

Date : February 03, 2023

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23A27-PTH02


Customer identification : Oregano - Hungary - O40110R

Type : Essential oil

Source : *Origanum vulgare* ct. Carvacrol

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 : Candide Morin, analyste

Analysis date : February 02, 2023

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light brownish yellow liquid

Refractive index: 1.5072 ± 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	0.01	Aliphatic aldehyde
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
Methyl 2-methylbutyrate	0.01	Aliphatic ester
Tricyclene	0.01	Monoterpene
α -Thujene	0.48	Monoterpene
α -Pinene	1.72	Monoterpene
Camphene	0.38	Monoterpene
α -Fenchene	0.06	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
β -Pinene	1.40	Monoterpene
Sabinene	tr	Monoterpene
Unknown	0.03	Monoterpene
Octen-3-ol	0.23	Aliphatic alcohol
<i>trans</i> -para-Menthane	0.02	Monoterpene
Octan-3-one	0.01	Aliphatic ketone
Myrcene	1.77	Monoterpene
2,7-Dimethyl-2,6-octadiene	0.03	Monoterpene
Pseudolimonene	0.09	Monoterpene
α -Phellandrene	0.06	Monoterpene
<i>cis</i> -Dehydroxylinalool oxide	0.01	Monoterpenic ether
Δ^3 -Carene	0.05	Monoterpene
α -Terpinene	1.02	Monoterpene
Carvomenthene	0.02	Aliphatic alcohol
para-Cymene	10.97	Monoterpene
Limonene	0.49	Monoterpene
1,8-Cineole	0.09	Monoterpenic ether
β -Phellandrene	0.07	Monoterpene
ortho-Cymene	0.02	Monoterpene
(<i>Z</i>)- β -Ocimene	0.03	Monoterpene
(<i>E</i>)- β -Ocimene	0.04	Monoterpene
γ -Terpinene	7.54	Monoterpene
<i>cis</i> -Sabinene hydrate	0.10	Monoterpenic alcohol
para-Mentha-3,8-diene	0.02	Monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.03	Monoterpenic alcohol
Fenchone	0.06	Monoterpenic ketone
Terpinolene	0.40	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	0.01	Monoterpenic alcohol
para-Cymenene	0.03	Monoterpene
<i>trans</i> -Sabinene hydrate	0.10	Monoterpenic alcohol
Linalool	2.41	Monoterpenic alcohol
Hotrienol	0.03	Monoterpenic alcohol
<i>cis</i> -para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
α -Campholenal	0.01	Monoterpenic aldehyde
<i>trans</i> -Pinocarveol	0.02	Monoterpenic alcohol

