Date : August 16, 2022

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 22H09-PTH07
Customer identification : Leleshwa - Kenya - LF2100R
Type : Essential oil
Source : *Tarchonanthus camphoratus*
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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4735 ± 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
Isobutanol	0.01	Aliphatic alcohol
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	0.03	Aliphatic alcohol
2-Methylbutanol	0.01	Aliphatic alcohol
Toluene	0.01	Simple phenolic
Hexan-3-one	0.01	Aliphatic ketone
Hexan-3-ol	0.01	Aliphatic alcohol
Octane	0.04	Alkane
2-Methyl-2-heptene	0.01	Alkene
(3*Z*)-Hexenol	0.02	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
Bornylene	0.04	Monoterpene
Hashishene	0.02	Monoterpene
Tricyclene	0.01	Monoterpene
α-Thujene	0.29	Monoterpene
α-Pinene	19.71	Monoterpene
Unknown	0.01	Monoterpene
Camphene	4.73	Monoterpene
α-Fenchene	0.97	Monoterpene
Thuja-2,4(10)-diene	0.06	Monoterpene
β-Pinene	3.78	Monoterpene
Sabinene	0.39	Monoterpene
Dehydro-1,8-cineole	0.08	Monoterpenic ether
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	0.09	Monoterpene
2-Carene	1.35	Monoterpene
α-Phellandrene	0.34	Monoterpene
Δ3-Carene	0.01	Monoterpene
α-Terpinene	0.43	Monoterpene
para-Cymene	2.97	Monoterpene
Limonene	3.43	Monoterpene
1,8-Cineole	15.84	Monoterpenic ether
(*Z*)-β-Ocimene	0.09	Monoterpene
(*E*)-β-Ocimene	0.01	Monoterpene
γ-Terpinene	0.89	Monoterpene
Unknown	0.02	Unknown
cis-Sabinene hydrate	0.18	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Fenchone	1.62	Monoterpenic ketone
Terpinolene	1.14	Monoterpene
para-Cymenene	0.06	Monoterpene
α-Pinene oxide	0.03	Monoterpenic ether
trans-Sabinene hydrate	0.03	Monoterpenic alcohol

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Linalool	0.09	Monoterpenic alcohol
Verbenol analog?	0.30	Monoterpenic alcohol
endo-Fenchol	18.71	Monoterpenic alcohol
exo-Fenchol	0.15	Monoterpenic alcohol
trans-Pinene hydrate	2.39	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.15	Monoterpenic alcohol
trans-Pinocarveol	0.22	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.17	Monoterpenic alcohol
Camphene hydrate	0.36	Monoterpenic alcohol
Epoxyterpinolene	0.05	Monoterpenic ether
Isoborneol	0.03	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Borneol	1.29	Monoterpenic alcohol
δ-Terpineol	0.10	Monoterpenic alcohol
Isopinocamphone	0.05	Monoterpenic ketone
endo-Fenchyl formate?	0.10	Monoterpenic ester
Terpinen-4-ol	3.67	Monoterpenic alcohol
Dill ether	0.01	Monoterpenic ether
para-Cymen-8-ol	0.16	Monoterpenic alcohol
α-Terpineol	5.94	Monoterpenic alcohol
Myrtenal	0.06	Monoterpenic aldehyde
cis-Piperitol	0.04	Monoterpenic alcohol
Unknown	0.04	Oxygenated monoterpene
Myrtenol	0.14	Monoterpenic alcohol
Verbenone	0.04	Monoterpenic ketone
trans-Piperitol	0.08	Monoterpenic alcohol
Pin-2-en-8-ol	0.02	Monoterpenic alcohol
endo-Fenchyl acetate	0.30	Monoterpenic ester
exo-2-Hydroxycineole	0.02	Monoterpenic alcohol
Bornyl formate	0.02	Monoterpenic ester
Unknown	0.04	Oxygenated monoterpene
Unknown	0.05	Unknown
trans-Ascaridole glycol	0.04	Monoterpenic alcohol
Unknown	0.03	Oxygenated monoterpene
cis-Ascaridole glycol	0.07	Monoterpenic alcohol
Pelargonic acid?	0.02	Aliphatic acid
Unknown	0.07	Oxygenated monoterpene
para-Menth-5-en-1,2-diol isomer II	0.02	Monoterpenic alcohol
Unknown	0.05	Monoterpenic alcohol
α-Cubebene	0.06	Sesquiterpene
Cyclosativene II	0.02	Sesquiterpene
α-Ylangene	0.04	Sesquiterpene
α-Copaene	0.33	Sesquiterpene
β-Bourbonene	0.07	Sesquiterpene
Unknown	0.02	Unknown
α-Funebrene	0.02	Sesquiterpene
Italicene	0.01	Sesquiterpene
β-Caryophyllene	0.56	Sesquiterpene
β-Copaene	0.05	Sesquiterpene
trans-α-Bergamotene	0.04	Sesquiterpene
α-Humulene	0.03	Sesquiterpene
allo-Aromadendrene	0.33	Sesquiterpene

