

Date : August 23, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22H16-PTH03

Customer identification : Tea Tree (BUY ATTIA) - Australia - T20113R

Type : Essential oil

Source : *Melaleuca alternifolia* ct. Terpinen-4-ol (Tea Tree)

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 : Amélie Simard, Analyste

Analysis date : August 18, 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: 1.4778 ± 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
Isobutyral	0.05	Aliphatic aldehyde
Ethyl acetate	tr	Aliphatic ester
Isobutanol	tr	Aliphatic alcohol
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	0.02	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
(3Z)-Hexenol	0.11	Aliphatic alcohol
Hexanol	tr	Aliphatic alcohol
α -Thujene	0.90	Monoterpene
α -Pinene	2.31	Monoterpene
Camphene	0.01	Monoterpene
α -Fenchene	0.01	Monoterpene
β -Pinene	0.69	Monoterpene
Sabinene	0.49	Monoterpene
Octen-3-ol	tr	Aliphatic alcohol
Myrcene	0.84	Monoterpene
α -Phellandrene	0.47	Monoterpene
Pseudolimonene	0.01	Monoterpene
(3Z)-Hexenyl acetate	0.01	Aliphatic ester
α -Terpinene	10.32	Monoterpene
Carvomenthene	tr	Aliphatic alcohol
para-Cymene	1.60	Monoterpene
Limonene	0.75	Monoterpene
1,8-Cineole	1.44	Monoterpenic ether
β -Phellandrene	0.87	Monoterpene
(Z)- β -Ocimene	tr	Monoterpene
(E)- β -Ocimene	0.01	Monoterpene
γ -Terpinene	20.57	Monoterpene
cis-Sabinene hydrate	0.08	Monoterpenic alcohol
Terpinolene	3.55	Monoterpene
para-Cymenene	tr	Monoterpene
trans-Sabinene hydrate	0.16	Monoterpenic alcohol
Linalool	0.06	Monoterpenic alcohol
endo-Fenchol	0.01	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.38	Monoterpenic alcohol
Cosmene isomer I	0.01	Monoterpene
trans-Pinocarveol	0.01	Monoterpenic alcohol
Camphor	tr	Monoterpenic ketone
trans-para-Menth-2-en-1-ol	0.15	Monoterpenic alcohol
Unknown	tr	Oxygenated monoterpene
Unknown	0.02	Unknown
Borneol	tr	Monoterpenic alcohol
δ -Terpineol	0.01	Monoterpenic alcohol
Terpinen-4-ol	41.18	Monoterpenic alcohol

Dill ether	0.01	Monoterpenic ether
para-Cymen-8-ol	0.03	Monoterpenic alcohol
α -Terpineol	2.93	Monoterpenic alcohol
<i>cis</i> -Piperitol	0.09	Monoterpenic alcohol
<i>trans</i> -Piperitol	0.16	Monoterpenic alcohol
endo-Fenchyl acetate	tr	Monoterpenic ester
exo-2-Hydroxycineole	0.01	Monoterpenic alcohol
<i>cis</i> -para-Mentha-1(7),8-dien-2-ol	tr	Monoterpenic alcohol
Nerol	0.02	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Piperitone	0.03	Monoterpenic ketone
<i>cis</i> -Carvenone oxide?	0.01	Monoterpenic ketone
<i>trans</i> -Ascaridole glycol	0.02	Monoterpenic alcohol
<i>cis</i> -Ascaridole glycol	0.01	Monoterpenic alcohol
Thymol	0.01	Monoterpenic alcohol
Carvacrol	tr	Monoterpenic alcohol
Unknown	0.02	Monoterpenic alcohol
Bicycloelemene	0.02	Sesquiterpene
α -Cubebene	0.05	Sesquiterpene
Unknown	0.01	Unknown
Isoledene	0.04	Sesquiterpene
α -Copaene	0.09	Sesquiterpene
7-Cubebene	0.04	Sesquiterpene
7-Cubebene epimer?	0.01	Aliphatic alcohol
β -Cubebene	0.01	Sesquiterpene
β -Elemene	0.03	Sesquiterpene
Unknown	0.02	Sesquiterpene
Methyleugenol	0.03	Phenylpropanoid
α -Gurjunene	0.29	Sesquiterpene
β -Maaliene	0.01	Sesquiterpene
β -Caryophyllene	0.31	Sesquiterpene
γ -Maaliene	0.05	Sesquiterpene
β -Gurjunene	0.02	Sesquiterpene
α -Maaliene	0.05	Sesquiterpene
Aromadendrene	0.77	Sesquiterpene
Selina-5,11-diene	0.12	Sesquiterpene
Cadina-3,5-diene isomer I?	0.11	Sesquiterpene
<i>trans</i> -Muurolo-3,5-diene	0.13	Sesquiterpene
α -Humulene	0.10	Sesquiterpene
allo-Aromadendrene	0.45	Sesquiterpene
Valerena-4,7(11)-diene	0.03	Sesquiterpene
γ -Gurjunene	0.04	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.30	Sesquiterpene
Selina-4,11-diene	0.04	Sesquiterpene
γ -Muurolole	0.01	Sesquiterpene
β -Selinene	0.08	Sesquiterpene
allo-Aromadendr-9-ene	0.08	Sesquiterpene
δ -Selinene	0.10	Sesquiterpene
α -Selinene	0.09	Sesquiterpene
Bicyclogermacrene	1.07	Sesquiterpene
Viridiflorene	0.75	Sesquiterpene
α -Muurolole	0.13	Sesquiterpene

