

Date : March 01, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22B22-PTH02

Customer identification : Juniper Berry ORGANIC - Hungary - J501052111R

Type : Essential oil

Source : *Juniperus communis*

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-014  - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Pamela Lavoie, M.Sc., Chimiste

Analysis date : February 28, 2022

Checked and approved by :

Alexis St-Gelais, Ph. D., Chimiste 2013-174

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4746 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
3-Methylfuran	tr	Furan
Toluene	tr	Simple phenolic
Tricyclene	0.10	Monoterpene
α -Thujene	1.30	Monoterpene
α -Pinene	34.03	Monoterpene
α -Fenchene	0.12	Monoterpene
Camphene	0.70	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.01	Monoterpene
Sabinene	14.71	Monoterpene
β -Pinene	4.92	Monoterpene
Unknown	0.03	Monoterpene
Octen-3-ol	0.01	Aliphatic alcohol
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
Myrcene	6.14	Monoterpene
3-para-Menthene?	0.02	Monoterpene
2-Carene	0.01	Monoterpene
Pseudolimonene	0.07	Monoterpene
Menthatriene isomer I	0.01	Monoterpene
α -Phellandrene	0.16	Monoterpene
Δ 3-Carene	0.10	Monoterpene
α -Terpinene	2.26	Monoterpene
meta-Cymene	0.03	Monoterpene
para-Cymene	1.93	Monoterpene
Limonene	4.53	Monoterpene
1,8-Cineole	0.39	Monoterpenic ether
(Z)- β -Ocimene	0.01	Monoterpene
(E)- β -Ocimene	0.03	Monoterpene
γ -Terpinene	5.15	Monoterpene
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
Unknown	0.03	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Fenchone	0.01	Monoterpenic ketone
Terpinolene	0.69	Monoterpene
trans-Linalool oxide (fur.)	tr	Monoterpenic alcohol
para-Cymenene	0.08	Monoterpene
α -Pinene oxide	0.01	Monoterpenic ether
6,7-Epoxyterpinene	0.01	Monoterpenic ether
trans-Sabinene hydrate	0.02	Monoterpenic alcohol
Perillene	tr	Monoterpenic ether
Linalool	0.03	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
endo-Fenchol	0.01	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.04	Monoterpenic alcohol
α -Campholenal	0.02	Monoterpenic aldehyde

<i>cis</i> -Limonene oxide	0.01	Monoterpenic ether
<i>trans</i> -Pinocarveol	0.04	Monoterpenic alcohol
Camphor	0.02	Monoterpenic ketone
<i>cis</i> -Verbenol	0.02	Monoterpenic alcohol
<i>trans</i> -Verbenol	0.03	Monoterpenic alcohol
Camphene hydrate	0.02	Monoterpenic alcohol
Unknown	0.01	Unknown
Borneol	0.56	Monoterpenic alcohol
α -Phellandren-8-ol	0.02	Monoterpenic alcohol
Isopinocampone	0.01	Monoterpenic ketone
Terpinen-4-ol	4.43	Monoterpenic alcohol
<i>para</i> -Cymen-8-ol	0.03	Monoterpenic alcohol
α -Terpineol	2.21	Monoterpenic alcohol
Myrtenal	0.01	Monoterpenic aldehyde
Myrtenol	0.04	Monoterpenic alcohol
Verbenone	0.03	Monoterpenic ketone
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
Citronellol	0.04	Monoterpenic alcohol
Carvone	0.01	Monoterpenic ketone
Carvacrol methyl ether	0.01	Monoterpenic ether
Piperitone	0.03	Monoterpenic ketone
Methyl citronellate	0.02	Monoterpenic ester
Geranial	0.02	Monoterpenic aldehyde
Bornyl acetate	0.10	Monoterpenic ester
2-Undecanone	0.02	Aliphatic ketone
Terpinen-4-yl acetate	0.02	Monoterpenic ester
Thymol	0.01	Monoterpenic alcohol
Carvacrol	0.04	Monoterpenic alcohol
Myrtenyl acetate	0.02	Monoterpenic ester
Terpinyl acetate analog	0.02	Monoterpenic ester
α -Cubebene	0.13	Sesquiterpene
α -Terpinyl acetate	0.06	Monoterpenic ester
Citronellyl acetate	0.02	Monoterpenic ester
Cyclosativene I	0.01	Sesquiterpene
α -Ylangene	0.03	Sesquiterpene
α -Copaene	0.10	Sesquiterpene
<i>cis</i> - β -Elemene	0.03	Sesquiterpene
Geranyl acetate	0.04	Monoterpenic ester
β -Elemene	0.48	Sesquiterpene
β -Cubebene	0.03	Sesquiterpene
Longifolene	0.04	Sesquiterpene
α -Gurjunene	0.02	Sesquiterpene
β -Caryophyllene	1.31	Sesquiterpene
β -Copaene	0.06	Sesquiterpene
<i>cis</i> -Thujopsene	0.01	Sesquiterpene
γ -Elemene	0.27	Sesquiterpene
Aromadendrene	0.01	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.01	Sesquiterpene
6,9-Guaiadiene	0.02	Sesquiterpene
α -Himachalene	0.05	Sesquiterpene
α -Humulene	3.45	Sesquiterpene
allo-Aromadendrene	0.06	Sesquiterpene