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γ-Muurolene	0.16	Sesquiterpene
γ-Curcumene	0.46	Sesquiterpene
β-Selinene	0.09	Sesquiterpene
ar-Curcumene	0.69	Sesquiterpene
Unknown	0.08	Sesquiterpene
α-Muurolene	0.05	Sesquiterpene
γ-Cadinene	0.16	Sesquiterpene
δ-Cadinene	0.20	Sesquiterpene
α-Calacorene	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.01	Sesquiterpenic ether
Spathulenol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.13	Sesquiterpenic ether
Unknown	0.02	Unknown
τ-Cadinol	0.04	Sesquiterpenic alcohol
β-Eudesmol	0.12	Sesquiterpenic alcohol
α-Cadinol	0.02	Sesquiterpenic alcohol
Unknown	0.04	Oxygenated sesquiterpene
trans-Bisabola-1(6),10-diene-2,3-diol	0.08	Sesquiterpenic alcohol
Unknown	0.03	Unknown
Consolidated total	**97.94%**	

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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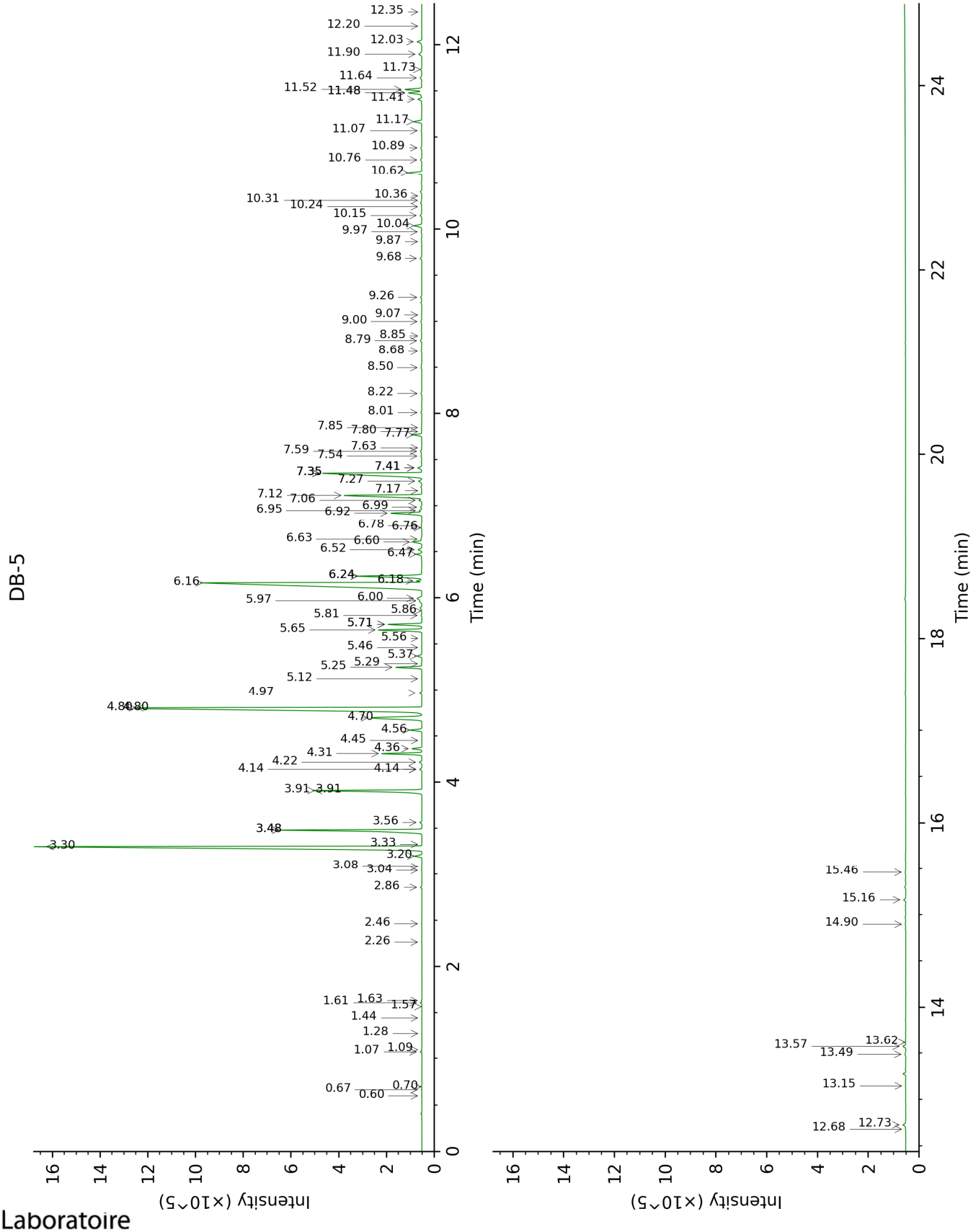
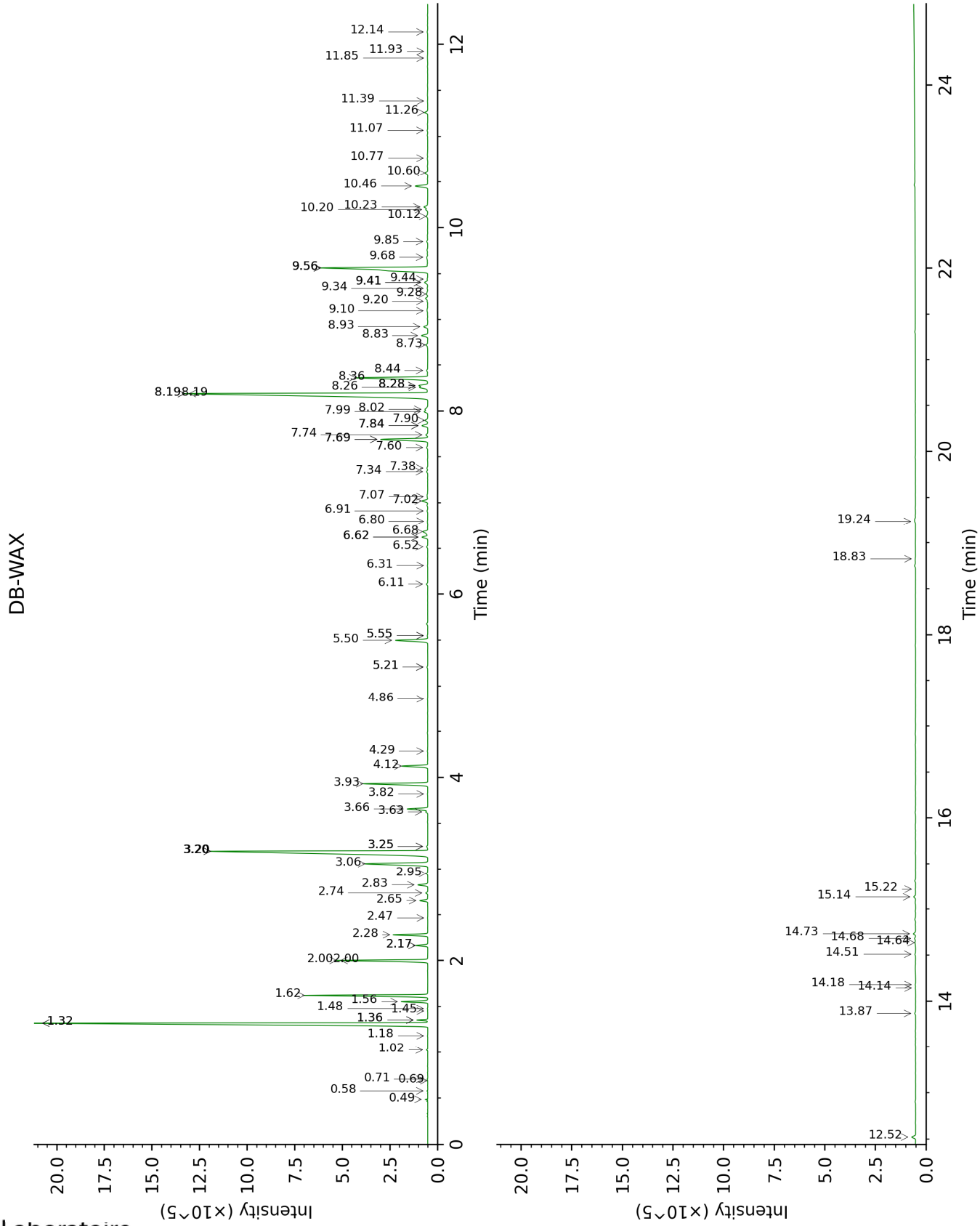
628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com


