Date : August 16, 2022

Certificate of Analysis – GC Profiling

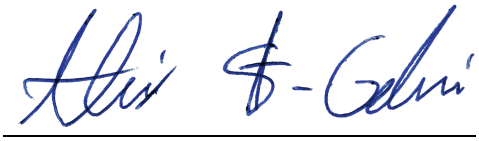
Sample identification

Internal code : 22H09-PTH06
Customer identification : Palo Santo - Ecuador - PJ0109R
Type : Essential oil
Source : *Bursera graveolens*
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 : Sylvain Mercier, M. Sc., Chimiste 2014-005
Analysis date : August 11, 2022

Checked and approved by :



Alexis St-Gelais, Ph. D., 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

Laboratoire PhytoChemia

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4754 ± 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
Toluene	tr	Simple phenolic
3-Methylcyclopentanone	0.04	Aliphatic ketone
α-Thujene	tr	Monoterpene
α-Pinene	0.08	Monoterpene
3-Methylcyclohexanone	0.02	Aliphatic ketone
Camphene	0.01	Monoterpene
β-Pinene	0.01	Monoterpene
Sabinene	tr	Monoterpene
Hexahydroacetophenone epimer I	0.04	Aliphatic ketone
Hexahydroacetophenone epimer II	0.04	Aliphatic ketone
Dehydro-1,8-cineole	0.04	Monoterpenic ether
Myrcene	0.39	Monoterpene
2-Carene	0.02	Monoterpene
α-Phellandrene	0.16	Monoterpene
Pseudolimonene	0.02	Monoterpene
Δ3-Carene	0.01	Monoterpene
α-Terpinene	0.01	Monoterpene
Carvomenthene	0.02	Aliphatic alcohol
para-Cymene	0.89	Monoterpene
β-Phellandrene	0.20	Monoterpene
Limonene	66.64	Monoterpene
1,8-Cineole	0.04	Monoterpenic ether
γ-Terpinene	0.03	Monoterpene
Octanol	0.01	Aliphatic alcohol
trans-Linalool oxide (fur.)	0.04	Monoterpenic alcohol
Terpinolene	0.03	Monoterpene
Linalool	0.05	Monoterpenic alcohol
trans-para-Mentha-2,8-dien-1-ol	0.04	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.06	Monoterpenic alcohol
Limona ketone	0.02	Normonoterpenic ketone
cis-Limonene oxide	0.03	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.09	Monoterpenic alcohol
trans-Limonene oxide	0.07	Monoterpenic ether
cis-β-Terpineol	0.05	Monoterpenic alcohol
Menthone	0.12	Monoterpenic ketone
Menthofuran	14.14	Monoterpenic ether
Isomenthone	0.13	Monoterpenic ketone
trans-β-Terpineol	0.01	Monoterpenic alcohol
Borneol	0.07	Monoterpenic alcohol
trans-Isopulegone	0.06	Monoterpenic ketone
Terpinen-4-ol	0.06	Monoterpenic alcohol
4-Methylacetophenone	0.02	Simple phenolic
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	8.35	Monoterpenic alcohol
Unknown	0.05	Unknown

