

Date : 2024-10-08

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24I24-PTH02

Customer Identification : Oregano - Greece - O40112R

Type : Essential Oil

Source : *Origanum vulgare ct. Carvacrol*

Customer : Plant Therapy

Checked and approved by:

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

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GAS CHROMATOGRAPHIC ANALYSIS

Method : PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID

✖ISO

Results : See analysis summary (next page)

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

Date : 2024-10-08

PHYSICOCHEMICAL DATA

Refractive index : 1.51 ± 0.0003 (20 °C)

Method : PC-MAT-016 - Measure of the refractive index of a liquid.

Analyst : Cindy Caron B. Sc.

Date : 2024-09-26

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	0.05	Aliphatic aldehyde
2-Methylbutyral	0.03	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Methyl 2-methylbutyrate	0.02	Aliphatic ester
Hexanal	tr	Aliphatic aldehyde
Octane	tr	Alkane
(2E)-Hexenal	0.02	Aliphatic aldehyde
(3Z)-Hexenol	0.01	Aliphatic alcohol
Tricyclene	0.01	Monoterpene
α -Thujene	0.37	Monoterpene
α -Pinene	0.34	Monoterpene
Unknown	0.01	Monoterpene
Camphene	0.14	Monoterpene
β -Pinene	0.07	Monoterpene
Sabinene	0.01	Monoterpene
Octen-3-ol	0.12	Aliphatic alcohol
Octan-3-one	0.01	Aliphatic ketone
Myrcene	0.89	Monoterpene
Octan-3-ol	0.01	Aliphatic alcohol
Pseudolimonene	[0.14]	Monoterpene
α -Phellandrene	[0.14]	Monoterpene
Δ^3 -Carene	0.07	Monoterpene
α -Terpinene	0.73	Monoterpene
<i>para</i> -Cymene	2.16	Monoterpene
Limonene	0.13	Monoterpene
1,8-Cineole	0.16	Monoterpenic ether
(Z)- β -Ocimene	0.03	Monoterpene
(E)- β -Ocimene	0.05	Monoterpene
γ -Terpinene	2.83	Monoterpene
<i>cis</i> -Sabinene hydrate	0.23	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.03	Monoterpenic alcohol
<i>trans</i> -Linalool oxide (fur.)	0.04	Monoterpenic alcohol
Terpinolene	0.11	Monoterpene
<i>trans</i> -Sabinene hydrate	0.11	Monoterpenic alcohol
Linalool	4.65	Monoterpenic alcohol
Hotrienol	0.08	Monoterpenic alcohol
endo-Fenchol	0.01	Monoterpenic alcohol
<i>cis-para</i> -Menth-2-en-1-ol	0.05	Monoterpenic alcohol
α -Campholenal	0.03	Monoterpenic aldehyde
<i>trans</i> -Pinocarveol	0.03	Monoterpenic alcohol

<i>trans-para</i> -Menth-2-en-1-ol	0.05	Monoterpenic alcohol
1,4-Dimethyl-4-acetylcyclohexene	0.02	Monoterpenic ketone
Isoborneol	0.01	Monoterpenic alcohol
Unknown	0.04	Unknown
Borneol	0.71	Monoterpenic alcohol
δ -Terpineol	0.02	Monoterpenic alcohol
Umbellulone	0.01	Monoterpenic ketone
Terpinen-4-ol	0.65	Monoterpenic alcohol
<i>meta</i> -Cymen-8-ol	0.02	Monoterpenic alcohol
<i>para</i> -Cymen-8-ol	0.02	Monoterpenic alcohol
α -Terpineol	0.10	Monoterpenic alcohol
<i>cis</i> -Dihydrocarvone	0.12	Monoterpenic ketone
Dihydrocarveol	0.04	Monoterpenic alcohol
Unknown	0.02	Unknown
<i>trans</i> -Piperitol	0.02	Monoterpenic alcohol
Thymol methyl ether	0.02	Monoterpenic ether
Carvone	0.01	Monoterpenic ketone
Carvacrol methyl ether	0.08	Monoterpenic ether
Thymoquinone	0.17	Monoterpenic ketone
Carvenone	0.01	Monoterpenic ketone
Geraniol	0.07	Monoterpenic alcohol
Linalyl acetate	0.18	Monoterpenic ester
Geranial	0.05	Monoterpenic aldehyde
Bornyl acetate	0.01	Monoterpenic ester
Cuminol	0.01	Monoterpenic alcohol
Thymol analogue I (isothymol?)	0.02	Monoterpenic alcohol
Thymol	1.24	Monoterpenic alcohol
Carvacrol	76.60	Monoterpenic alcohol
2-Methyl-5-(propan-2-ylidene)cyclohexane-1,4-diol ?	0.20	Monoterpenic alcohol
2-Methyl-6-propylphenol?	0.06	Miscellaneous
Eugenol	0.02	Phenylpropanoid
Neryl acetate	0.01	Monoterpenic ester
Carvacryl acetate	0.11	Monoterpenic ester
α -Copaene	0.01	Sesquiterpene
β -Bourbonene	0.03	Sesquiterpene
Geranyl acetate	0.02	Monoterpenic ester
β -Elemene	0.01	Sesquiterpene
Methyleugenol	0.11	Phenylpropanoid
β -Caryophyllene	0.80	Sesquiterpene
β -Copaene	0.02	Sesquiterpene
α -Maaliene	0.02	Sesquiterpene
Aromadendrene	0.17	Sesquiterpene
Selina-5,11-diene	0.02	Sesquiterpene
α -Humulene	0.05	Sesquiterpene