γ -Cadinene	0.03	Sesquiterpene
<i>trans</i> -Calamenene	0.07	Sesquiterpene
δ -Cadinene	1.00	Sesquiterpene
Zonarene	0.26	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.17	Sesquiterpene
α -Calacorene	0.01	Sesquiterpene
Epiglobulol	0.06	Sesquiterpenic alcohol
Eudesma-5,7(11)-diene	0.02	Sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Palustrol	0.04	Sesquiterpenic alcohol
Spathulenol	0.05	Sesquiterpenic alcohol
Globulol	0.22	Sesquiterpenic alcohol
Gleenol	0.03	Sesquiterpenic alcohol
Viridiflorol	0.12	Sesquiterpenic alcohol
Cubeban-11-ol	0.09	Sesquiterpenic alcohol
Ledol	tr	Sesquiterpenic alcohol
Eudesm-5-en-11-ol analog	0.04	Sesquiterpenic alcohol
Rosifoliol	0.09	Sesquiterpenic alcohol
1-epi-Cubenol	0.14	Sesquiterpenic alcohol
Isospathulenol	0.04	Sesquiterpenic alcohol
Cubenol	0.09	Sesquiterpenic alcohol
α -Muurolol	0.03	Sesquiterpenic alcohol
α -Cadinol	0.01	Sesquiterpenic alcohol
Consolidated total	98.63%	

