

Date : September 16, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20I09-PTH06

Customer identification : Rosemary Organic - Tunisia - R5010889R

Type : Essential oil

Source : *Rosmarinus officinalis* ct. 1,8-Cineole

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 : Fanny Charlier, B. Sc., chimiste à l'entraînement

Analysis date : September 14, 2020

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4673 ± 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
Isovaleral	tr	Aliphatic aldehyde
(3Z)-Hexenol	0.03	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
Hashishene	0.01	Monoterpene
Tricyclene	0.15	Monoterpene
α -Thujene	0.36	Monoterpene
α -Pinene	10.10	Monoterpene
Camphene	4.15	Monoterpene
α -Fenchene	0.06	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
β -Pinene	8.43	Monoterpene
Sabinene	0.16	Monoterpene
Octen-3-ol	0.04	Aliphatic alcohol
Octan-3-one	0.16	Aliphatic ketone
Myrcene	1.28	Monoterpene
Octan-3-ol	0.01	Aliphatic alcohol
α -Phellandrene	0.11	Monoterpene
Pseudolimonene	0.03	Monoterpene
Δ^3 -Carene	0.19	Monoterpene
α -Terpinene	0.37	Monoterpene
para-Cymene	0.91	Monoterpene
Limonene	2.09	Monoterpene
1,8-Cineole	45.71	Monoterpenic ether
(Z)- β -Ocimene	0.06	Monoterpene
(E)- β -Ocimene	0.05	Monoterpene
γ -Terpinene	0.70	Monoterpene
cis-Sabinene hydrate	0.16	Monoterpenic alcohol
Fenchone	0.01	Monoterpenic ketone
Terpinolene	0.34	Monoterpene
para-Cymenene	0.02	Monoterpene
trans-Sabinene hydrate	0.08	Monoterpenic alcohol
Linalool	0.75	Monoterpenic alcohol
endo-Fenchol	0.04	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
Camphor	9.81	Monoterpenic ketone
Camphene hydrate	0.07	Monoterpenic alcohol
Isoborneol	0.01	Monoterpenic alcohol
Pinocarvone	0.01	Monoterpenic ketone
Borneol	2.40	Monoterpenic alcohol
δ -Terpineol	0.33	Monoterpenic alcohol
Terpinen-4-ol	0.72	Monoterpenic alcohol
para-Cymen-8-ol	0.03	Monoterpenic alcohol
α -Terpineol	1.60	Monoterpenic alcohol
Myrtenol	0.01	Monoterpenic alcohol
Verbenone	0.01	Monoterpenic ketone

Bornyl formate	0.02	Monoterpenic ester
Citronellol	0.02	Monoterpenic alcohol
Carvone	0.01	Monoterpenic ketone
Linalyl acetate	0.01	Monoterpenic ester
<i>trans</i> -Ascaridole glycol	0.01	Monoterpenic alcohol
Isopiperitenone	0.02	Monoterpenic ketone
Bornyl acetate	1.18	Monoterpenic ester
Unknown	0.02	Oxygenated monoterpene
<i>cis</i> -para-Mentha-2,8-diene-1-hydroperoxide?	0.01	Monoterpenic peroxide
Unknown	0.01	Unknown
Unknown	0.01	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
α -Cubebene	0.05	Sesquiterpene
α -Ylangene	0.07	Sesquiterpene
α -Copaene	0.20	Sesquiterpene
Methyleugenol	0.04	Phenylpropanoid
β -Caryophyllene	4.11	Sesquiterpene
β -Copaene	0.05	Sesquiterpene
Aromadendrene	0.06	Sesquiterpene
α -Humulene	0.46	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.02	Sesquiterpene
γ -Murolene	0.17	Sesquiterpene
α -Amorphene	0.02	Sesquiterpene
β -Selinene	0.05	Sesquiterpene
α -Selinene	0.04	Sesquiterpene
Unknown	0.04	Unknown
α -Murolene	0.07	Sesquiterpene
β -Bisabolene	0.06	Sesquiterpene
γ -Cadinene	0.09	Sesquiterpene
δ -Cadinene	0.25	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.02	Sesquiterpene
α -Calacorene	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.03	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Caryophyllene oxide	0.16	Sesquiterpenic ether
Humulene epoxide II	0.02	Sesquiterpenic ether
Caryophylladienol II	0.02	Sesquiterpenic alcohol
14-Hydroxy-(<i>Z</i>)-caryophyllene	0.02	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.02	Sesquiterpenic alcohol
Consolidated total	99.09%	