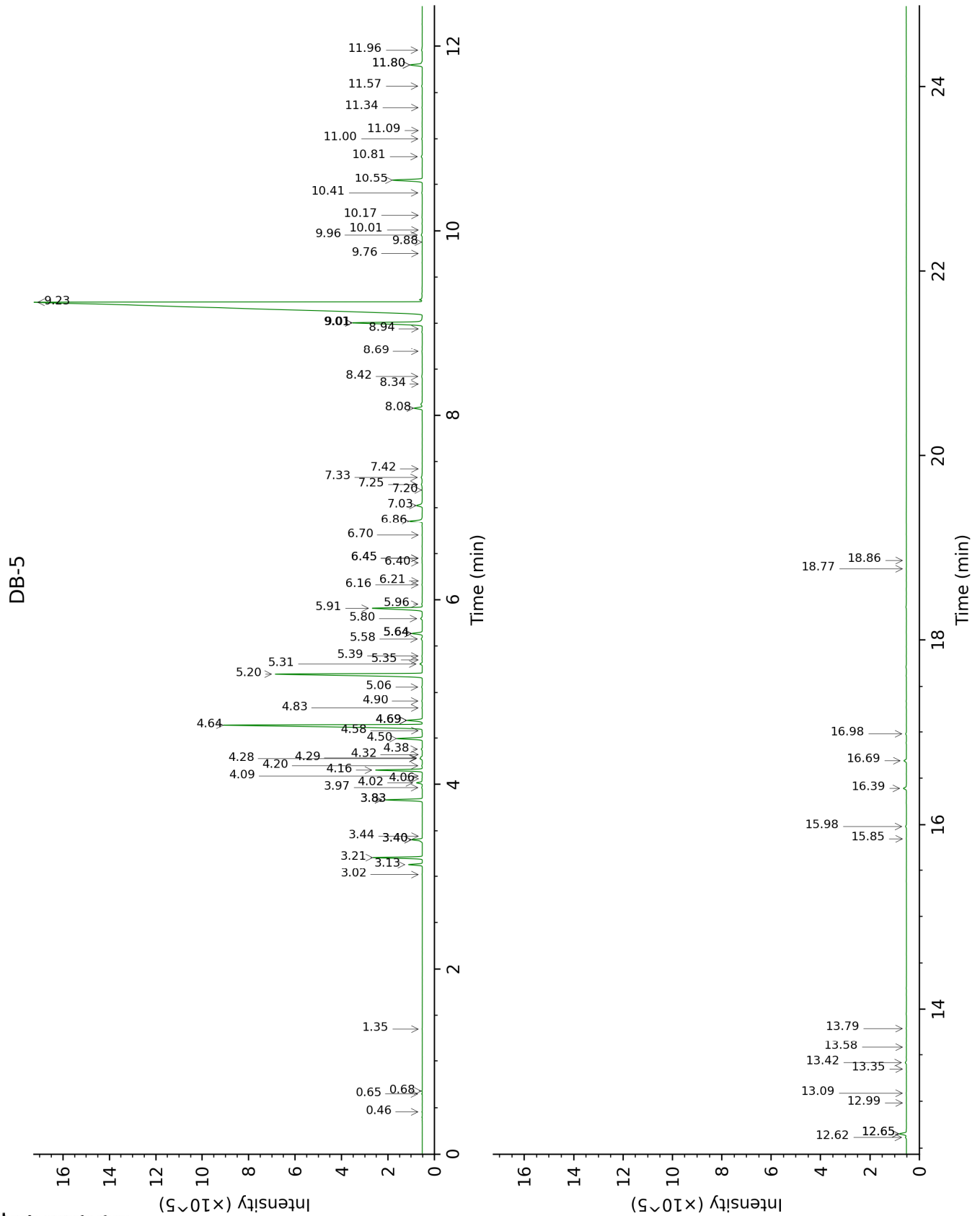
<i>trans</i> -para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
Camphor	0.01	Monoterpenic ketone
Isoborneol	0.02	Monoterpenic alcohol
Borneol	0.64	Monoterpenic alcohol
Terpinen-4-ol	0.32	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α -Terpineol	0.08	Monoterpenic alcohol
<i>cis</i> -Dihydrocarvone	0.10	Monoterpenic ketone
<i>trans</i> -Dihydrocarvone	0.02	Monoterpenic ketone
Carvacrol methyl ether	0.36	Monoterpenic ether
Geraniol	0.01	Monoterpenic alcohol
Linalyl acetate	0.05	Monoterpenic ester
Bornyl acetate	0.04	Monoterpenic ester
Thymol analogue I (isothymol?)	0.01	Monoterpenic alcohol
Thymol analogue II	0.05	Monoterpenic alcohol
Thymol	3.59	Monoterpenic alcohol
Carvacrol	60.41	Monoterpenic alcohol
Eugenol	0.01	Phenylpropanoid
Neryl acetate	0.02	Monoterpenic ester
Carvacryl acetate	0.06	Monoterpenic ester
α -Copaene	0.01	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
Methyleugenol	0.04	Phenylpropanoid
β -Caryophyllene	1.36	Sesquiterpene
Aromadendrene	0.05	Sesquiterpene
α -Humulene	0.03	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
γ -Murolene	0.02	Sesquiterpene
α -Selinene	0.04	Sesquiterpene
γ -Cadinene	0.03	Sesquiterpene
β -Bisabolene	0.56	Sesquiterpene
δ -Cadinene	0.05	Sesquiterpene
Spathulenol	0.05	Sesquiterpenic alcohol
Caryophyllene oxide	0.31	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Humulene epoxide II	0.01	Sesquiterpenic ether
10-epi-Cubenol	0.01	Sesquiterpenic alcohol
Caryophylladienol II	0.01	Sesquiterpenic alcohol
τ -Cadinol	0.06	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated sesquiterpene
(3Z)-Caryophylla-3,8(13)-dien-5 β -ol	0.02	Sesquiterpenic alcohol
Phytone	0.01	Terpenic ketone
Unknown	0.04	Unknown
Unknown	0.15	Unknown
Unknown	0.12	Unknown
meta-Camphorene	0.04	Diterpene
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Consolidated total	98.84%	

