Date : February 03, 2021

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 21A29-PTH10
Customer identification : Frank Serrata ORGANIC - F50107810R
Type : Essential oil
Source : *Boswellia serrata*
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
Analysis date : January 31, 2021

Checked and approved by :

Sylvain Mercier, M. Sc., chimiste 2014-005

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

This report is an update of the version first issued on February 01, 2021 to correct a mistake in the customer identification.

Méthode certifiée ISO 17025:2017 Certified method

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4588 ± 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
(*E*)-2-Methyl-1,3-pentadiene	0.01	Alkene
Toluene	0.01	Simple phenolic
Unknown	0.02	Unknown
Hashishene	0.08	Monoterpene
Tricyclene	tr	Monoterpene
α-Thujene	69.46	Monoterpene
α-Pinene	5.68	Monoterpene
Unknown	0.33	Monoterpene
Camphene	0.07	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
meta-Cymene	0.02	Monoterpene
Sabinene	5.67	Monoterpene
β-Pinene	0.35	Monoterpene
Pseudolimonene isomer	0.01	Monoterpene
Myrcene	1.02	Monoterpene
α-Phellandrene	3.06	Monoterpene
Δ3-Carene	4.06	Monoterpene
α-Terpinene	0.32	Monoterpene
ortho-Cymene	0.06	Monoterpene
para-Cymene	1.29	Monoterpene
Unknown	0.12	Unknown
β-Phellandrene	0.64*	Monoterpene
1,8-Cineole	[0.64]*	Monoterpenic ether
Limonene	1.70	Monoterpene
(*Z*)-β-Ocimene	0.58	Monoterpene
Unknown	0.05	Unknown
(*E*)-β-Ocimene	0.26	Monoterpene
Unknown	0.02	Unknown
γ-Terpinene	0.59	Monoterpene
cis-Sabinene hydrate	0.03	Monoterpenic alcohol
Isoterpinolene	0.02	Monoterpene
Terpinolene	0.25	Monoterpene
para-Cymenene	0.01	Monoterpene
trans-Sabinene hydrate	0.03	Monoterpenic alcohol
Linalool	0.09	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
β-Thujone	0.11	Monoterpenic ketone
cis-para-Menth-2-en-1-ol	0.04	Monoterpenic alcohol
allo-Ocimene	0.03	Monoterpene
trans-para-Menth-2-en-1-ol	0.04	Monoterpenic alcohol
trans-Verbenol	0.01	Monoterpenic alcohol
para-Menth-3-en-8-ol	0.02	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Borneol	0.03	Monoterpenic alcohol
cis-Sabinol	0.04	Monoterpenic alcohol

Umbellulone	0.01	Monoterpenic ketone
Terpinen-4-ol	0.27	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	0.03	Monoterpenic alcohol
Methylchavicol	1.34	Phenylpropanoid
cis-α-Phellandrene epoxide (IPP vs Me)	0.02	Monoterpenic ether
Verbenone	0.02	Monoterpenic ketone
Unknown	0.04	Unknown
Linalyl acetate	0.03	Monoterpenic ester
Unknown	0.02	Oxygenated monoterpene
Bornyl acetate	0.03	Monoterpenic ester
Carvacrol	0.02	Monoterpenic alcohol
α-Terpinyl acetate	0.03	Monoterpenic ester
α-Ylangene	0.02	Sesquiterpene
α-Copaene	0.08	Sesquiterpene
β-Bourbonene	0.32	Sesquiterpene
1,5-diepi-β-Bourbonene	0.03	Sesquiterpene
β-Elemene	0.02	Sesquiterpene
Unknown	0.03	Unknown
β-Longipinene	0.01	Sesquiterpene
Methyleugenol	0.07	Phenylpropanoid
β-Caryophyllene	tr	Sesquiterpene
β-Ylangene	0.02	Sesquiterpene
β-Copaene	0.05	Sesquiterpene
trans-α-Bergamotene	0.04	Sesquiterpene
Isogermacrene D	0.03	Sesquiterpene
cis-Muurola-4(15),5-diene	0.01	Sesquiterpene
γ-Muurolene	0.03	Sesquiterpene
Germacrene D	0.19	Sesquiterpene
Unknown	0.10	Sesquiterpene
Bicyclogermacrene	0.02	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
δ-Cadinene	0.12	Sesquiterpene
Elemicin	0.02	Phenylpropanoid
4,10-diepi-Guaiol	0.01	Sesquiterpenic alcohol
α-Phellandrene dimer II	0.03	Diterpene
α-Phellandrene dimer III	0.01	Diterpene
(3*E*)-Cembrene A	0.02	Diterpene
Cembrenol	0.01	Diterpenic alcohol
Serratol	0.05	Diterpenic alcohol
Consolidated total	**99.49%**	