allo-Aromadendrene	0.02	Sesquiterpene
(E)- β -Farnesene	0.05	Sesquiterpene
trans-Cadina-1(6),4-diene	0.01	Sesquiterpene
γ -Muurolene	0.04	Sesquiterpene
allo-Aromadendr-9-ene	0.04	Sesquiterpene
α -Selinene	0.01	Sesquiterpene
Viridiflorene	0.08	Sesquiterpene
(3Z,6E)- α -Farnesene	0.02	Sesquiterpene
α -Muurolene	0.02	Sesquiterpene
β -Bisabolene	2.07	Sesquiterpene
γ -Cadinene	0.31	Sesquiterpene
δ -Cadinene	0.08	Sesquiterpene
β -Sesquiphellandrene	0.05	Sesquiterpene
(E)- α -Bisabolene	0.04	Sesquiterpene
Spathulenol	0.08	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.21	Sesquiterpenic ether
Humulene epoxide II	0.02	Sesquiterpenic ether
1,10-diepi-Cubenol	0.03	Sesquiterpenic alcohol
10-epi-Cubenol?	0.01	Sesquiterpenic alcohol
Caryophylladienol I	0.01	Sesquiterpenic alcohol
Caryophylladienol II	0.01	Sesquiterpenic alcohol
τ -Cadinol	0.14	Sesquiterpenic alcohol
α -Muurolol	0.04	Sesquiterpenic alcohol
Unknown	0.02	Sesquiterpenic alcohol
α -Cadinol	0.01	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated sesquiterpene
(3Z)-Caryophylla-3,8(13)-dien-5 β -ol	0.01	Sesquiterpenic alcohol
epi- α -Bisabolol	0.05	Sesquiterpenic alcohol
Phytone	0.01	Terpenic ketone
Unknown	0.02	Unknown
Unknown	0.03	Unknown
Unknown	0.01	Unknown
Unknown	0.06	Unknown
Unknown	0.02	Unknown
Unknown	0.03	Unknown
Unknown	0.01	Unknown
Unknown	0.02	Unknown
Unknown	0.01	Unknown
Consolidated total	99.47	

tr: The compound has been detected below 0.005% of the 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