Note: no correction factor was applied

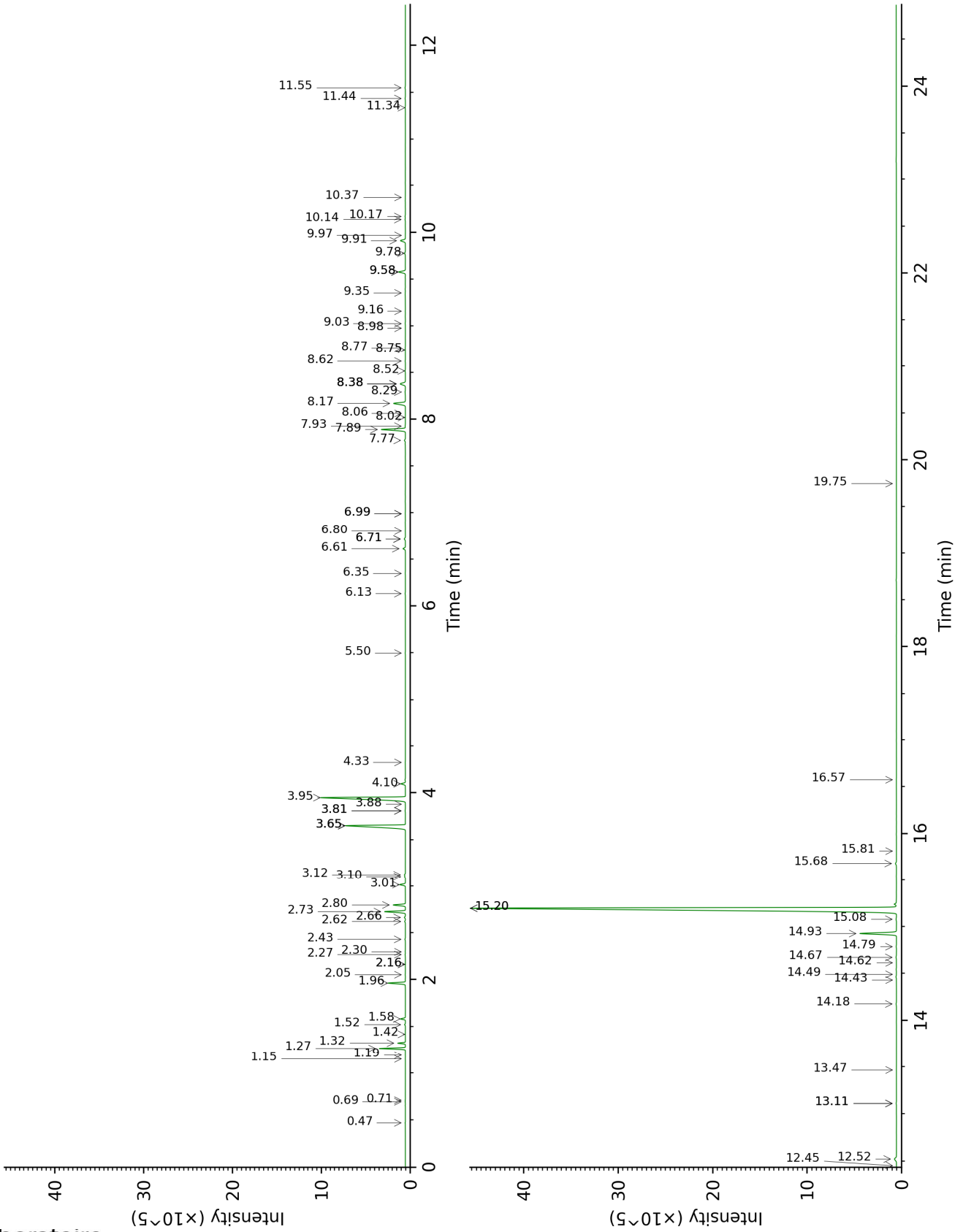
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.



DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isobutylal	0.46	538	0.01	0.47	780	0.01
Isovaleral	0.65	640	0.01	0.71	886	0.01
2-Methylbutylal	0.68	651	0.01	0.70	879	0.01
Methyl 2-methylbutyrate	1.35	773	0.01	1.19	975	0.01
Tricyclene	3.02	918	0.01	1.15	968	0.01
α -Thujene	3.14	926	0.48	1.32	996	0.48
α -Pinene	3.21	930	1.72	1.27	988	1.73
Camphene	3.40*	943	0.45	1.58	1023	0.38
α -Fenchene	3.40*	943	[0.45]	1.52	1017	0.06
Thuja-2,4(10)-diene	3.44	946	0.01	2.16*†	1084	0.02
β -Pinene	3.84*	971	1.40	1.96	1063	1.40
Sabinene	3.84*	971	[1.40]	2.16*†	1084	[0.02]
Unknown [m/z 93, 79 (73), 67 (49), 95 (42), 91 (41), 121 (38)...]	3.97	980	0.03	2.27	1095	0.03
Octen-3-ol	4.02	983	0.23	6.61	1421	0.23
<i>trans</i> -para-Menthane	4.06	986	0.02	1.42	1006	0.01
Octan-3-one	4.09	988	0.01	3.81*	1219	0.04
Myrcene	4.16	992	1.77	2.73	1132	1.77
2,7-Dimethyl-2,6-octadiene	4.20	996	0.03	2.05	1072	0.02
Pseudolimonene	4.28†	1000	0.15	2.66	1127	0.09
α -Phellandrene	4.29†	1001	[0.15]	2.62	1123	0.06
<i>cis</i> -Dehydroxylinalool oxide	4.32	1003	0.01	3.65*	1207	7.56
Δ^3 -Carene	4.38	1007	0.05	2.43	1108	0.04
α -Terpinene	4.50	1014	1.02	2.80	1138	1.02
Carvomenthene	4.58	1020	0.02	2.30	1097	0.02
para-Cymene	4.64	1023	10.97	3.95	1229	10.94
Limonene	4.69*	1026	0.66	3.01	1156	0.49
1,8-Cineole	4.69*	1026	[0.66]	3.12	1165	0.09
β -Phellandrene	4.69*	1026	[0.66]	3.10	1163	0.07
ortho-Cymene	4.83	1035	0.02	4.32	1258	0.02
(<i>Z</i>)- β -Ocimene	4.90	1039	0.03	3.65*	1207	[7.56]
(<i>E</i>)- β -Ocimene	5.06	1049	0.04	3.81*	1219	[0.04]
γ -Terpinene	5.20	1058	7.54	3.65*	1207	[7.56]
<i>cis</i> -Sabinene hydrate	5.31	1065	0.10	6.72*	1429	0.12
para-Mentha-3,8-diene	5.35	1068	0.02	3.88	1224	0.01
<i>cis</i> -Linalool oxide (fur.)	5.40	1070	0.03	6.35	1402	0.02
Fenchone	5.58	1082	0.06	5.50	1340	0.02