*: 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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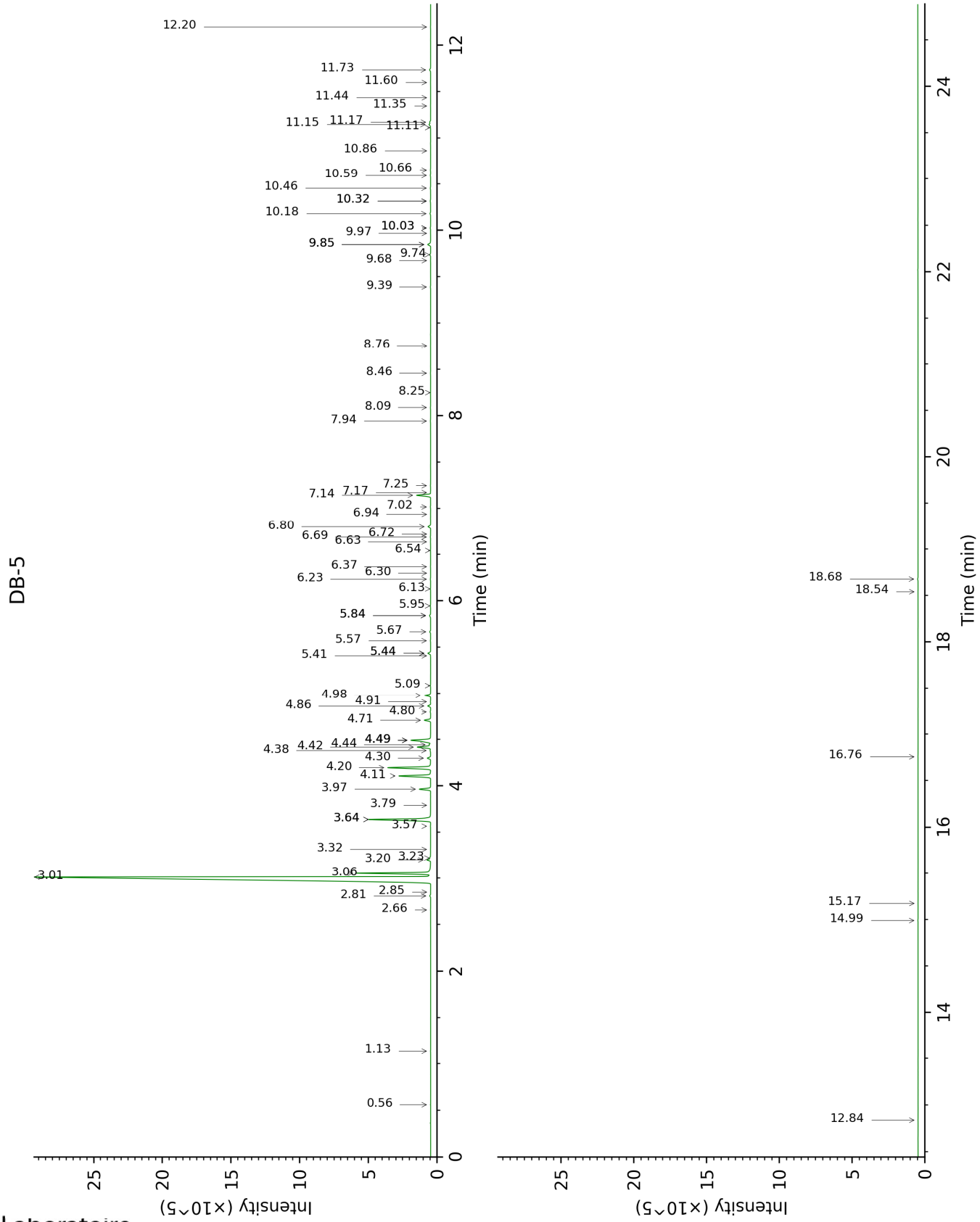
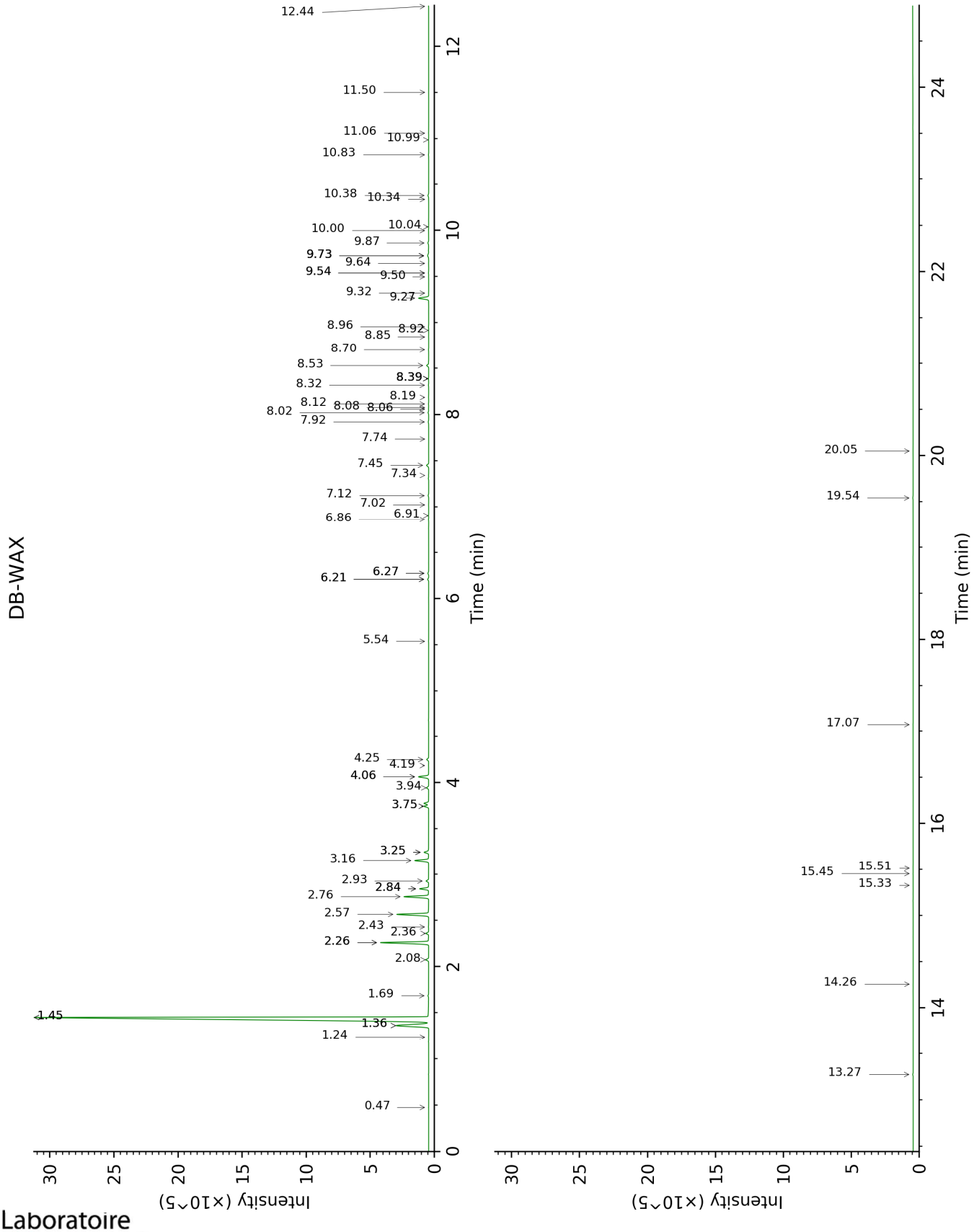

