38
2.26
2.28
2.06
1.33
1.39
1.40
1.10
0.94
0.94
0.58
0.60
14.36
14.44
13.73
13.54
13.33
13.29
13.17
13.23
13.13
13.01
12.68
12.58
12.46


DB-WAX
Time (min)
Intensity (×10^5)
12.29
12.11
11.64
11.53
11.40
11.33
11.23
10.87
10.75
10.66
10.42
10.38
10.11
10.07
9.98
9.79
9.74
9.65
9.59
9.54
9.48
9.27
9.23
9.17
9.06
8.99
8.92
8.86
8.65
8.62
8.57
8.53
8.42
8.40
8.34
8.28
8.20
8.13
8.07
7.93
7.90
7.60
7.13
7.10
7.04
7.00
6.91
6.85
6.77
6.53
6.31
5.78
5.46
5.43
5.29
5.06
4.84
4.78
4.69
4.43
4.27
4.08
3.97
3.84
3.79
3.76
3.44
3.32
3.17
2.94
2.86
2.81
2.76
2.35
2.27
2.08
1.69
1.63
1.43
1.39
1.24
1.19
0.76
0.74
0.51
16.84
16.31
16.27
15.49
15.41
15.34
15.21
15.07
14.90
14.41
14.04
13.93
13.71
13.39
13.30
12.77

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.58	639	0.05	0.76	887	0.05
2-Methylbutyral	0.60	650	tr	0.74	880	0.01
Isoamyl alcohol	0.94	732	tr	3.44*	1179	0.04
2-Methylbutanol	0.94	734	0.02	3.44*	1179	[0.04]
Toluene	1.10	757	tr	1.43*	1001	0.37
2,4-Dimethyl-3-pentanone	1.33	791	0.09	1.19	964	0.08
Hexanal	1.39	799	tr			
Octane	1.40	802	0.01	0.51	789	0.01
(3*Z*)-Hexenol	2.06	859	0.04	5.78	1347	0.04
Hexanol	2.26	875	0.01	5.43	1321	0.02
Isoamyl acetate	2.28	877	0.03	2.35	1093	0.03
Styrene	2.38	886	0.01	3.84	1209	0.02
Unknown [m/z 43, 57 (88), 41 (56), 55 (38), 56 (34), 85 (32)...]	2.55	900	tr			
Tricyclene	2.79	917	tr	1.24	972	tr
α-Thujene	2.91	925	0.15	1.43*	1001	[0.37]
α-Pinene	3.02	932	41.15	1.39	998	39.79
Camphene	3.17*	942	0.04	1.69	1027	0.03
α-Fenchene	3.17*	942	[0.04]	1.63	1021	0.01
Thuja-2,4(10)-diene	3.26	948	0.03	2.27*	1084	0.58
β-Pinene	3.58*	969	1.24	2.08	1066	0.61
Sabinene	3.58*	969	[1.24]	2.27*	1084	[0.58]
Isoamyl propionate	3.58*	969	[1.24]	3.17*	1158	1.02
6-Methyl-5-hepten-2-one	3.81	985	0.02	5.06	1297	0.01
Myrcene	3.91	992	0.31	2.86	1133	0.30
α-Phellandrene	4.05*	1000	0.06	2.76	1126	0.02
Pseudolimonene	4.05*	1000	[0.06]	2.81	1129	0.02
Δ3-Carene	4.13	1006	0.01			
(3*Z*)-Hexenyl acetate	4.18	1009	0.08	4.84	1281	0.06
α-Terpinene	4.24	1013	0.13	2.94	1140	0.13
Isoamyl isobutyrate	4.28	1015	0.03	3.32*	1169	10.85
para-Cymene	4.37	1021	0.32	4.08	1226	0.31
Limonene	4.47*	1027	11.93	3.17*	1158	[1.02]
1,8-Cineole	4.47*	1027	[11.93]	3.32*	1169	[10.85]
(*Z*)-β-Ocimene	4.66	1039	0.10	3.76	1203	0.09
(*E*)-β-Ocimene	4.81	1049	1.29	3.97	1218	1.26
γ-Terpinene	4.92	1056	0.28	3.79	1205	0.28
Isoamyl butyrate	4.96	1058	0.10	4.27*	1240	0.11
cis-Sabinene hydrate	4.99	1060	0.02	6.91*	1430	0.05

Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.11	1067	0.02	4.78	1277	0.03
cis-Linalool oxide (fur.)	5.16	1070	0.02	6.53	1401	0.02
Octanol	5.27	1078	0.04	8.20	1527	0.07
para-Cymenene	5.38*	1084	0.11	6.31	1385	0.03
Terpinolene	5.38*	1084	[0.11]	4.27*	1240	[0.11]
trans-Linalool oxide (fur.)	5.38*	1084	[0.11]	6.91*	1430	[0.05]
trans-Sabinene hydrate	5.57	1096	0.01	7.93	1506	0.01
Isoamyl 2-methylbutyrate	5.67*	1102	1.47	4.43	1251	0.14
Linalool	5.67*	1102	[1.47]	8.07	1517	1.31
Isoamyl isovalerate	5.74	1107	0.32	4.69	1270	0.30
cis-Rose oxide	5.78*	1109	0.10	5.29	1311	0.07
endo-Fenchol	5.78*	1109	[0.10]	8.34	1538	0.02
cis-para-Menth-2-en-1-ol	5.92	1118	0.02	8.13	1521	0.01
α-Campholenal	5.95	1120	0.07	7.04	1439	0.04
trans-Rose oxide	6.02	1125	0.03	5.46	1323	0.03
trans-Pinocarveol	6.16	1133	0.09	9.17	1603	0.08
cis-Verbenol	6.22	1138	0.02	9.27	1611	0.15
Unknown [m/z 109, 43 (73), 71 (54), 124 (51), 69 (37), 41 (35)...152 (5)]	6.30	1142	0.05			
Unknown [m/z 109, 124 (45), 119 (41), 43 (35), 91 (28), 95 (25)...]	6.34	1145	0.02	6.85*	1425	0.04
Citronellal	6.45	1152	0.12	7.00	1436	0.16
Pinocarvone	6.48	1154	0.02	7.90	1504	0.01
Borneol	6.61	1162	0.01	9.79*	1653	1.78
δ-Terpineol	6.64	1164	0.13	9.48*	1627	0.27
Terpinen-4-ol	6.78	1173	0.44	8.57	1556	0.43
para-Cymen-8-ol	6.93	1183	0.01	11.53	1799	0.04
α-Terpineol	7.02*	1188	1.57	9.79*	1653	[1.78]
Myrtenal	7.02*	1188	[1.57]	8.65	1562	0.14
Myrtenol	7.11	1194	0.05	10.87	1742	0.03
Verbenone	7.22	1201	0.05	9.59	1636	0.14
trans-Carveol	7.48	1218	0.04	11.40	1787	0.05
Citronellol	7.70	1233	1.39	10.75*	1732	1.50
Carvone	7.77	1238	0.14	10.07*	1675	3.23
Neral	7.85	1243	0.02	9.48*	1627	[0.27]
Isoamyl hexanoate	7.97	1251	0.03	6.85*	1425	[0.04]
Geraniol	8.07	1258	0.22	11.64	1809	0.24
(2*E*)-Decenal	8.15	1263	0.02	9.06	1594	0.01