Terpinolene	5.64*	1085	0.45	4.10	1241	0.40
<i>trans</i> -Linalool oxide (fur.)	5.64*	1085	[0.45]	6.72*	1429	[0.12]
para-Cymenene	5.64*	1085	[0.45]	6.13	1386	0.03
<i>trans</i> -Sabinene hydrate	5.80	1095	0.10	7.77	1508	0.10
Linalool	5.91	1102	2.41	7.89	1517	2.40
Hotrienol	5.96	1105	0.03	8.62	1574	0.02
<i>cis</i> -para-Menth-2-en-1-ol	6.16	1118	0.02	7.93	1520	0.03
α-Campholenal	6.21	1121	0.01	6.80	1435	0.01
<i>trans</i> -Pinocarveol	6.40	1134	0.02	8.98	1602	0.02
<i>trans</i> -para-Menth-2-en-1-ol	6.45*†	1137	0.04	8.76	1585	0.02
Camphor	6.45*†	1137	[0.04]	6.99*	1450	0.02
Isoborneol	6.70	1152	0.02	9.16	1617	0.02
Borneol	6.86	1162	0.64	9.58*	1651	0.71
Terpinen-4-ol	7.03	1173	0.32	8.38*	1555	0.67
para-Cymen-8-ol	7.20	1184	0.02	11.34	1798	0.03
α-Terpineol	7.25	1188	0.08	9.58*	1651	[0.71]
<i>cis</i> -Dihydrocarvone	7.33	1192	0.10	8.29	1548	0.04
<i>trans</i> -Dihydrocarvone	7.42	1198	0.02	8.52	1566	0.04
Carvacrol methyl ether	8.08	1242	0.36	8.38*	1555	[0.67]
Geraniol	8.34	1259	0.01	11.44	1807	0.04
Linalyl acetate	8.42	1265	0.05	8.02	1527	0.02
Bornyl acetate	8.69	1283	0.04	8.06	1531	0.01
Thymol analogue I (isothymol?)	8.94	1299	0.01	14.79	2118	0.03
Thymol analogue II	9.01*	1304	3.67	15.08	2147	0.05
Thymol	9.01*	1304	[3.67]	14.93	2132	3.59
Carvacrol	9.23	1319	60.41	15.20*†	2159	60.64
Eugenol	9.76	1356	0.01	14.62	2101	0.01
Neryl acetate	9.88	1365	0.02	9.97	1682	0.01
Carvacryl acetate	9.96	1370	0.06	11.55	1817	0.04
α-Copaene	10.01	1374	0.01	6.99*	1450	[0.02]
Geranyl acetate	10.17	1385	0.01	10.37	1716	0.01
Methyleugenol	10.41	1402	0.04	13.11*	1958	0.04
β-Caryophyllene	10.55	1412	1.36	8.17	1539	1.37
Aromadendrene	10.81	1432	0.05	8.38*	1555	[0.67]
α-Humulene	11.00	1446	0.03	9.03	1606	0.03
allo-Aromadendrene	11.09	1453	0.01	8.75	1584	0.01
γ-Murolene	11.34	1471	0.02	9.35	1633	0.02
α-Selinene	11.57	1488	0.04	9.78	1667	0.09
γ-Cadinene	11.80*	1506	0.59	10.14†	1696	0.08
β-Bisabolene	11.80*	1506	[0.59]	9.91	1678	0.56
δ-Cadinene	11.96	1518	0.05	10.17†	1699	[0.08]
Spathulenol	12.62	1570	0.05	14.18	2058	0.05

Caryophyllene oxide	12.65*	1572	0.32	12.52	1903	0.31
Caryophyllene oxide isomer	12.65*	1572	[0.32]	12.45	1897	0.01
Humulene epoxide II	12.99	1598	0.01	13.11*	1958	[0.04]
10-epi-Cubenol	13.09	1607	0.01	13.47	1990	0.01
Caryophylladienol II	13.35	1628	0.01	15.81	2221	0.01
τ-Cadinol	13.42	1634	0.06	14.67	2106	0.06
Unknown [m/z 161, 59 (67), 95 (45), 93 (40), 105 (40), 149 (39), 81 (39), 43 (38), 204 (37)... 220 (5)]	13.58	1648	0.01	14.43	2082	0.01
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.79	1665	0.02	16.57	2301	0.02
Phytone	15.85	1842	0.01	14.49	2088	0.01
Unknown [m/z 81, 150 (90), 136 (88), 135 (74), 93 (54), 121 (41)...]	15.98	1854	0.04			
Unknown [m/z 81, 150 (83), 136 (81), 135 (67), 93 (48), 121 (36)...]	16.39	1892	0.15			
Unknown [m/z 136, 81 (81), 150 (74), 135 (52), 93 (46), 121 (42)...]	16.69	1919	0.12	15.68	2208	0.12
meta-Camphorene	16.98	1947	0.04	15.20*†	2159	[60.64]
Unknown [m/z 69, 41 (81), 91 (37), 166 (35), 105 (33), 43 (30)...]	18.77	2122	0.01	19.75	2658	0.01
Unknown [m/z 201, 241 (93), 159 (74), 302 (57), 259 (38), 43 (29)...]	18.86	2132	0.01			
Total identified		98.55%			98.43%	
Total reported		98.92%			98.60%	

*: 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

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index