cis-Dihydrocarvone	0.08	Monoterpenic ketone
trans-Dihydrocarvone	0.03	Monoterpenic ketone
trans-Isopiperitenol	0.05	Monoterpenic alcohol
trans-Piperitol	0.02	Monoterpenic alcohol
4,7-Dimethylbenzofuran?	0.01	Furan
cis-Isopiperitenol	0.02	Monoterpenic alcohol
trans-Carveol	0.14	Monoterpenic alcohol
cis-Isocarveol	0.02	Monoterpenic alcohol
cis-Carveol	0.08	Monoterpenic alcohol
Pulegone	0.69	Monoterpenic ketone
Carvone	1.14	Monoterpenic ketone
Unknown	0.04	Unknown
Perillaldehyde	0.01	Monoterpenic aldehyde
Limonen-10-ol	0.01	Monoterpenic alcohol
Perilla alcohol	0.01	Monoterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.06	Unknown
Menthofurolactone isomer I	0.07	Monoterpenic lactone
Menthofurolactone isomer II	0.08	Monoterpenic lactone
Evodone	0.04	Monoterpenic ketone
α-Ylangene	0.03	Sesquiterpene
α-Copaene	0.05	Sesquiterpene
β-Cubebene	0.03	Sesquiterpene
β-Elemene	0.11	Sesquiterpene
α-Cedrene	0.02	Sesquiterpene
β-Ylangene	0.06	Sesquiterpene
8-Hydroxycarvotanacetone	0.01	Monoterpenic alcohol
cis-Thujopsene	0.04	Sesquiterpene
β-Copaene	0.05	Sesquiterpene
Menthofurolactone isomer III	0.10	Monoterpenic lactone
Unknown	0.13	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
γ-Muurolene	0.21	Sesquiterpene
Germacrene D	1.77	Sesquiterpene
β-Selinene	0.04	Sesquiterpene
Unknown	0.01	Unknown
Menthalactone	0.17	Monoterpenic lactone
α-Selinene	tr	Sesquiterpene
Bicyclogermacrene	0.11	Sesquiterpene
α-Muurolene	0.08	Sesquiterpene
Germacrene A	0.01	Sesquiterpene
γ-Cadinene	0.09	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.26	Sesquiterpene
β-Bisabolene	0.02	Sesquiterpene
trans-Calamenene	0.03	Sesquiterpene
δ-Cadinene	0.24	Sesquiterpene
Menthofurolactone analog	0.06	Monoterpenic lactone
α-Cadinene	0.03	Sesquiterpene
Germacrene B	0.04	Sesquiterpene
1,5-Epoxysalvial-4(14)-ene	0.03	Sesquiterpenic ether
7α-Hydroxymintlactone	0.02	Monoterpenic alcohol
Spathulenol	0.02	Sesquiterpenic alcohol

Globulol	0.01	Sesquiterpenic alcohol
Salvial-4(14)-en-1-one	0.02	Aliphatic alcohol
Viridiflorol	0.02	Sesquiterpenic alcohol
Unknown	0.03	Oxygenated sesquiterpene
10-epi-γ-Eudesmol	0.02	Sesquiterpenic alcohol
Junenol	0.13	Sesquiterpenic alcohol
1-epi-Cubenol	0.03	Sesquiterpenic alcohol
Cubenol	0.01	Sesquiterpenic alcohol
τ-Cadinol	0.03	Sesquiterpenic alcohol
β-Eudesmol	0.03	Sesquiterpenic alcohol
Unknown	0.04	Sesquiterpenic alcohol
α-Cadinol	0.05	Sesquiterpenic alcohol
Germacra-4(15),5,10(14)-trien-1α-ol	0.02	Sesquiterpenic alcohol
Consolidated total	**99.15%**	