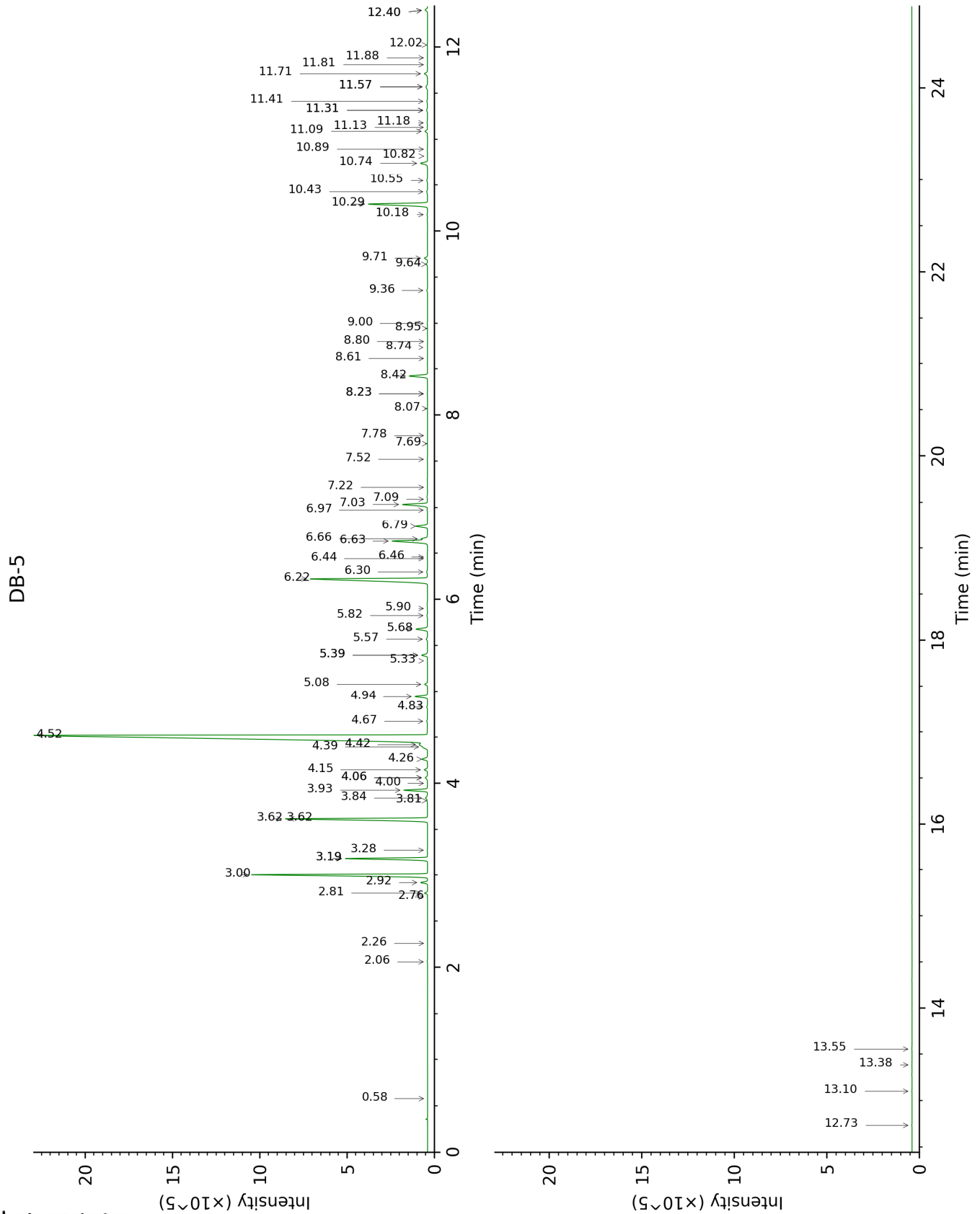
tr: The compound has been detected below 0.005% of total signal.