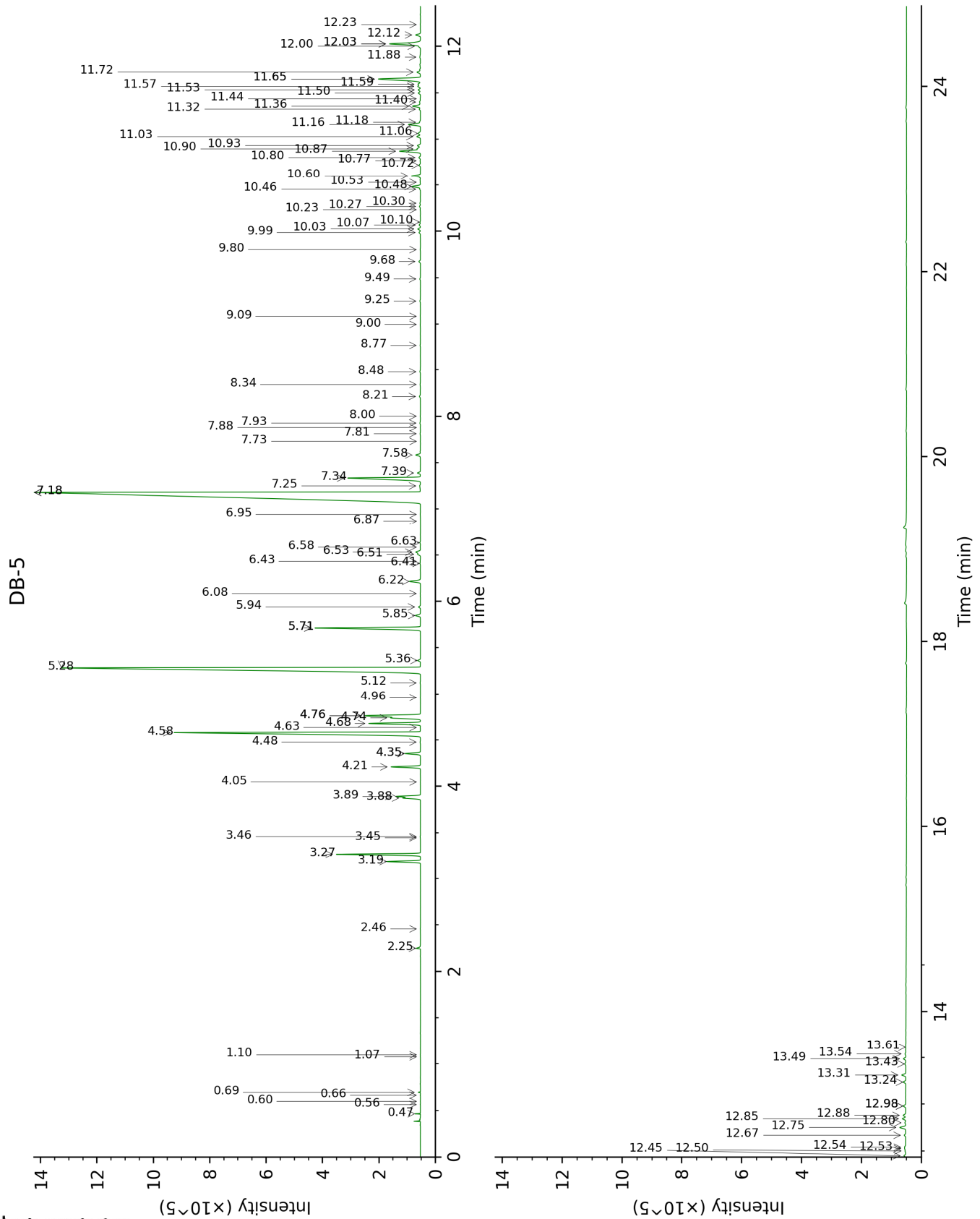
tr: The compound has been detected below 0.005% of total signal.