(E)-β-Farnesene	0.20	Sesquiterpene
trans-Cadina-1(6),4-diene	0.01	Sesquiterpene
γ-Murolene	0.23	Sesquiterpene
Germacrene D	2.21	Sesquiterpene
β-Selinene	0.15	Sesquiterpene
γ-Amorphene	0.06	Sesquiterpene
Bicyclogermacrene	0.07	Sesquiterpene
α-Selinene	0.20	Sesquiterpene
α-Murolene	0.32	Sesquiterpene
Germacrene A	0.05	Sesquiterpene
γ-Cadinene	0.29	Sesquiterpene
δ-Cadinene	0.80	Sesquiterpene
trans-Calamenene	0.01	Sesquiterpene
Selina-4(15),7(11)-diene	0.11	Sesquiterpene
α-Cadinene	0.10	Sesquiterpene
Germacrene B	1.20	Sesquiterpene
Caryophyllenyl alcohol	0.02	Sesquiterpenic alcohol
Spathulenol	0.25	Sesquiterpenic alcohol
Caryophyllene oxide	0.03	Sesquiterpenic ether
Unknown	0.06	Oxygenated sesquiterpene
α-Cedrol	0.01	Sesquiterpenic alcohol
Humulene epoxide II	0.04	Sesquiterpenic ether
10-epi-Cubenol	0.04	Sesquiterpenic alcohol
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.02	Unknown
τ-Cadinol	0.09	Sesquiterpenic alcohol
τ-Murolol	0.06	Sesquiterpenic alcohol
α-Murolol	0.03	Sesquiterpenic alcohol
α-Cadinol	0.15	Sesquiterpenic alcohol
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	0.01	Sesquiterpenic alcohol
α-Bisabolol	0.11	Sesquiterpenic alcohol
Juniper camphor	0.04	Sesquiterpenic alcohol
Mayurone?	0.03	Norsesquiterpenic ketone
Aromadendrane-4,10-diol	0.01	Sesquiterpenic alcohol
Biformene?	0.03	Diterpene
meta-Camphorene	0.01	Diterpene
Trachylobane?	0.05	Diterpene
13-epi-Manoyl oxide	0.01	Diterpenic ether
Consolidated total	98.99%	