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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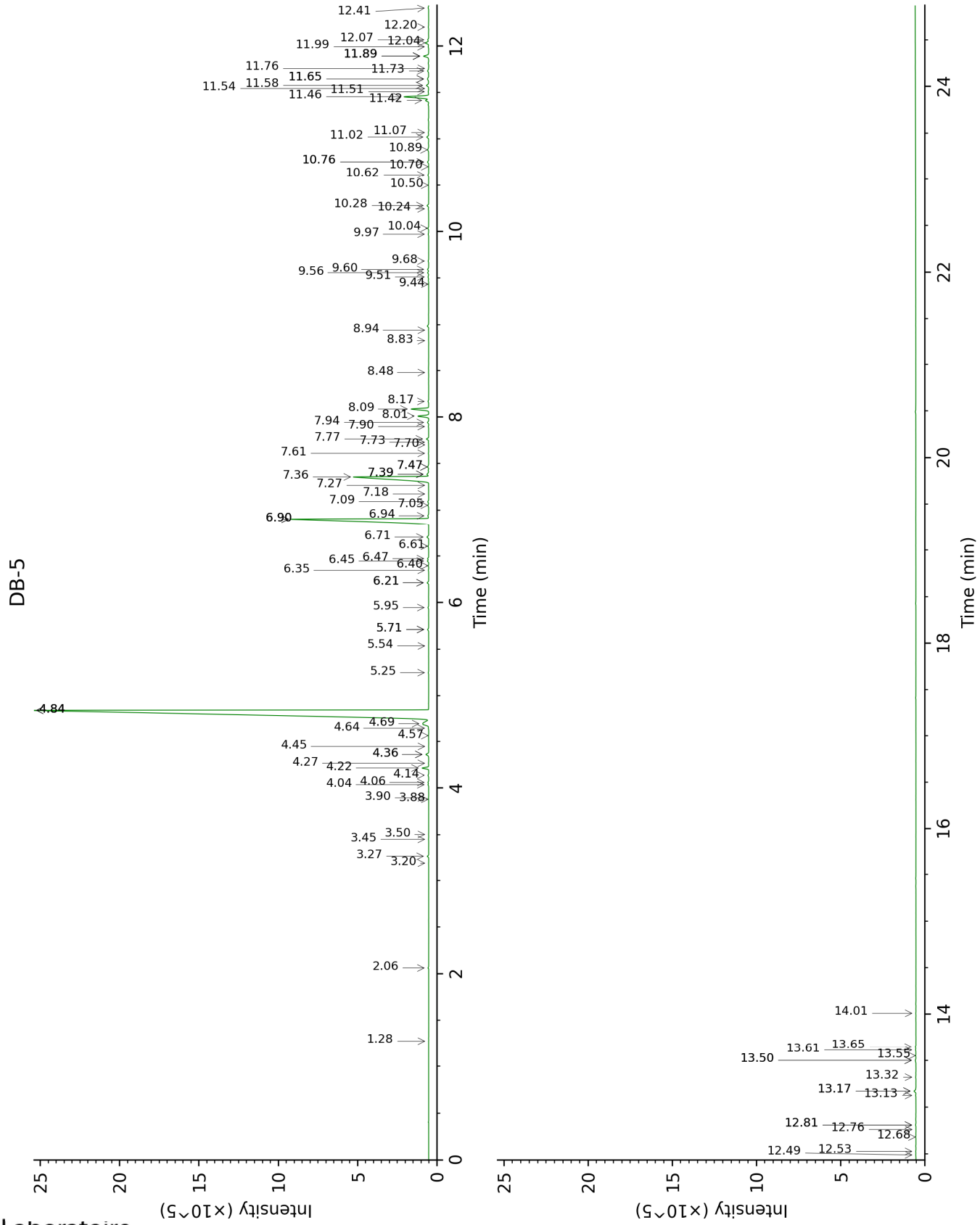
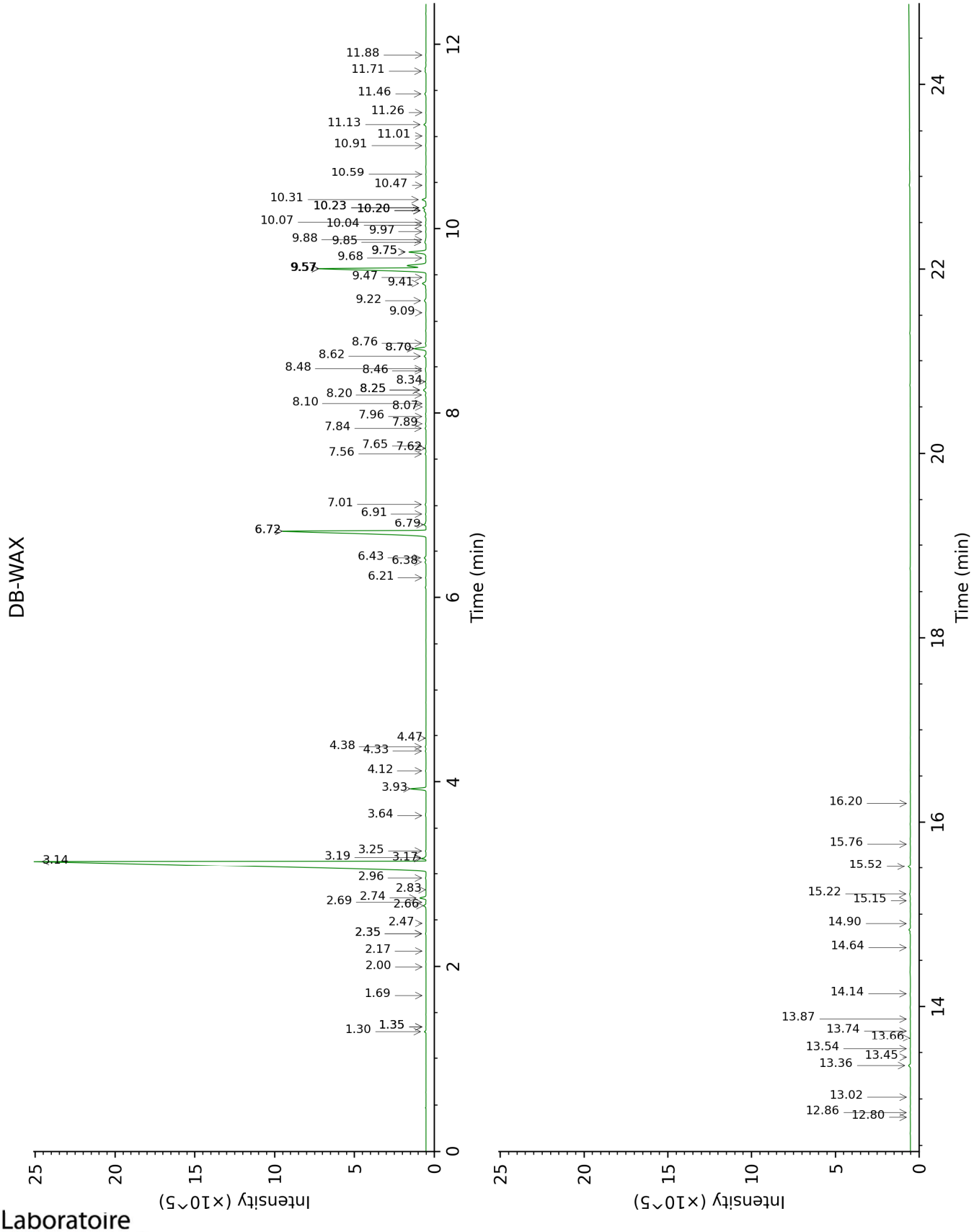