DB-5
Intensity (×10^5)
Time (min)
12.35
12.20
12.03
11.90
11.73
11.64
11.52
11.48
11.41
11.17
11.07
10.89
10.76
10.62
10.36
10.31
10.24
10.15
10.04
9.97
9.87
9.68
9.26
9.07
9.00
8.85
8.79
8.68
8.50
8.22
8.01
7.85
7.80
7.77
7.63
7.59
7.54
7.41
7.35
7.27
7.17
7.12
7.06
6.99
6.95
6.92
6.78
6.76
6.63
6.60
6.52
6.47
6.24
6.18
6.16
6.00
5.97
5.86
5.81
5.71
5.65
5.56
5.46
5.37
5.29
5.25
5.12
4.97
4.80
4.80
4.70
4.56
4.45
4.36
4.31
4.22
4.14
4.14
3.91
3.91
3.56
3.48
3.33
3.30
3.20
3.08
3.04
2.86
2.46
2.26
1.63
1.61
1.57
1.44
1.28
1.09
1.07
0.70
0.67
0.60
15.46
15.16
14.90
13.62
13.57
13.49
13.15
12.73
12.68


DB-WAX
Intensity (×10^5)
Time (min)
12.14
11.93
11.85
11.39
11.26
11.07
10.77
10.60
10.46
10.20
10.23
10.12
9.85
9.68
9.56
9.41
9.44
9.34
9.28
9.20
9.10
8.93
8.83
8.73
8.44
8.36
8.28
8.26
8.19
8.19
7.99
8.02
7.90
7.84
7.74
7.69
7.60
7.34
7.38
7.07
7.02
6.91
6.80
6.68
6.62
6.52
6.31
6.11
5.50
5.55
5.21
4.86
4.29
4.12
3.93
3.82
3.66
3.63
3.25
3.20
3.06
2.95
2.83
2.74
2.65
2.47
2.28
2.17
2.00
2.00
1.62
1.56
1.48
1.45
1.36
1.32
1.18
1.02
0.71
0.69
0.58
0.49
19.24
18.83
15.22
15.14
14.73
14.68
14.64
14.51
14.18
14.14
13.87
12.52