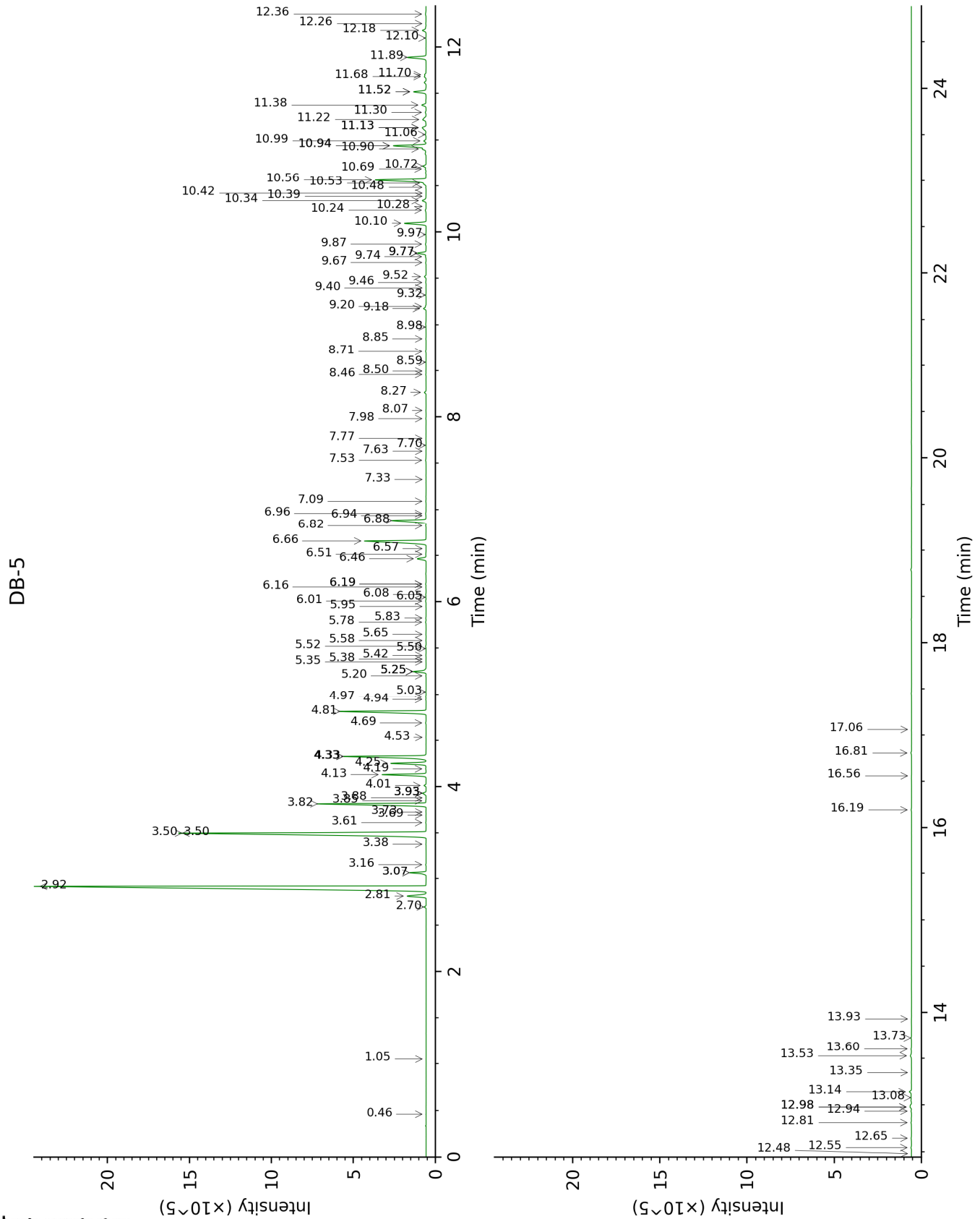
tr: The compound has been detected below 0.005% of total signal.