DB-5
Time (min)
Intensity (×10^5)
12.41
12.20
11.99
12.07
12.04
11.89
11.76
11.73
11.65
11.54
11.58
11.46
11.51
11.42
11.02
11.07
10.89
10.76
10.70
10.62
10.50
10.28
10.24
9.97
10.04
9.68
9.56
9.60
9.51
9.44
8.94
8.83
8.48
8.17
8.09
8.01
7.94
7.90
7.77
7.73
7.70
7.61
7.47
7.36
7.39
7.27
7.18
7.09
7.05
6.90
6.94
6.71
6.61
6.45
6.47
6.40
6.35
6.21
5.95
5.71
5.54
5.25
4.84
4.64
4.69
4.57
4.45
4.36
4.27
4.22
4.14
4.04
4.06
3.90
3.88
3.45
3.50
3.27
3.20
2.06
1.28
14.01
13.61
13.65
13.50
13.55
13.32
13.17
13.13
12.81
12.76
12.68
12.49
12.53


DB-WAX
Time (min)
Intensity (×10^5)
11.88
11.71
11.46
11.26
11.13
11.01
10.91
10.59
10.47
10.31
10.23
10.20
10.07
10.04
9.97
9.88
9.85
9.75
9.68
9.57
9.47
9.41
9.22
9.09
8.76
8.70
8.62
8.48
8.46
8.34
8.25
8.20
8.10
8.07
7.96
7.89
7.84
7.65
7.62
7.56
7.01
6.91
6.79
6.72
6.43
6.38
6.21
4.47
4.38
4.33
4.12
3.93
3.64
3.25
3.19
3.17
3.14
2.96
2.83
2.74
2.69
2.66
2.47
2.35
2.17
2.00
1.69
1.35
1.30
16.20
15.76
15.52
15.22
15.15
14.90
14.64
14.14
13.87
13.74
13.66
13.54
13.45
13.36
13.02
12.86
12.80