Geranial	8.23	1268	0.17	10.10	1678	0.16
(2*E*)-Decenol	8.31	1273	0.05	11.33	1781	0.06
Unknown [m/z 43, 93 (66), 91 (44), 41 (38), 69 (35)... 152? (1)]	8.63	1295	tr			
Methyl geranate	9.02	1321	0.02	9.74	1649	0.01
Bicycloelemene	9.15	1330	0.04	7.10	1444	0.06
α-Cubebene	9.34	1344	0.10	6.77	1419	0.12
Geranic acid	9.69	1368	0.11	16.84	2309	0.09
α-Copaene	9.73	1371	0.07	7.13*	1446	0.13
7-Cubebene	9.79	1376	0.11	7.13*	1446	[0.13]
cis-β-Elemene	9.89	1383	0.02	8.28	1533	0.04
β-Elemene	9.94	1386	0.22	8.42	1544	0.22
α-Gurjunene	10.14	1400	0.54	7.60	1481	0.52
β-Caryophyllene	10.26	1409	0.66	8.40*	1542	0.66
β-Gurjunene	10.46	1424	0.02	8.40*	1542	[0.66]
Aromadendrene	10.53	1429	0.15	8.53	1553	0.15
trans-α-Bergamotene	10.55	1431	0.19	8.40*	1542	[0.66]
Cadina-3,5-diene isomer I?	10.63*†	1436	0.28			
6,9-Guaiadiene	10.63*†	1436	[0.28]	8.62	1559	0.17
Cadina-3,5-diene?	10.69	1441	0.46	8.86	1578	0.44
α-Humulene	10.72	1443	0.15	9.24*	1608	0.18
allo-Aromadendrene	10.82	1450	0.82	8.99	1588	0.83
Valerena-4,7(11)-diene	10.85	1453	0.07	8.92	1583	0.06
trans-Cadina-1(6),4-diene	11.02†	1466	0.31	9.24*	1608	[0.18]
γ-Muurolene	11.07†	1469	[0.31]	9.54*	1633	0.25
Germacrene D	11.16	1476	0.05	9.79*	1653	[1.78]
β-Selinene	11.19	1478	0.23	9.79*	1653	[1.78]
allo-Aromadendr-9-ene	11.23	1481	0.21	9.54*	1633	[0.25]
Bicyclogermacrene	11.32*	1488	4.89	10.07*	1675	[3.23]
Viridiflorene	11.32*	1488	[4.89]	9.65	1641	1.78
Unknown [m/z 93, 105 (63), 119 (60), 91 (58), 107 (55), 41 (51), 69 (44), 79 (44), 202 (43)]	11.41	1494	0.13			
α-Muurolene	11.45	1497	0.02	9.98	1668	0.02
γ-Cadinene	11.55	1505	0.23	10.38	1701	0.49
trans-Calamenene	11.67	1515	1.13	11.23	1773	1.13
δ-Cadinene	11.70	1517	1.19	10.42	1704	1.07
trans-Cadina-1,4-diene	11.79	1524	0.40	10.66	1724	0.40
α-Cadinene	11.86	1530	0.09	10.75*	1732	[1.50]
α-Calacorene	11.90	1533	0.07	12.11*	1850	0.09
Isocaryophyllene	12.02	1542	0.03	12.11*	1850	[0.09]

epoxide B						
Unknown [m/z 161, 109 (98), 82 (93), 43 (72), 105 (68), 93 (59), 69 (56), 119 (55)... 222 (7)]	12.22*	1558	0.50	13.30	1957	0.06
Palustrol	12.22*	1558	[0.50]	12.28	1865	0.46
Spathulenol	12.36	1569	0.69	14.41	2063	0.57
Caryophyllene oxide	12.46*	1576	1.86	12.77	1909	0.14
Globulol	12.46*	1576	[1.86]	13.93	2016	1.81
Viridiflorol	12.58	1586	14.41	14.04	2027	14.12
Ledol	12.68	1594	1.86	13.39	1966	1.81
1-epi-Cubenol	13.01	1621	0.30	13.70	1995	0.48
γ-Eudesmol	13.13	1631	0.14	14.90*	2111	0.24
τ-Cadinol	13.17*	1634	0.35	14.90*	2111	[0.24]
τ-Muurolol	13.17*	1634	[0.35]	15.07	2127	0.17
α-Muurolol	13.23	1639	0.10	15.21	2141	0.16
β-Eudesmol	13.29	1644	0.03	15.41	2161	0.04
α-Eudesmol	13.33*	1647	0.23	15.34	2154	0.04
α-Cadinol	13.33*	1647	[0.23]	15.49	2170	0.24
Unknown [m/z 159, 118 (33), 91 (30), 131 (30)... 220? (4)]	13.54	1665	0.03	16.27	2249	0.03
Shyobunol	13.73	1680	0.06	16.31	2253	0.07
1,10-seco-Aromadendrane-1,10-dione?	14.36	1734	0.03			
Unknown [m/z 43, 194 (68), 136 (63), 81 (63), 177 (56), 223 (51)... 238 (3)]	14.44	1741	0.01			
Total identified		**97.79%**			**96.06%**	
Total reported		**98.06%**			**96.18%**	

*: 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