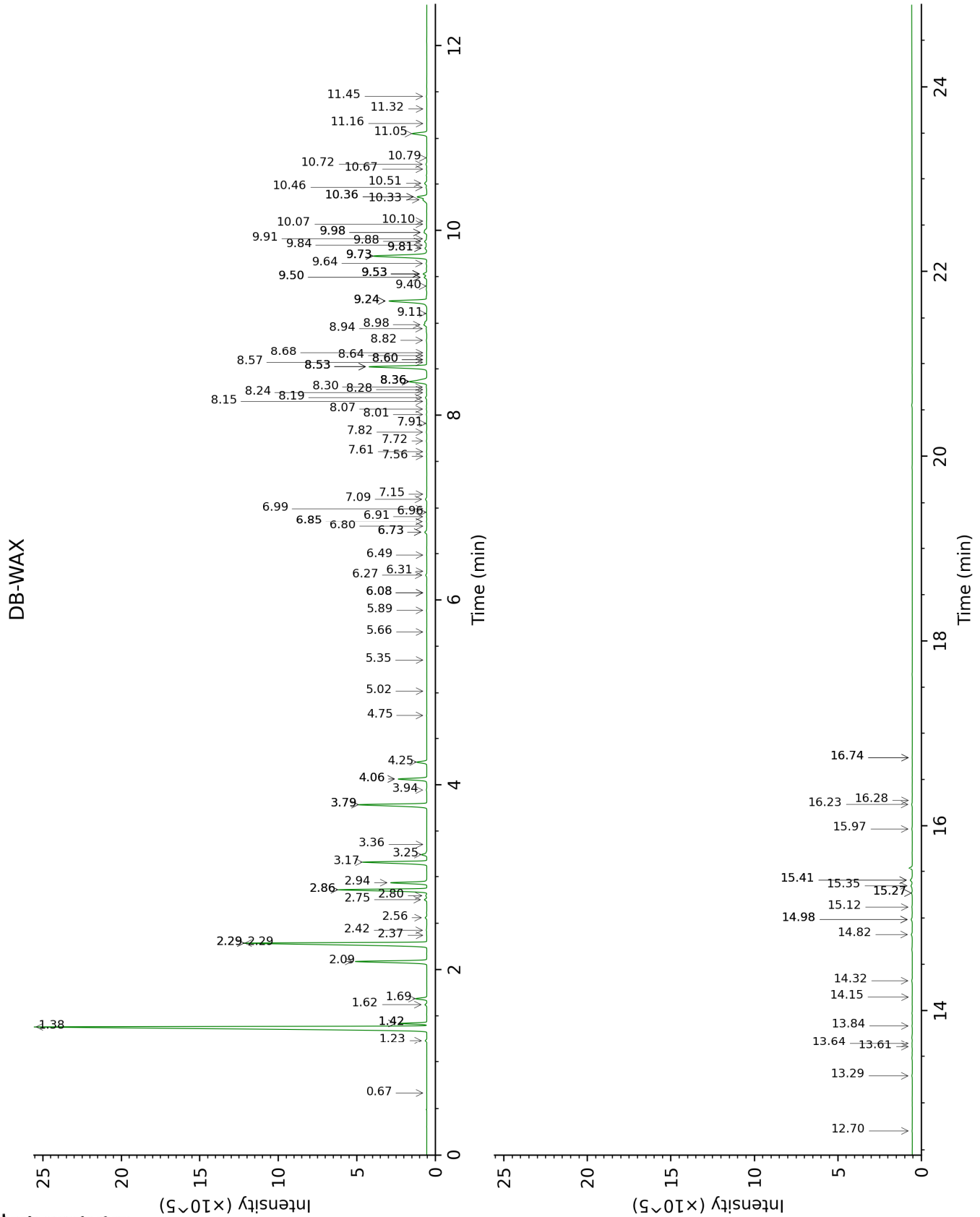
Note: no correction factor was applied

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.

This page was intentionally left blank. The following pages present the complete data of the analysis.





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
3-Methylfuran	0.46	606	tr	0.67	859	tr
Toluene	1.05	757	tr	1.42*	1002	1.32
Tricyclene	2.70	917	0.10	1.23	973	0.10
α -Thujene	2.81	925	1.30	1.42*	1002	[1.32]
α -Pinene	2.92	932	34.03	1.38	997	33.87
α -Fenchene	3.07*	942	0.82	1.62	1022	0.12
Camphene	3.07*	942	[0.82]	1.69	1028	0.70
Thuja-2,4(10)-diene	3.16	949	0.02	2.29*	1087	14.75
3,7,7-Trimethylcyclohepta-1,3,5-triene	3.38	964	0.01	2.86*	1135	6.14
Sabinene	3.50*	972	19.73	2.29*	1087	[14.75]
β -Pinene	3.50*	972	[19.73]	2.09	1068	4.92
Unknown [m/z 93, 79 (73), 67 (49), 95 (42), 91 (41), 121 (38)...]	3.61	979	0.03	2.42	1101	0.03
Octen-3-ol	3.70	985	0.01	6.73*	1421	0.18
6-Methyl-5-hepten-2-one	3.73	987	0.02	5.02	1300	0.01
Myrcene	3.82	993	6.14	2.86*	1135	[6.14]
3-para-Menthene?	3.85	995	0.02	2.29*	1087	[14.75]
2-Carene	3.88	998	0.01	2.37	1096	0.01
Pseudolimonene	3.93*	1001	0.23	2.80	1130	0.07
Menthatriene isomer I	3.93*	1001	[0.23]	3.36	1174	0.01
α -Phellandrene	3.93*	1001	[0.23]	2.76	1127	0.16
Δ 3-Carene	4.01	1006	0.10	2.56	1112	0.10
α -Terpinene	4.13	1014	2.26	2.94	1141	2.27
meta-Cymene	4.19	1018	0.03	4.06*	1228	1.97
para-Cymene	4.25	1022	1.93	4.06*	1228	[1.97]
Limonene	4.33*	1026	4.91	3.17	1159	4.53
1,8-Cineole	4.33*	1026	[4.91]	3.25	1166	0.39
(Z)- β -Ocimene	4.53	1039	0.01	3.79*	1208	5.17
(E)- β -Ocimene	4.69	1049	0.03	3.94	1220	0.03
γ -Terpinene	4.81	1057	5.15	3.79*	1208	[5.17]
cis-Sabinene hydrate	4.94	1065	0.02	6.85*	1430	0.02
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	4.97	1067	0.03	4.75	1279	0.02
cis-Linalool oxide (fur.)	5.03	1070	0.01	6.49	1403	0.02
Fenchone	5.20	1082	0.01	5.66	1344	0.01
Terpinolene	5.25*	1084	0.75	4.25	1242	0.69
trans-Linalool oxide (fur.)	5.25*	1084	[0.75]	6.85*	1430	[0.02]
para-Cymenene	5.25*	1084	[0.75]	6.27	1388	0.08
α -Pinene oxide	5.35	1091	0.01	5.35	1322	0.01