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isobutanol	0.60	621	0.01	2.00*	1068	3.79
Isovaleral	0.66	642	0.01	0.71	885	0.01
2-Methylbutyral	0.70	653	tr	0.69	879	tr
Isoamyl alcohol	1.07	733	0.03	3.25*	1174	0.06
2-Methylbutanol	1.10	736	0.01	3.25*	1174	[0.06]
Toluene	1.28	760	0.01	1.36*	1003	0.30
Hexan-3-one	1.44	782	0.01	1.45	1014	0.01
Hexan-3-ol	1.57	799	0.01	3.20*	1170	15.85
Octane	1.61	804	0.04	0.49	799	0.04
2-Methyl-2-heptene	1.63	806	0.01	0.58	838	0.01
(3*Z*)-Hexenol	2.26	857	0.02	5.55*	1342	0.03
Hexanol	2.46	873	0.01	5.21*	1317	0.04
Bornylene	2.86	905	0.04	1.02	949	0.04
Hashishene	3.04	917	0.02	1.32*	998	19.60
Tricyclene	3.08	920	0.01	1.18	975	0.01
α-Thujene	3.20	927	0.29	1.36*	1003	[0.30]
α-Pinene	3.30	934	19.71	1.32*	998	[19.60]
Unknown [m/z 79, 93 (79), 80 (57), 121 (42), 77 (36), 94 (35), 91 (34), 126 (26)]	3.33	936	0.01	1.48	1016	0.01
Camphene	3.48*	946	5.74	1.62	1030	4.73
α-Fenchene	3.48*	946	[5.74]	1.56	1024	0.97
Thuja-2,4(10)-diene	3.56	951	0.06	2.17*	1084	0.46
β-Pinene	3.91*	974	4.19	2.00*	1068	[3.79]
Sabinene	3.91*	974	[4.19]	2.17*	1084	[0.46]
Dehydro-1,8-cineole	4.14*	989	0.08	2.95	1151	0.08
6-Methyl-5-hepten-2-one	4.14*	989	[0.08]	4.86	1296	0.01
Myrcene	4.22	994	0.09	2.74	1134	0.09
2-Carene	4.31	1000	1.35	2.28	1096	1.34
α-Phellandrene	4.36	1003	0.34	2.66	1127	0.34
Δ3-Carene	4.45	1009	0.01	2.47	1112	0.01
α-Terpinene	4.56	1016	0.43	2.83	1141	0.43
para-Cymene	4.70	1024	2.97	3.93	1227	2.96
Limonene	4.80*	1031	19.40	3.06	1160	3.43
1,8-Cineole	4.80*	1031	[19.40]	3.20*	1170	[15.85]
(*Z*)-β-Ocimene	4.97	1041	0.09	3.63	1204	0.09
(*E*)-β-Ocimene	5.12	1051	0.01	3.82	1219	0.02
γ-Terpinene	5.25	1058	0.89	3.66	1207	0.90
Unknown [m/z 94, 79 (51), 43 (45), 67 (19), 95 (19), 109 (17)...]	5.29	1061	0.02	4.29	1254	0.02

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cis-Sabinene hydrate	5.37	1066	0.18	6.68	1426	0.34
cis-Linalool oxide (fur.)	5.46	1072	0.02	6.31	1398	0.01
Octanol	5.56	1078	0.01	7.99	1526	0.20
Fenchone	5.65	1084	1.62	5.50	1338	1.61
Terpinolene	5.71*	1087	1.21	4.12	1241	1.14
para-Cymenene	5.71*	1087	[1.21]	6.11	1383	0.06
α-Pinene oxide	5.81	1093	0.03	5.21*	1317	[0.04]
trans-Sabinene hydrate	5.86	1096	0.03	7.74	1506	0.10
Linalool	5.97	1103	0.09	7.84*	1514	0.31
Verbenol analog?	6.00	1105	0.30	8.19*	1541	18.48
endo-Fenchol	6.16	1116	18.71	8.19*	1541	[18.48]
exo-Fenchol	6.18	1117	0.15	8.02	1528	0.17
trans-Pinene hydrate	6.24*	1120	2.68	7.69*	1502	2.41
cis-para-Menth-2-en-1-ol	6.24*	1120	[2.68]	7.90	1518	0.15
trans-Pinocarveol	6.47	1135	0.22	8.92	1599	0.22
trans-para-Menth-2-en-1-ol	6.52	1138	0.17	8.73	1584	0.12
Camphene hydrate	6.60	1144	0.36	8.28*†	1548	[0.85]
Epoxyterpinolene	6.63	1146	0.05	6.52	1413	0.05
Isoborneol	6.76	1154	0.03	9.20	1622	0.03
Unknown [m/z 95, 81 (36), 93 (34), 53 (29), 136 (29)...]	6.78	1155	0.02	5.55*	1342	[0.03]
Borneol	6.92	1164	1.29	9.56*	1652	7.75
δ-Terpineol	6.95	1166	0.10	9.28	1628	0.11
Isopinocamphone	6.99	1168	0.05	7.38	1478	0.04
endo-Fenchyl formate?	7.06	1173	0.10			
Terpinen-4-ol	7.12	1176	3.67	8.36	1555	3.65
Dill ether	7.16	1180	0.01	7.07	1455	0.02
para-Cymen-8-ol	7.27	1186	0.16	11.26	1796	0.16
α-Terpineol	7.35*	1192	6.04	9.56*	1652	[7.75]
Myrtenal	7.35*	1192	[6.04]	8.44	1561	0.06
cis-Piperitol	7.35*	1192	[6.04]	9.34	1633	0.04
Unknown [m/z 121, 43 (99), 91 (85), 77 (73), 93 (41), 136 (33)... 166 (3)]	7.41*	1195	0.18			
Myrtenol	7.41*	1195	[0.18]	10.60	1739	0.14
Verbenone	7.54	1203	0.04	9.41*	1639	0.20
trans-Piperitol	7.59	1207	0.08	10.12	1698	0.09
Pin-2-en-8-ol	7.63	1209	0.02	10.76	1753	0.03
endo-Fenchyl acetate	7.77	1219	0.30	6.62*	1421	0.30