DB-5
12.20
11.73
11.60
11.44
11.35
11.15
11.17
11.11
10.86
10.59
10.66
10.46
10.32
10.18
9.97
10.03
9.85
9.68
9.74
9.39
8.76
8.46
8.25
8.09
7.94
7.14
7.17
7.25
6.94
7.02
6.80
6.69
6.63
6.72
6.54
6.37
6.23
6.30
6.13
5.95
5.84
5.67
5.57
5.41
5.44
5.09
4.86
4.98
4.91
4.80
4.71
4.38
4.42
4.44
4.49
4.30
4.20
4.11
3.97
3.79
3.64
3.57
3.32
3.20
3.23
3.01
3.06
2.81
2.85
2.66
1.13
0.56
Time (min)
Intensity (×10^5)
18.68
18.54
16.76
15.17
14.99
12.84
Time (min)
Intensity (×10^5)


DB-WAX
12.44
11.50
11.06
10.99
10.83
10.38
10.34
10.00
10.04
9.87
9.73
9.64
9.54
9.50
9.32
9.27
8.96
8.92
8.85
8.70
8.53
8.39
8.32
8.19
8.12
8.08
8.06
8.02
7.92
7.74
7.45
7.34
7.12
7.02
6.91
6.86
6.27
6.21
5.54
4.25
4.19
4.06
3.94
3.75
3.25
3.16
2.93
2.84
2.76
2.57
2.43
2.36
2.26
2.08
1.69
1.45
1.36
1.24
0.47
20.05
19.54
17.07
15.51
15.45
15.33
14.26
13.27
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
(*E*)-2-Methyl-1,3-pentadiene	0.56	626	0.01	0.48	764	0.01
Toluene	1.13	763	0.01	1.45*†	1004	[75.61]
Unknown [m/z 93, 91 (72), 121 (58), 77 (49), 79 (41), 43 (22), 105 (20),107 (20), 41 (18), 136 (17), 92 (17)]	2.66	906	0.02			
Hashishene	2.81	916	0.08	1.36*†	993	75.61
Tricyclene	2.85	918	tr	1.24	972	0.01
α-Thujene	3.01	929	69.46	1.45*†	1004	[75.61]
α-Pinene	3.06	932	5.68	1.36*†	993	[75.61]
Unknown [m/z 91, 92 (47), 65 (11)... 134 (1)]	3.20†	941	0.40	2.36	1094	0.33
Camphene	3.22†	943	[0.40]	1.69	1028	0.07
Thuja-2,4(10)-diene	3.32	949	0.01	2.26*	1084	5.67
meta-Cymene	3.57	965	0.02	2.84*	1134	1.04
Sabinene	3.64*	970	6.13	2.26*	1084	[5.67]
β-Pinene	3.64*	970	[6.13]	2.08	1066	0.35
Pseudolimonene isomer	3.79	980	0.01	2.43	1101	0.03
Myrcene	3.97	992	1.02	2.84*	1134	[1.04]
α-Phellandrene	4.11	1001	3.06	2.76	1127	2.95
Δ3-Carene	4.20	1007	4.06	2.57	1112	3.84
α-Terpinene	4.30	1013	0.32	2.93	1140	0.31
ortho-Cymene	4.38	1018	0.06	4.06*	1228	1.33
para-Cymene	4.42	1021	1.29	4.06*	1228	[1.33]
Unknown [m/z 109, 43 (58), 95 (26)... 137 (15)...]	4.44	1022	0.12	6.21*	1382	0.14
β-Phellandrene	4.49*	1025	2.34	3.25*	1165	0.58
1,8-Cineole	4.49*	1025	[2.34]	3.25*	1165	[0.58]
Limonene	4.49*	1025	[2.34]	3.16	1158	1.70
(*Z*)-β-Ocimene	4.71	1039	0.58	3.74*†	1204	1.16
Unknown [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	4.80	1044	0.05			
(*E*)-β-Ocimene	4.86	1048	0.26	3.94	1219	0.27
Unknown [m/z 109 , 45 (67), 41 (40), 67 (39), 81 (33), 79 (27), 95 (24), 91	4.91	1051	0.02	6.91	1433	0.02