6,7-Epoxyterpinene	5.38	1093	0.01	6.08*	1374	0.01
<i>trans</i> -Sabinene hydrate	5.42	1096	0.02	7.82	1502	0.04
Perillene	5.50	1100	tr	6.08*	1374	[0.01]
Linalool	5.52	1102	0.03	8.01	1517	0.03
Nonanal	5.58	1106	0.01	5.89	1360	0.02
endo-Fenchol	5.65	1110	0.01	8.28	1538	0.01
<i>cis</i> -para-Menth-2-en-1-ol	5.78	1118	0.04	8.07	1521	0.03
α -Campholenal	5.83	1121	0.02	6.96	1438	0.02
<i>cis</i> -Limonene oxide	5.95	1129	0.01	6.31	1390	0.01
<i>trans</i> -Pinocarveol	6.01	1133	0.04	9.11	1602	0.03
Camphor	6.05	1136	0.02	7.15	1452	0.01
<i>cis</i> -Verbenol	6.08	1138	0.02	9.24*	1613	3.38
<i>trans</i> -Verbenol	6.16	1143	0.03	9.50*	1633	0.21
Camphene hydrate	6.19*	1145	0.03	8.36*	1544	1.82
Unknown [m/z 109, 124 (45), 119 (41), 43 (35), 91 (28), 95 (25)...]	6.19*	1145	[0.03]	6.80	1426	0.01
Borneol	6.46	1162	0.56	9.73*	1652	4.98
α -Phellandren-8-ol	6.51	1166	0.02	10.10	1683	0.02
Isopinocampone	6.57	1169	0.01	7.56	1482	0.02
Terpinen-4-ol	6.66	1175	4.43	8.52*	1557	4.48
para-Cymen-8-ol	6.82	1185	0.03	11.45	1797	0.03
α -Terpineol	6.88	1189	2.21	9.73*	1652	[4.98]
Myrtenal	6.94	1193	0.01	8.64	1566	0.01
Myrtenol	6.96	1194	0.04	10.79	1740	0.02
Verbenone	7.09	1203	0.03	9.53*	1636	0.29
<i>trans</i> -Carveol	7.33	1218	0.01	11.32	1786	0.01
Citronellol	7.53	1232	0.04	10.67	1730	0.02
Carvone	7.63	1239	0.01	9.91	1667	0.03
Carvacrol methyl ether	7.70	1243	0.01	8.52*	1557	[4.48]
Piperitone	7.77	1248	0.03	9.84†	1662	[0.22]
Methyl citronellate	7.98	1262	0.02	8.15	1528	0.02
Geranial	8.07	1268	0.02	10.07	1680	0.03
Bornyl acetate	8.26	1281	0.10	8.19	1531	0.11
2-Undecanone	8.46	1294	0.02	8.57	1560	0.03
Terpinen-4-yl acetate	8.50	1297	0.02	8.68	1568	0.02
Thymol	8.59	1303	0.01	14.98*	2127	0.11
Carvacrol	8.71	1311	0.04	15.27*	2156	0.05
Myrtenyl acetate	8.85	1321	0.02	9.53*	1636	[0.29]
Terpinyl acetate analog	8.98	1330	0.02	9.53*	1636	[0.29]
α -Cubebene	9.18†	1345	0.19	6.73*	1421	[0.18]
α -Terpinyl acetate	9.20†	1346	[0.19]	9.64	1646	0.06
Citronellyl acetate	9.32	1355	0.02	9.40	1626	0.04
Cyclosativene I	9.40	1360	0.01	6.91	1434	0.02
α -Ylangene	9.46	1364	0.03	6.99	1441	0.02
α -Copaene	9.52	1369	0.10	7.10	1448	0.10
<i>cis</i> - β -Elemene	9.67	1380	0.03	8.24	1535	0.03