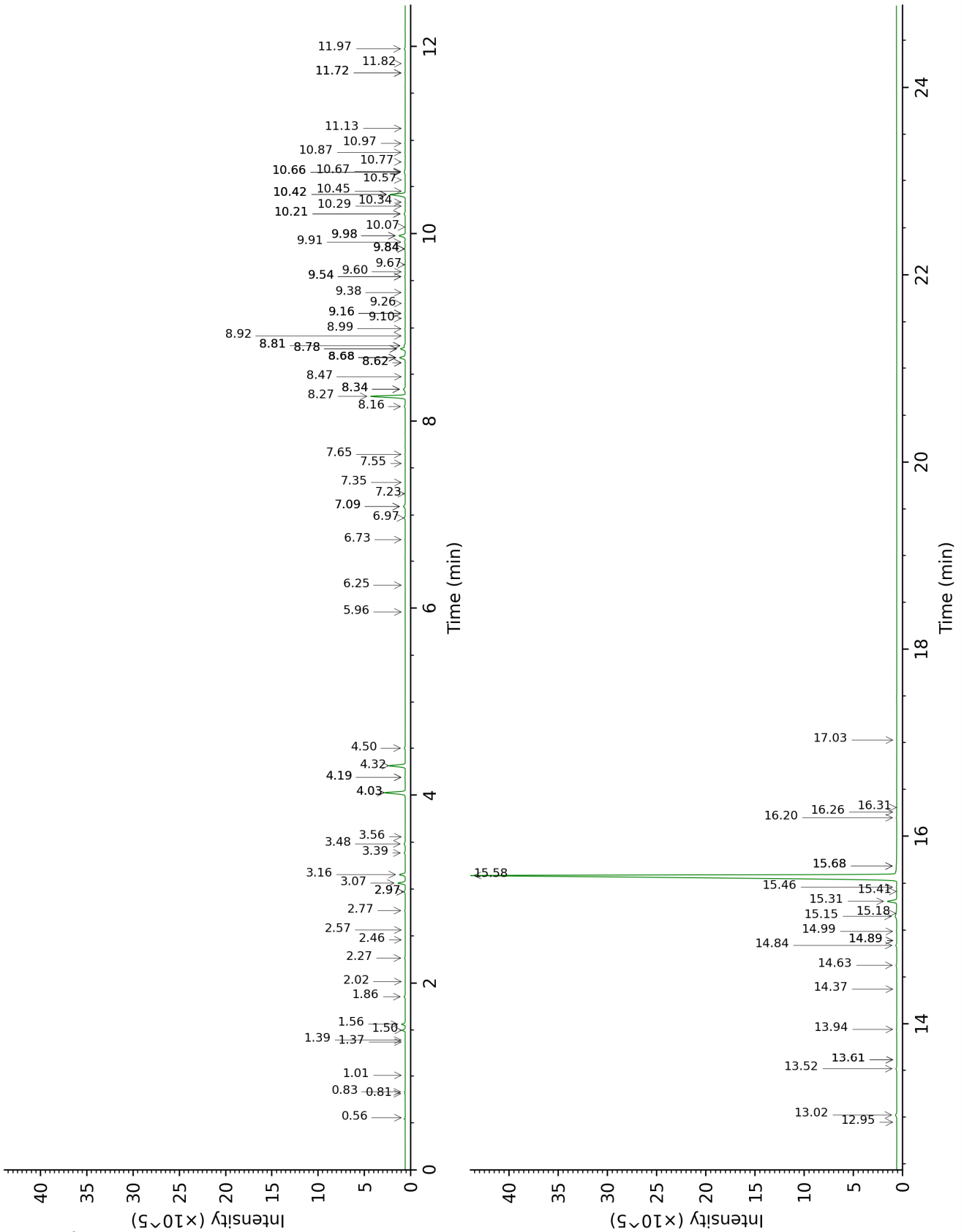
chromatograms in this report to access the full untreated data and perform their own calculations if needed.

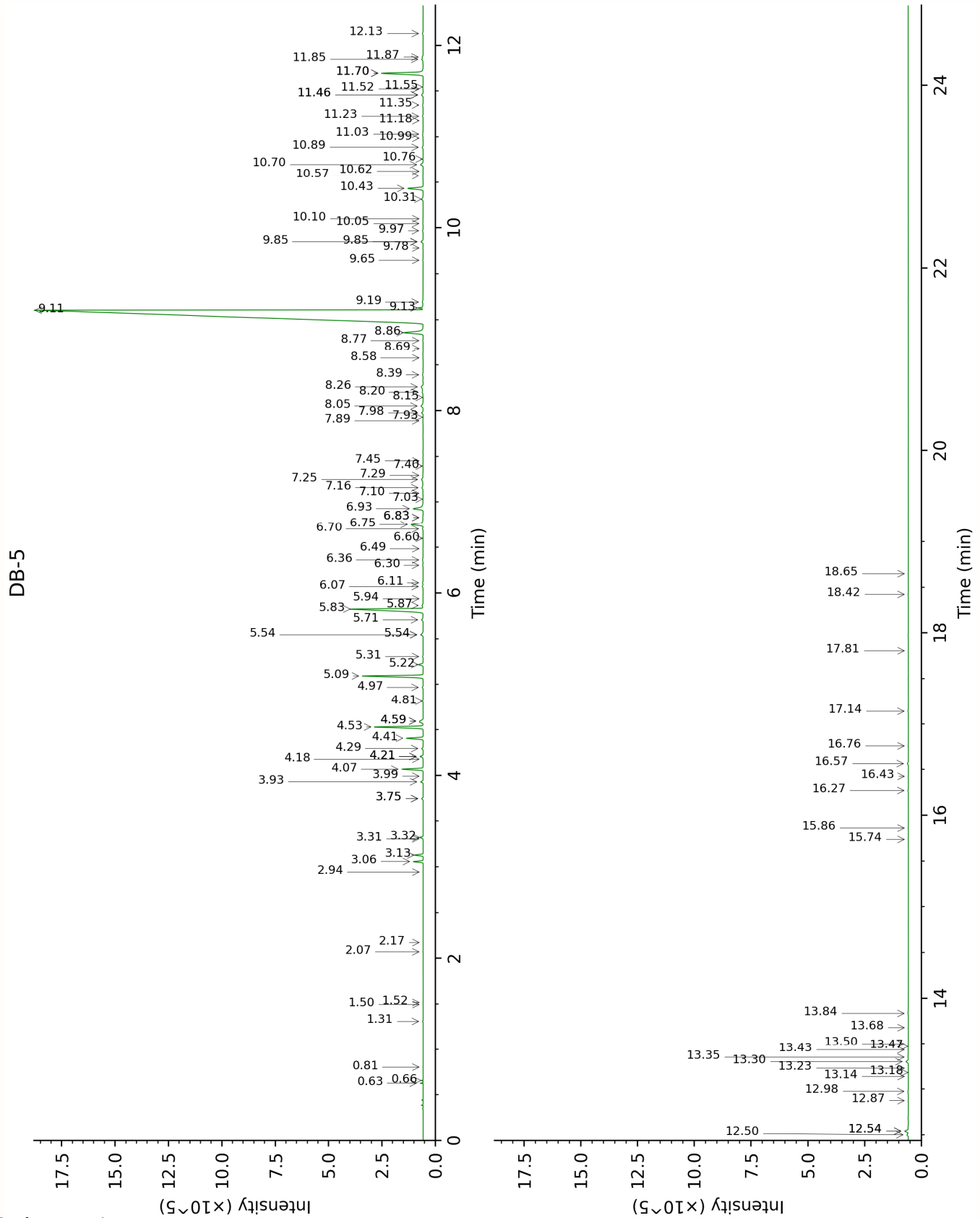
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