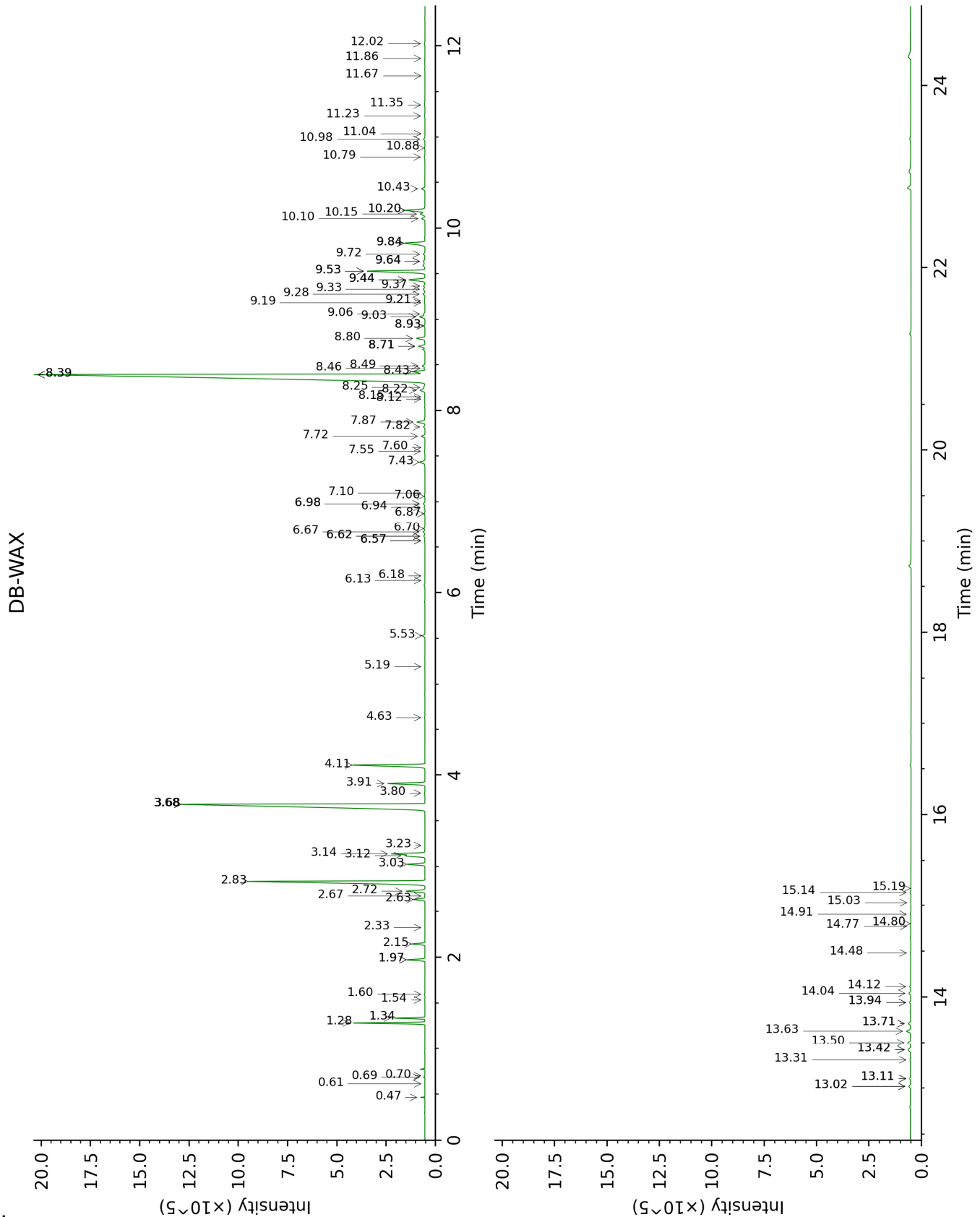
Note: no correction factor was applied

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	%
Isobutyral	0.46	540	0.05	0.47	780	0.05
Ethyl acetate	0.56	610	tr	0.61	850	tr
Isobutanol	0.60	621	tr	1.97*	1065	0.70
Isovaleral	0.66	642	tr	0.70	883	tr
2-Methylbutyral	0.69	652	0.02	0.69	877	0.02
Isoamyl alcohol	1.07	733	tr			
2-Methylbutanol	1.10	736	tr	3.23	1173	tr
(3Z)-Hexenol	2.25	856	0.11	5.53	1340	0.13
Hexanol	2.46	873	tr	5.19	1316	0.01
α -Thujene	3.19	927	0.90	1.34	1000	0.90
α -Pinene	3.27	932	2.31	1.28	991	2.30
Camphene	3.45†	943	0.01	1.60	1028	0.01
α -Fenchene	3.46†	944	[0.01]	1.54	1022	0.01
β -Pinene	3.88†	972	1.18	1.97*	1065	[0.70]
Sabinene	3.89†	972	[1.18]	2.15	1083	0.49
Octen-3-ol	4.05	983	tr	6.57*	1417	0.02
Myrcene	4.21	993	0.84	2.72	1133	0.85
α -Phellandrene	4.35*	1003	0.47	2.63	1126	0.47
Pseudolimonene	4.35*	1003	[0.47]	2.67	1129	0.01
(3Z)-Hexenyl acetate	4.48	1010	0.01	4.63	1279	0.02
α -Terpinene	4.58	1017	10.32	2.83	1141	10.28
Carvomenthene	4.64	1020	tr	2.33	1100	tr
para-Cymene	4.68	1023	1.60	3.91	1225	1.60
Limonene	4.74†	1027	3.06	3.03	1157	0.75
1,8-Cineole	4.76*†	1028	[3.06]	3.14	1166	1.44
β -Phellandrene	4.76*†	1028	[3.06]	3.12	1164	0.87
(Z)- β -Ocimene	4.96	1041	tr	3.68*	1209	20.48
(E)- β -Ocimene	5.12	1051	0.01	3.80	1218	0.02
γ -Terpinene	5.28	1061	20.57	3.68*	1209	[20.48]
cis-Sabinene hydrate	5.36	1066	0.08	6.67	1424	0.09
Terpinolene	5.71*	1088	3.59	4.11	1240	3.55
para-Cymenene	5.71*	1088	[3.59]	6.14	1385	tr
trans-Sabinene hydrate	5.85	1096	0.16	7.72	1504	0.18
Linalool	5.94	1102	0.06	7.82	1512	0.06
endo-Fenchol	6.08	1111	0.01	8.12	1536	0.01
cis-para-Menth-2-en-1-ol	6.22	1119	0.38	7.87	1516	0.41
Cosmene isomer I	6.41	1131	0.01	6.18	1388	tr
trans-Pinocarveol	6.43	1133	0.01	8.93*	1600	0.05
Camphor	6.51†	1138	0.27	6.98*	1448	0.09
trans-para-Menth-2-en-1-ol	6.53†	1139	[0.27]	8.71*	1582	0.31
Unknown [m/z 109, 43 (73), 71 (54), 124 (51), 69]	6.58	1143	tr			