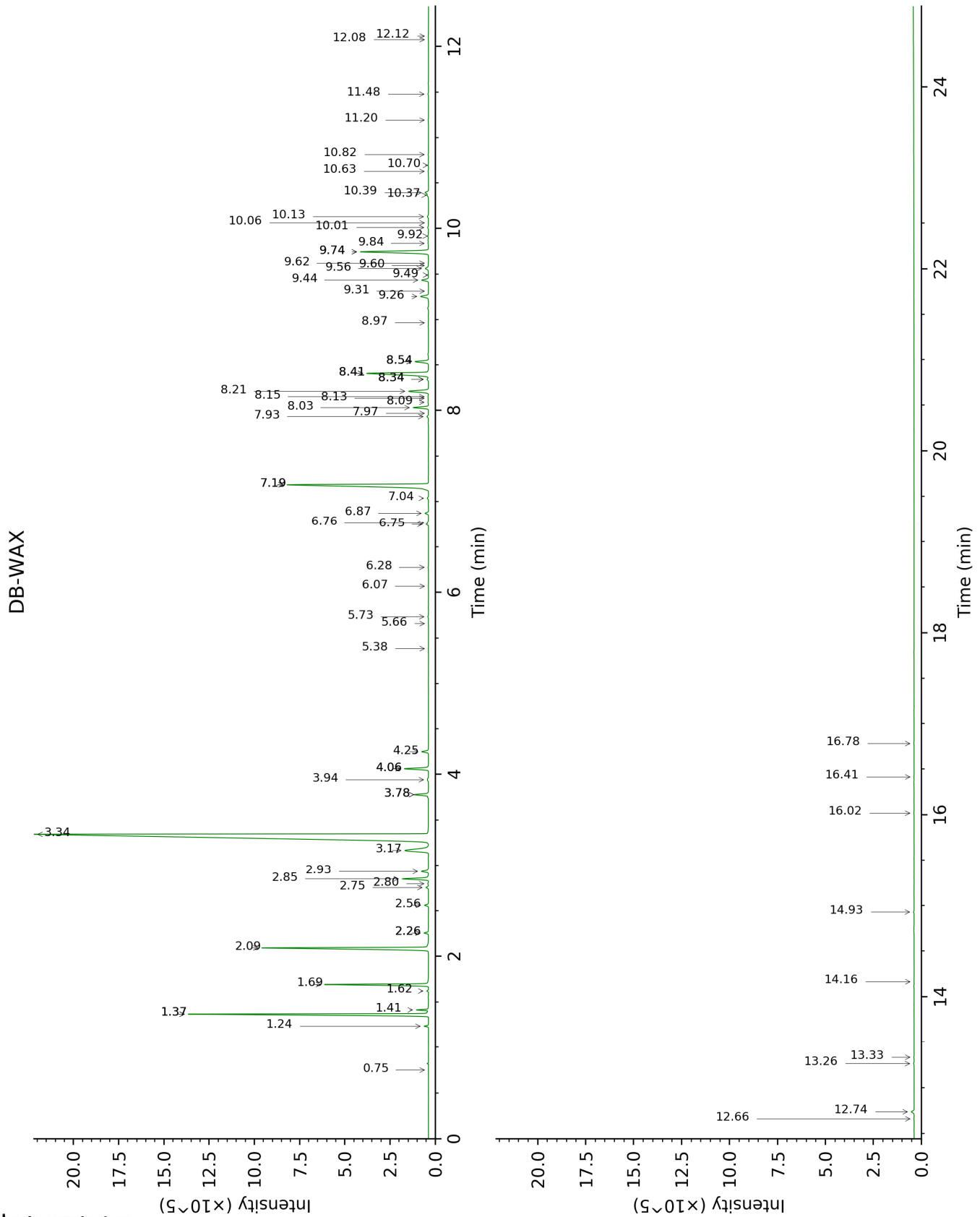
Note: no correction factor was applied

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	%
Isovaleral	0.58	640	tr	0.75	883	tr
(3Z)-Hexenol	2.06	858	0.03	5.73	1343	0.03
Hexanol	2.26	876	0.01	5.38	1318	0.01
Hashishene	2.76	915	0.01	1.37*†	993	10.32
Tricyclene	2.80	918	0.15	1.24	972	0.15
α-Thujene	2.92	925	0.36	1.41†	1000	[10.32]
α-Pinene	3.00	931	10.10	1.37*†	993	[10.32]
Camphene	3.19*	943	4.27	1.69	1027	4.15
α-Fenchene	3.19*	943	[4.27]	1.62	1020	0.06
Thuja-2,4(10)-diene	3.28	949	0.02	2.26*	1083	0.18
β-Pinene	3.62*	972	8.72	2.09	1067	8.43
Sabinene	3.62*	972	[8.72]	2.26*	1083	[0.18]
Octen-3-ol	3.81	985	0.04	6.76	1418	0.05
Octan-3-one	3.84	987	0.16	4.06*	1225	1.18
Myrcene	3.93	992	1.28	2.85	1132	1.25
Octan-3-ol	4.00	998	0.01	6.07	1367	0.01
α-Phellandrene	4.06*	1002	0.16	2.75	1125	0.11
Pseudolimonene	4.06*	1002	[0.16]	2.80	1128	0.03
Δ ³ -Carene	4.15	1007	0.19	2.56	1110	0.18
α-Terpinene	4.26	1014	0.37	2.93	1139	0.36
para-Cymene	4.40†	1022	48.71	4.06*	1225	[1.18]