Bracketed value (xx): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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

DB-WAX





FULL ANALYSIS DATA

Isovaleral	Column DB-WAX			Column DB-5		
	0.83	884.2	0.04	0.63	640.3	0.05
2-Methylbutyral	0.81	877.3	0.03	0.66	650.7	0.03
2-Ethylfuran	1.01	917.8	tr	0.80	701.2	tr
Methyl 2-methylbutyrate	1.39	977.1	0.02	1.31	773.8	0.02
Hexanal	2.02	1044.1	tr	1.50	799.8	tr
Octane	0.56	781.7	tr	1.52	802.9	tr
(2E)-Hexenal	3.56	1171.4	0.02	2.07	849.1	0.02
(3Z)-Hexenol	5.96	1344.7	0.01	2.17	857.6	0.01
Tricyclene	1.37	973.9	tr	2.94	917.8	0.01
α -Thujene	1.56	1000.7	0.38	3.06	925.4	0.37
α -Pinene	1.50	993.3	0.34	3.13	930.1	0.34
Unknown SAOF I [m/z 91, 92 (47), 65 (11)... 134 (1)]	2.57	1096.3	0.01	3.31	941.8	0.01
Camphene	1.86	1028.8	0.14	3.32	942.8	0.14
β -Pinene	2.27	1068.0	0.07	3.75*	970.9	[0.07]
Sabinene	2.46	1086.3	0.01	3.75*	970.9	[0.07]
Octen-3-ol	6.97	1417.7	0.13	3.93	983.0	0.12
Octan-3-one	4.19*	1217.5	[0.05]	3.99	987.0	0.01
Myrcene	3.07	1134.2	0.89	4.07	992.2	0.89
Octan-3-ol	6.25	1365.1	0.01	4.18	999.4	0.01
Pseudolimonene	2.97*	1127.2	[0.14]	4.21*	1001.3	[0.14]
α -Phellandrene	2.97*	1127.2	[0.14]	4.21*	1001.3	[0.14]
Δ 3-Carene	2.77	1112.0	0.07	4.29	1006.9	0.07
α -Terpinene	3.16	1141.1	0.73	4.41	1014.0	0.73
<i>para</i> -Cymene	4.32	1226.2	2.17	4.53	1021.7	2.16
Limonene	3.39	1158.5	0.13	4.59*†	1025.7	[0.15]
1,8-Cineole	3.48	1165.8	0.16	4.59*†	1025.7	[0.15]
(Z)- β -Ocimene	4.03*	1206.1	[2.86]	4.81	1039.5	0.03
(E)- β -Ocimene	4.19*	1217.5	[0.05]	4.97	1049.2	0.05
γ -Terpinene	4.03*	1206.1	[2.86]	5.09	1057.1	2.83
<i>cis</i> -Sabinene hydrate	7.09*	1426.7	[0.26]	5.22	1064.9	0.23
<i>cis</i> -Linalool oxide (fur.)	6.73	1400.0	0.03	5.31	1070.4	0.03
<i>trans</i> -Linalool oxide (fur.)	7.09*	1426.7	[0.26]	5.54*	1085.3	[0.15]
Terpinolene	4.50	1239.3	0.11	5.54*	1085.3	[0.15]
<i>trans</i> -Sabinene hydrate	8.16	1506.0	0.14	5.71	1095.6	0.11
Linalool	8.27	1514.4	4.66	5.83	1102.9	4.65
Hotrienol	8.99	1570.5	0.05	5.86	1105.4	0.08
endo-Fenchol	8.62*	1542.1	[0.02]	5.94	1110.1	0.01