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Toluene	1.28	760	tr	1.35*	1002	0.01
3-Methylcyclopentanone	2.06	841	0.04	3.26	1175	0.03
α-Thujene	3.20	927	tr	1.35*	1002	[0.01]
α-Pinene	3.27	932	0.08	1.30	993	0.07
3-Methylcyclohexanone	3.45	944	0.02	4.47	1267	0.01
Camphene	3.50	947	0.01	1.69	1037	tr
β-Pinene	3.88†	972	0.02	2.00	1067	0.01
Sabinene	3.90†	973	[0.02]	2.17	1084	tr
Hexahydroacetophenone epimer I	4.04	982	0.04	4.34	1257	0.04
Hexahydroacetophenone epimer II	4.06	984	0.04	4.38	1260	0.04
Dehydro-1,8-cineole	4.14	989	0.04	2.96	1151	0.04
Myrcene	4.22	994	0.39	2.74	1134	0.38
2-Carene	4.27	997	0.02	2.35*	1103	0.03
α-Phellandrene	4.36*	1003	0.20	2.66	1128	0.16
Pseudolimonene	4.36*	1003	[0.20]	2.69	1130	0.02
Δ3-Carene	4.45	1009	0.01	2.47	1112	0.01
α-Terpinene	4.57	1016	0.01	2.83	1141	0.02
Carvomenthene	4.64	1021	0.02	2.35*	1103	[0.03]
para-Cymene	4.69	1024	0.89	3.93	1227	0.88
β-Phellandrene	4.84*	1033	66.91	3.17	1168	0.20
Limonene	4.84*	1033	[66.91]	3.14	1166	66.64
1,8-Cineole	4.84*	1033	[66.91]	3.18	1169	0.04
γ-Terpinene	5.25	1058	0.03	3.64	1205	0.03
Octanol	5.54	1076	0.01	8.07	1532	0.01
trans-Linalool oxide (fur.)	5.71*	1087	0.07	6.72*	1428	14.18
Terpinolene	5.71*	1087	[0.07]	4.12	1241	0.03
Linalool	5.95	1102	0.05	7.89	1517	0.04
trans-para-Mentha-2,8-dien-1-ol	6.21*	1119	0.10	8.76	1587	0.04
cis-para-Menth-2-en-1-ol	6.21*	1119	[0.10]			
Limona ketone	6.35	1128	0.02	7.62	1497	0.03
cis-Limonene oxide	6.40	1131	0.03	6.21	1391	0.03
cis-para-Mentha-2,8-dien-1-ol	6.45	1134	0.09	9.22	1624	0.15
trans-Limonene oxide	6.47	1136	0.07	6.38	1403	0.07
cis-β-Terpineol	6.61	1144	0.05			
Menthone	6.71	1150	0.12	6.43	1406	0.12
Menthofuran	6.90*	1163	14.29	6.72*	1428	[14.18]
Isomenthone	6.90*	1163	[14.29]	6.79	1434	0.13
trans-β-Terpineol	6.90*	1163	[14.29]	9.47	1644	0.01
Borneol	6.94	1165	0.07	9.57*	1652	8.50
trans-Isopulegone	7.05	1172	0.06	8.70*	1582	0.83
Terpinen-4-ol	7.09	1175	0.06	8.34	1553	0.03
4-Methylacetophenone	7.18	1180	0.02	10.23*	1706	0.23
para-Cymen-8-ol	7.27	1186	0.01	11.26	1796	0.01
α-Terpineol	7.36	1192	8.35	9.57*	1652	[8.50]

Unknown [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39), 84 (37)...]	7.39*	1194	0.14	7.84	1513	0.05
cis-Dihydrocarvone	7.39*	1194	[0.14]	8.25*	1546	0.21
trans-Dihydrocarvone	7.47*	1199	0.08	8.46	1562	0.03
trans-Isopiperitenol	7.47*	1199	[0.08]	10.23*	1706	[0.23]
trans-Piperitol	7.61	1208	0.02	10.20*	1704	0.17
4,7-Dimethylbenzofuran?	7.70	1214	0.01			
cis-Isopiperitenol	7.73	1216	0.02	10.07	1694	0.02
trans-Carveol	7.77	1218	0.14	11.13	1784	0.14
cis-Isocarveol	7.90	1227	0.02	11.71	1835	0.07
cis-Carveol	7.94	1230	0.08	11.46	1813	0.10
Pulegone	8.01	1235	0.69	8.70*	1582	[0.83]
Carvone	8.09	1240	1.14	9.75*	1667	1.25
Unknown [m/z 112, 43 (70), 70 (63), 59 (53), 97 (46), 84 (25)...]	8.17	1245	0.04	10.04	1691	0.04
Perillaldehyde	8.48	1266	0.01	10.47	1727	0.01
Limonen-10-ol	8.83	1289	0.01	12.86	1939	0.02
Perilla alcohol	8.94	1297	0.01	13.02	1955	0.01
Unknown [m/z 124, 123 (43), 121 (35), 166 (30), 93 (30), 136 (17)...]	9.44	1331	0.01			
Unknown [m/z 150, 71 (67), 107 (54), 43 (44), 109 (42)...]	9.51	1337	0.06			
Menthofurolactone isomer I	9.56	1340	0.07			
Menthofurolactone isomer II	9.60	1342	0.08			
Evodone	9.68	1349	0.04			
α-Ylangene	9.97	1369	0.03	6.91	1443	0.03
α-Copaene	10.04	1374	0.05	7.01	1451	0.06
β-Cubebene	10.24	1388	0.03	7.56	1492	0.04
β-Elemene	10.28	1391	0.11	8.25*	1546	[0.21]
α-Cedrene	10.50	1406	0.02	7.65	1499	0.03
β-Ylangene	10.62	1415	0.06	7.96	1524	0.05
8-Hydroxycarvotanacetone	10.70	1422	0.01	16.20	2271	0.01
cis-Thujopsene	10.76*	1425	0.08	8.48	1564	0.04
β-Copaene	10.76*	1425	[0.08]	8.20	1542	0.05
Menthofurolactone isomer III	10.89	1435	0.10			
Unknown [m/z 91, 161 (92), 105 (85), 119 (63), 133 (53), 79 (49), 204 (46)]	11.02	1445	0.13	8.62	1575	0.12
α-Humulene	11.07	1449	0.02	9.09	1613	0.02
γ-Muurolene	11.42	1474	0.21	9.41	1639	0.31
Germacrene D	11.46	1477	1.77	9.57*	1652	[8.50]
β-Selinene	11.51	1481	0.04	9.68	1662	0.04