(37), 41 (35)...152 (5)]						
Unknown [m/z 109, 124 (45), 119 (41), 43 (35), 91 (28), 95 (25)...]	6.63	1146	0.02	6.62*	1421	0.06
Borneol	6.87	1161	tr	9.53*	1649	2.94
δ-Terpineol	6.94	1166	0.01	9.19	1620	0.01
Terpinen-4-ol	7.18*	1181	41.28	8.39*	1557	41.23
Dill ether	7.18*	1181	[41.28]	7.10	1457	0.01
para-Cymen-8-ol	7.25	1185	0.03	11.23	1793	0.03
α-Terpineol	7.34	1190	2.93	9.53*	1649	[2.94]
cis-Piperitol	7.39	1194	0.09	9.28	1628	0.10
trans-Piperitol	7.58	1206	0.16	10.10	1696	0.16
endo-Fenchyl acetate	7.73	1216	tr	6.57*	1417	[0.02]
exo-2-Hydroxycineole	7.81	1222	0.01	11.35	1803	0.02
cis-para-Mentha-1(7),8-dien-2-ol	7.88	1226	tr	11.67	1832	tr
Nerol	7.93	1229	0.02	10.79	1754	0.04
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	8.00	1234	0.01	11.04	1776	tr
Piperitone	8.22	1248	0.03	9.64*	1658	0.09
cis-Carvenone oxide?	8.34	1257	0.01			
trans-Ascaridole glycol	8.48	1266	0.02	13.94*	2042	0.06
cis-Ascaridole glycol	8.77	1286	0.01	14.48	2095	0.03
Thymol	9.00	1301	0.01	14.80	2126	tr
Carvacrol	9.09	1307	tr	15.03	2150	0.01
Unknown [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	9.25	1318	0.02	14.77	2124	0.01
Bicycloelemene	9.49	1335	0.02	6.87	1440	0.02
α-Cubebene	9.68	1348	0.05	6.62*	1421	[0.06]
Unknown [m/z 43, 95 (62), 107 (45), 110 (41), 55 (28), 67 (25)...]	9.80	1357	0.01	13.71*	2020	0.13
Isoledene	9.99	1370	0.04	6.70	1427	0.05
α-Copaene	10.03	1373	0.09	6.98*	1448	[0.09]
7-Cubebene	10.07	1376	0.04	6.94	1445	0.04
7-Cubebene epimer?	10.10	1378	0.01	7.06	1454	0.02
β-Cubebene	10.23	1388	0.01	7.60	1495	0.01
β-Elemene	10.27	1390	0.03	8.25	1546	0.07