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exo-2-Hydroxycineole	7.80	1221	0.02	11.39	1806	0.02
Bornyl formate	7.85	1224	0.02	7.84*	1514	[0.31]
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	8.01	1235	0.04	11.07	1779	0.03
Unknown [m/z 43, 109 (63), 71 (50), 81 (31), 55 (29), 85 (26)...]	8.22	1248	0.05	9.44	1642	0.04
trans-Ascaridole glycol	8.50	1267	0.04	13.87	2035	0.05
Unknown [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	8.68	1279	0.03	12.14	1874	0.04
cis-Ascaridole glycol	8.79	1287	0.07	14.51	2098	0.05
Pelargonic acid?	8.85	1290	0.02	14.68	2114	0.06
Unknown [m/z 43, 93 (66), 91 (44), 41 (38), 69 (35)... 152? (1)]	9.00	1301	0.07			
para-Menth-5-en-1,2-diol isomer II	9.07	1306	0.02	14.18	2066	0.02
Unknown [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	9.26	1319	0.05	14.73	2120	0.12
α-Cubebene	9.68	1349	0.06	6.62*	1421	[0.30]
Cyclosativene II	9.86	1362	0.02	6.80	1435	0.03
α-Ylangene	9.97	1369	0.04	6.91	1443	0.04
α-Copaene	10.04	1374	0.33	7.02	1452	0.30
β-Bourbonene	10.15	1381	0.07	7.34	1476	0.07
Unknown [m/z 125, 82 (78), 43 (68), 97 (45), 71 (28), 41 (27), 124 (26)...]	10.24	1388	0.02			
α-Funebrene	10.31	1393	0.02	7.69*	1502	[2.41]
Italicene	10.36	1396	0.01	7.60	1496	0.08
β-Caryophyllene	10.62	1415	0.56	8.28*†	1548	[0.85]
β-Copaene	10.76	1425	0.05	8.19*	1541	[18.48]
trans-α-Bergamotene	10.89	1435	0.04	8.26†	1547	0.85
α-Humulene	11.07	1449	0.03	9.10	1613	0.04
allo-Aromadendrene	11.17	1456	0.33	8.83	1592	0.33
γ-Muurolene	11.41	1474	0.16	9.41*	1639	[0.20]
γ-Curcumene	11.48*	1479	0.55	9.56*	1652	[7.75]
β-Selinene	11.48*	1479	[0.55]	9.68	1661	0.09

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ar-Curcumene	11.52	1482	0.69	10.46	1726	0.65
Unknown [m/z 43, 59 (83), 109 (67), 79 (56), 93 (54), 41 (49), 95 (45)...]	11.64	1491	0.08			
α-Muurolene	11.73	1498	0.05	9.85	1675	0.06
γ-Cadinene	11.90	1511	0.16	10.20	1704	0.11
δ-Cadinene	12.03	1521	0.20	10.23	1706	0.22
α-Calacorene	12.20	1534	0.01	11.85	1848	0.04
Isocaryophyllene epoxide B	12.35	1546	0.01	11.93	1855	0.01
Spathulenol	12.68	1572	0.02	14.14	2062	0.02
Caryophyllene oxide	12.73	1576	0.13	12.52	1908	0.22
Unknown [m/z 93, 92 (67), 91 (32), 43 (24), 77 (22)...]	13.15	1609	0.02			
τ-Cadinol	13.49	1637	0.04	14.64	2110	0.06
β-Eudesmol	13.57	1644	0.12	15.14	2160	0.11
α-Cadinol	13.62	1647	0.02	15.22	2169	0.02
Unknown [m/z 109, 138 (71), 82 (42), 123 (41), 127 (38)...]	14.90	1756	0.04	18.83	2562	0.02
trans-Bisabola-1(6),10-diene-2,3-diol	15.16	1778	0.08	19.24	2610	0.04
Unknown [m/z 43, 82 (69), 41 (66), 93 (62), 96 (55), 55 (49), 67 (45), 154 (44)...]	15.46	1804	0.03			
Total identified	**97.79%**			**97.25%**		
Total reported	**98.27%**			**97.53%**		

*: 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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