Limonene	4.42†	1024	[48.71]	3.17	1157	2.09
1,8-Cineole	4.52†	1030	[48.71]	3.34	1171	45.71
(Z)-β-Ocimene	4.67	1040	0.06	3.78*	1204	0.70
(E)-β-Ocimene	4.83	1050	0.05	3.94	1216	0.04
γ-Terpinene	4.94	1057	0.70	3.78*	1204	[0.70]
cis-Sabinene hydrate	5.08	1065	0.16	6.87	1427	0.17
Fenchone	5.33	1081	0.01	5.66	1338	0.01
Terpinolene	5.40*	1085	0.36	4.25	1238	0.34
para-Cymenene	5.40*	1085	[0.36]	6.28	1382	0.02
trans-Sabinene hydrate	5.57	1096	0.08	7.93	1506	0.08
Linalool	5.68	1103	0.75	8.03	1514	0.76
endo-Fenchol	5.82	1112	0.04	8.34*	1538	0.08
cis-para-Menth-2-en-1-ol	5.90	1117	0.02	8.13	1522	0.02
Camphor	6.22	1137	9.81	7.19*	1450	10.07
Camphene hydrate	6.30	1142	0.07	8.41*	1543	4.12
Isoborneol	6.44	1151	0.01	9.31	1614	0.01
Pinocarvone	6.46	1152	0.01	7.97	1509	0.01
Borneol	6.63	1164	2.40	9.74*	1649	4.00
δ-Terpineol	6.66	1165	0.33	9.44	1624	0.36
Terpinen-4-ol	6.79	1174	0.72	8.54*	1553	0.76
para-Cymen-8-ol	6.97	1185	0.03	11.48	1794	0.03
α-Terpineol	7.03	1189	1.60	9.74*	1649	[4.00]