Unknown [m/z 93, 122 (98), 161 (98), 107 (86), 95 (46), 105 (72)... 204 (34)]	10.30	1392	0.02			
Methyleugenol	10.46†	1403	0.32	13.10*	1963	0.04
α-Gurjunene	10.48†	1405	[0.32]	7.44	1483	0.29
β-Maaliene	10.53	1409	0.01	7.55	1492	0.03
β-Caryophyllene	10.60	1414	0.31	8.22	1544	0.31
γ-Maaliene	10.72	1423	0.05	8.39*	1557	[41.23]
β-Gurjunene	10.77	1426	0.02	8.15	1538	0.02
α-Maaliene	10.80	1429	0.05	8.46	1563	0.04
Aromadendrene	10.87	1434	0.77	8.42	1560	0.65
Selina-5,11-diene	10.90	1436	0.12	8.49	1565	0.13
Cadina-3,5-diene isomer I?	10.93	1438	0.11			
<i>trans</i> -Muurolo-3,5-diene	11.03	1446	0.13	8.71*	1582	[0.31]
α-Humulene	11.06	1448	0.10	9.06	1610	0.07
allo-Aromadendrene	11.16	1455	0.45	8.80	1589	0.44
Valerena-4,7(11)-diene	11.18	1457	0.03	8.71*	1582	[0.31]
γ-Gurjunene	11.32	1468	0.04	8.93*	1600	[0.05]
<i>trans</i> -Cadina-1(6),4-diene	11.36	1470	0.30	9.03	1608	0.28
Selina-4,11-diene	11.40	1473	0.04	9.21	1622	0.04
γ-Muurolole	11.44	1476	0.01	9.37	1636	0.07
β-Selinene	11.50	1480	0.08	9.64*	1658	[0.09]
allo-Aromadendrene	11.53	1483	0.08	9.33	1633	0.09
δ-Selinene	11.57	1486	0.10	9.44*	1641	0.85
α-Selinene	11.59	1488	0.09	9.72	1664	0.09
Bicyclogermacrene	11.65*	1492	1.92	9.84*	1674	1.21
Viridiflorene	11.65*	1492	[1.92]	9.44*	1641	[0.85]
α-Muurolole	11.72	1497	0.13	9.84*	1674	[1.21]
γ-Cadinene	11.88	1510	0.03	10.20*	1704	1.04
<i>trans</i> -Calamenene	12.00†	1519	1.33	10.98	1771	0.07
δ-Cadinene	12.03*†	1521	[1.33]	10.20*	1704	[1.04]
Zonarene	12.03*†	1521	[1.33]	10.15	1700	0.26
<i>trans</i> -Cadina-1,4-diene	12.12	1528	0.17	10.43	1724	0.17
α-Calacorene	12.24	1537	0.01	11.86	1849	0.01
Epiglobulol	12.45	1554	0.06	13.02*	1955	0.09
Eudesma-5,7(11)-diene	12.50	1558	0.02	10.88	1763	0.02
Unknown [m/z 161, 109 (98), 82 (93), 43 (72), 105 (68), 93 (59), 69 (56), 119 (55)... 222 (7)]	12.53	1560	0.03	13.02*	1955	[0.09]
Palustrol	12.54	1561	0.04	12.02	1864	0.04

Spathulenol	12.67	1571	0.05	14.12	2059	0.05
Globulol	12.75	1578	0.22	13.63	2012	0.22
Gleenol	12.80	1581	0.03	13.31	1982	0.03
Viridiflorol	12.85	1585	0.12	13.71*	2020	[0.13]
Cubeban-11-ol	12.88	1588	0.09	13.42*	1992	0.17
Ledol	12.98*	1596	0.09	13.10*	1963	[0.04]
Eudesm-5-en-11-ol analog	12.98*	1596	[0.09]	13.94*	2042	[0.06]
Rosifoliol	13.24	1616	0.09	14.04	2052	0.09
1-epi-Cubenol	13.31	1622	0.14	13.50	2000	0.14
Isospathulenol	13.43	1632	0.04	15.14	2161	0.04
Cubenol	13.49	1637	0.09	13.42*	1992	[0.17]
α-Muurolol	13.54	1641	0.03	14.91	2137	0.04
α-Cadinol	13.61	1647	0.01	15.19	2166	0.01
Total identified		98.92%			98.44%	
Total reported		99.02%			98.46%	

*: 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