(23), 82 (21), 55 (21), 93 (20)...]						
γ-Terpinene	4.98	1056	0.59	3.74*†	1204	[1.16]
cis-Sabinene hydrate	5.09	1063	0.03	6.86	1430	0.03
Isoterpinolene	5.41†	1083	0.28	4.19	1237	0.02
Terpinolene	5.44*†	1085	[0.28]	4.25	1241	0.25
para-Cymenene	5.44*†	1085	[0.28]	6.27*	1387	0.12
trans-Sabinene hydrate	5.57	1093	0.03	7.92	1509	0.08
Linalool	5.67	1100	0.09	8.02	1517	0.08
Unknown [m/z 109, 81 (54), 91 (32), 79 (22)...]	5.84*	1111	0.14	6.21*	1382	[0.14]
β-Thujone	5.84*	1111	[0.14]	6.27*	1387	[0.12]
cis-para-Menth-2-en-1-ol	5.95	1118	0.04	8.06	1520	0.03
allo-Ocimene	6.13	1129	0.03	5.54	1334	0.02
trans-para-Menth-2-en-1-ol	6.23	1136	0.04	8.92	1587	0.01
trans-Verbenol	6.30	1140	0.01	9.50	1634	0.02
para-Menth-3-en-8-ol	6.37	1145	0.02	8.70	1570	0.03
Unknown [m/z 109, 43 (75), 137 (46), 67 (31), 93 (25)... 152 (4)]	6.54	1156	0.02			
Borneol	6.64	1162	0.03	9.73*	1652	0.23
cis-Sabinol	6.69	1166	0.04	10.83	1743	0.04
Umbellulone	6.72	1168	0.01	8.85	1582	0.02
Terpinen-4-ol	6.80	1173	0.27	8.53	1557	0.28
para-Cymen-8-ol	6.94	1182	0.01	11.50	1801	0.01
α-Terpineol	7.02	1188	0.03	9.73*	1652	[0.23]
Methylchavicol	7.14	1196	1.34	9.27	1615	1.37
cis-α-Phellandrene epoxide (IPP vs Me)	7.17	1198	0.02	10.99	1757	0.03
Verbenone	7.25	1203	0.02	9.54*	1637	0.04
Unknown [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]	7.94	1251	0.04	11.06	1763	0.03
Linalyl acetate	8.09	1261	0.03	8.12	1524	0.03
Unknown [m/z 109, 41 (22), 81 (14), 43 (11)... 152 (4)]	8.25	1272	0.02			
Bornyl acetate	8.46	1286	0.03	8.19	1530	0.03
Carvacrol	8.76	1308	0.02	15.33	2158	0.02
α-Terpinyl acetate	9.39	1347	0.03	9.64	1645	0.03
α-Ylangene	9.68	1367	0.02	7.02	1442	0.02
α-Copaene	9.74	1372	0.08	7.12	1450	0.08

β-Bourbonene	9.85*	1379	0.34	7.45	1474	0.32
1,5-diepi-β-Bourbonene	9.85*	1379	[0.34]	7.34	1466	0.03
β-Elemene	9.97	1388	0.02	8.39*	1546	0.06
Unknown [m/z 71, 100 (92), 111 (79), 69 (46), 109 (45)...]	10.03*	1392	0.04	17.07	2339	0.03
β-Longipinene	10.03*	1392	[0.04]	7.74	1495	0.01
Methyleugenol	10.18	1403	0.07	13.27	1960	0.06
β-Caryophyllene	10.32*	1413	0.06	8.39*	1546	[0.06]
β-Ylangene	10.32*	1413	[0.06]	8.08	1521	0.02
β-Copaene	10.46	1423	0.05	8.32	1540	0.05
trans-α-Bergamotene	10.59	1434	0.04	8.39*	1546	[0.06]
Isogermacrene D	10.66	1438	0.03	8.96	1590	0.04
cis-Muurola-4(15),5-diene	10.86	1454	0.01	9.32	1619	0.02
γ-Muurolene	11.11	1472	0.03	9.54*	1637	[0.04]
Germacrene D	11.15	1475	0.19	9.73*	1652	[0.23]
Unknown [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	11.17	1477	0.10	9.86	1663	0.15
Bicyclogermacrene	11.35	1490	0.02	10.04	1678	0.02
α-Muurolene	11.44	1496	0.01	10.00	1674	0.03
γ-Cadinene	11.60	1509	0.02	10.34	1702	0.01
δ-Cadinene	11.74	1520	0.12	10.38	1705	0.12
Elemicin	12.20	1556	0.02	15.45	2171	0.02
4,10-diepi-Guaiol	12.84	1607	0.01	14.26	2053	0.01
α-Phellandrene dimer II	14.99	1788	0.03	12.44	1884	0.03
α-Phellandrene dimer III	15.17	1804	0.01			
(3*E*)-Cembrene A	16.76	1951	0.02	15.51	2177	0.02
Cembrenol	18.54	2126	0.01	20.05	2678	0.01
Serratol	18.68	2141	0.05	19.54	2617	0.05
Total identified		**98.86%**			**98.95%**	
Total reported		**99.65%**			**99.50%**	

*: 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