Myrtenol	7.09	1193	0.01	10.82	1738	0.02
Verbenone	7.22	1201	0.01	9.62	1639	0.01
Bornyl formate	7.52	1221	0.02	8.09	1518	0.04
Citronellol	7.69	1232	0.02	10.70	1728	0.02
Carvone	7.78	1238	0.01	10.06	1675	0.01
Linalyl acetate	8.07	1258	0.01	8.15	1523	0.03
<i>trans</i> -Ascaridole glycol	8.23*	1268	0.03	14.16	2039	0.01
Isopiperitenone	8.23*	1268	[0.03]	11.20	1770	0.02
Bornyl acetate	8.42	1281	1.18	8.21	1528	1.19
Unknown [m/z 43, 93 (66), 91 (44), 41 (38), 69 (35)... 152? (1)]	8.61	1294	0.02			
<i>cis</i> -para-Mentha-2,8-diene-1-hydroperoxide?	8.74	1301	0.01			
Unknown [m/z 69, 41 (79), 91 (56), 92 (54), 79 (50), 77 (35)...]	8.80	1306	0.01			
Unknown [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	8.95	1316	0.01	14.93	2113	0.03
Unknown [m/z 91, 79 (94), 77 (72), 41 (37), 93 (31)... 152 (1)]	9.00	1320	0.02			
α -Cubebene	9.36	1345	0.05	6.75	1417	0.11
α -Ylangene	9.64	1365	0.07	7.04	1439	0.06
α -Copaene	9.71	1370	0.20	7.19*	1450	[10.07]
Methyleugenol	10.18	1403	0.04	13.26	1954	0.03
β -Caryophyllene	10.29	1411	4.11	8.41*	1543	[4.12]
β -Copaene	10.43	1421	0.05	8.34*	1538	[0.08]
Aromadendrene	10.55	1430	0.06	8.54*	1553	[0.76]
α -Humulene	10.74	1445	0.46	9.26	1610	0.47
allo-Aromadendrene	10.82	1450	0.01	8.97	1586	0.01
(<i>E</i>)- β -Farnesene	10.89	1456	0.02	9.49	1629	0.02
γ -Murolene	11.09	1470	0.17	9.56	1634	0.19
α -Amorphene	11.13	1474	0.02	9.60	1637	0.01
β -Selinene	11.18	1477	0.05	9.84	1657	0.02
α -Selinene	11.32*	1487	0.08	9.92	1663	0.04
Unknown [m/z 59, 94 (67), 95 (50), 79 (44), 43 (41), 73 (16)...]	11.32*	1487	[0.08]			
α -Murolene	11.41	1495	0.07	10.01	1671	0.05
β -Bisabolene	11.57*	1507	0.16	10.13	1680	0.06
γ -Cadinene	11.57*	1507	[0.16]	10.36	1700	0.09
δ -Cadinene	11.71	1518	0.25	10.39	1702	0.21

<i>trans</i> -Cadina-1,4-diene	11.81	1526	0.02	10.63	1722	0.02
α -Calacorene	11.88	1531	0.01	12.12	1850	0.01
Isocaryophyllene epoxide B	12.02	1542	0.03	12.08	1847	0.01
Caryophyllene oxide isomer	12.40*	1572	0.17	12.66	1899	0.01
Caryophyllene oxide	12.40*	1572	[0.17]	12.74	1906	0.16
Humulene epoxide II	12.73	1598	0.02	13.33	1961	0.02
Caryophylladienol II	13.10	1628	0.02	16.02	2223	0.02
14-Hydroxy-(<i>Z</i>)-caryophyllene	13.38	1652	0.02	16.42	2264	0.02
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	13.55	1666	0.02	16.78	2302	0.02
Total identified		99.24%			98.93%	
Total reported		99.30%			98.96%	

*: 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