Unknown [m/z 149, 161 (51), 93 (43), 91 (42), 164 (42), 105 (37)...204? (11)]	11.54	1484	0.01	8.10	1534	0.01
Menthalactone	11.58	1486	0.17	15.52	2199	0.16
α-Selinene	11.65*	1492	0.12	9.75*	1667	[1.25]
Bicyclogermacrene	11.65*	1492	[0.12]	9.85	1676	0.11
α-Muurolene	11.73	1498	0.08	9.88	1678	0.02
Germacrene A	11.76	1500	0.01	10.20*	1704	[0.17]
γ-Cadinene	11.89*	1510	0.38	10.20*	1704	[0.17]
(3*E*,6*E*)-α-Farnesene	11.89*	1510	[0.38]	10.32	1714	0.26
β-Bisabolene	11.89*	1510	[0.38]	9.97	1685	0.02
trans-Calamenene	11.99	1518	0.03	11.01	1774	0.01
δ-Cadinene	12.04	1521	0.24	10.23*	1706	[0.23]
Menthofurolactone analog	12.07	1524	0.06			
α-Cadinene	12.20	1535	0.03	10.59	1738	0.02
Germacrene B	12.41	1551	0.04	10.91	1765	0.04
1,5-Epoxysalvial-4(14)-ene	12.49	1557	0.03	11.88	1851	0.03
7α-Hydroxymintlactone	12.53	1560	0.02			
Spathulenol	12.68	1572	0.02	14.14	2062	0.02
Globulol	12.76	1578	0.01	13.66	2015	0.01
Salvial-4(14)-en-1-one	12.81*	1582	0.03	12.80	1935	0.02
Viridiflorol	12.81*	1582	[0.03]	13.74	2022	0.02
Unknown [m/z 43, 93 (88), 91 (76), 79 (73), 69 (64), 41 (63), 95 (53).. 220 (3)]	13.13	1607	0.03			
10-epi-γ-Eudesmol	13.17*	1611	0.16	13.87	2035	0.02
Junenol	13.17*	1611	[0.16]	13.36	1987	0.13
1-epi-Cubenol	13.32	1623	0.03	13.54	2004	0.02
Cubenol	13.50*	1638	0.06	13.45	1995	0.01
τ-Cadinol	13.50*	1638	[0.06]	14.64	2110	0.03
β-Eudesmol	13.55	1642	0.03	15.15	2161	0.02
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109 (40)... 204 (35), 222 (2)]	13.61	1647	0.04	14.90	2136	0.02
α-Cadinol	13.65	1650	0.05	15.22	2169	0.07
Germacra-4(15),5,10(14)-trien-1α-ol	14.01	1680	0.02	15.76	2225	0.02
Total identified		**98.92%**			**96.88%**	
Total reported		**99.24%**			**97.13%**	

*: 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