Geranyl acetate	9.74	1384	0.04	10.46	1713	0.06
β-Elemene	9.77*	1387	0.51	8.36*	1544	[1.82]
β-Cubebene	9.77*	1387	[0.51]	7.72	1495	0.03
Longifolene	9.87	1394	0.04	7.91	1509	0.04
α-Gurjunene	9.97	1401	0.02	7.61	1486	0.02
β-Caryophyllene	10.10	1410	1.31	8.36*	1544	[1.82]
β-Copaene	10.24	1420	0.06	8.30	1540	0.05
cis-Thujopsene	10.28	1424	0.01	8.60*	1562	0.03
γ-Elemene	10.34	1428	0.27	8.98	1592	0.41
Aromadendrene	10.39	1432	0.01	8.52*	1557	[4.48]
trans-α-Bergamotene	10.42	1434	0.01	8.36*	1544	[1.82]
6,9-Guaiadiene	10.48	1439	0.02	8.60*	1562	[0.03]
α-Himachalene	10.53†	1442	3.50	8.82	1579	0.05
α-Humulene	10.56†	1445	[3.50]	9.24*	1613	[3.38]
allo-Aromadendrene	10.69	1454	0.06	8.94	1589	0.05
(E)-β-Farnesene	10.72	1456	0.20	9.50*	1633	[0.21]
trans-Cadina-1(6),4-diene	10.90†	1470	2.44	9.24*	1613	[3.38]
γ-Murolene	10.94*†	1473	[2.44]	9.53*	1636	[0.29]
Germacrene D	10.94*†	1473	[2.44]	9.73*	1652	[4.98]
β-Selinene	10.99	1477	0.15	9.81*†	1659	0.22
γ-Amorphene	11.06	1482	0.06	9.81*†	1659	[0.22]
Bicyclogermacrene	11.13*	1487	0.39	9.98*†	1673	0.39
α-Selinene	11.13*	1487	[0.39]	9.88	1665	0.20
α-Murolene	11.22	1494	0.32	9.98*†	1673	[0.39]
Germacrene A	11.30	1500	0.05	10.33†	1701	1.16
γ-Cadinene	11.38	1506	0.29	10.36*†	1704	[1.16]
δ-Cadinene	11.52*	1517	0.81	10.36*†	1704	[1.16]
trans-Calamenene	11.52*	1517	[0.81]	11.16	1772	0.01
Selina-4(15),7(11)-diene	11.68	1530	0.11	10.51	1716	0.20
α-Cadinene	11.70	1532	0.10	10.72	1735	0.06
Germacrene B	11.89	1546	1.20	11.05	1763	1.19
Caryophyllenyl alcohol	12.10	1562	0.02	13.61	1992	0.03
Spathulenol	12.18	1569	0.25	14.32	2062	0.05
Caryophyllene oxide	12.26	1575	0.03	12.70	1908	0.02
Unknown [m/z 159, 83 (88), 55 (53), 93 (50), 121 (48)... 220 (9)]	12.36	1583	0.06			
α-Cedrol	12.48	1592	0.01	14.15	2045	0.01
Humulene epoxide II	12.55	1598	0.04	13.29	1963	0.03
10-epi-Cubenol	12.65	1606	0.04	13.64	1996	0.03
Unknown [m/z 119, 121 (64), 105 (57), 93 (55), 161 (52)... 218 (25)]	12.81	1620	0.04			
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	12.94	1630	0.02	13.84	2014	0.03

τ-Cadinol	12.98*	1633	0.15	14.82	2111	0.09
τ-Muurolol	12.98*	1633	[0.15]	14.98*	2127	[0.11]
α-Muurolol	13.08	1642	0.03	15.12	2141	0.03
α-Cadinol	13.14	1647	0.15	15.41*	2170	0.18
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.35	1664	0.01	16.74*	2309	0.02
α-Bisabolol	13.53	1679	0.11	15.35	2164	0.13
Juniper camphor	13.60	1685	0.04	15.97	2228	0.04
Mayurone?	13.73	1695	0.03			
Aromadendrane-4,10-diol	13.93	1713	0.01	16.74*	2309	[0.02]
Biformene?	16.19	1915	0.03	15.41*	2170	[0.18]
meta-Camphorene	16.56	1950	0.01	15.27*	2156	[0.05]
Trachylobane?	16.81	1973	0.05	16.23	2256	0.05
13-epi-Manoyl oxide	17.06	1997	0.01	16.28	2260	0.01
Total identified		99.00%			98.72%	
Total reported		99.18%			98.81%	

*: 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