<i>cis-para</i> -Menth-2-en-1-ol	8.34*	1520.2	[0.29]	6.07	1118.6	0.05
α -Campholenal	7.23	1436.8	0.03	6.11	1121.3	0.03
<i>trans</i> -Pinocarveol	9.38	1600.5	0.03	6.30	1133.5	0.03
<i>trans-para</i> -Menth-2-en-1-ol	9.16*	1583.1	[0.05]	6.36	1137.2	0.05
1,4-Dimethyl-4-acetylcyclohexene	7.55	1460.6	0.02	6.49	1145.1	0.02
Isoborneol	9.60	1618.3	0.02	6.60	1152.3	0.01
Unknown RHGR XVIII [m/z 123, 81 (46), 43 (45), 95 (34), 166 (30)]	9.16*	1583.1	[0.05]	6.70	1159.0	0.04
Borneol	9.98*	1649.2	[0.92]	6.75	1162.1	0.71
δ -Terpineol	9.67	1624.4	0.02	6.83*	1167.2	[0.03]
Umbellulone	9.10	1579.0	0.01	6.83*	1167.2	[0.03]
Terpinen-4-ol	8.78*	1554.1	[0.65]	6.93	1173.5	0.65
<i>meta</i> -Cymen-8-ol	11.72*	1794.2	[0.04]	7.03	1180.1	0.02
<i>para</i> -Cymen-8-ol	11.72*	1794.2	[0.04]	7.10	1184.2	0.02
α -Terpineol	9.98*	1649.2	[0.92]	7.16	1188.1	0.10
<i>cis</i> -Dihydrocarvone	8.68*	1546.2	[0.86]	7.25	1193.9	0.12
Dihydrocarveol	10.66*†	1704.7	[0.13]	7.29	1196.7	0.04
Unknown PIMA 7 [m/z 95, 93 (32), 121 (24), 79 (22), 91 (21), 105 (16)... 154 (2)]	11.13	1744.2	0.02	7.40	1203.2	0.02
<i>trans</i> -Piperitol	10.57	1697.2	0.04	7.45	1207.0	0.02
Thymol methyl ether	8.68*	1546.2	[0.86]	7.89	1236.4	0.02
Carvone	10.21*	1667.9	[0.17]	7.93	1239.0	0.01
Carvacrol methyl ether	8.81*	1556.6	[0.18]	7.98	1242.2	0.08
Thymoquinone	10.42*	1684.6	[2.25]	8.05	1247.1	0.17
Carvenone	10.07	1656.6	0.01	8.15	1253.4	0.01
Geraniol	11.82	1803.0	0.02	8.20	1257.2	0.07
Linalyl acetate	8.34*	1520.2	[0.29]	8.26	1261.2	0.18
Geranial	10.34	1677.9	0.02	8.39	1270.0	0.05
Bornyl acetate	8.48	1530.5	0.01	8.58	1282.4	0.01
Cuminol	14.37	2036.2	0.01	8.69	1289.6	0.01
Thymol analogue I (isothymol?)	15.18	2114.7	0.13	8.77	1295.4	0.02
Thymol	15.31	2127.4	1.23	8.86	1301.3	1.24
Carvacrol	15.58	2154.9	75.71	9.10	1318.4	76.60
2-Methyl-5-(propan-2-ylidene)cyclohexane-	14.84	2081.0	0.15	9.13	1320.1	0.20

1,4-diol ?						
2-Methyl-6-propylphenol?				9.19	1324.6	0.06
Eugenol	14.99	2095.5	0.05	9.65	1356.7	0.02
Neryl acetate	10.42*	1684.6	[2.25]	9.78	1366.2	0.01
Carvacryl acetate	11.98	1816.8	0.11	9.85*	1371.0	[0.12]
α -Copaene	7.35	1445.7	0.01	9.85*	1371.0	[0.12]
β -Bourbonene	7.65	1467.8	0.04	9.97	1379.4	0.03
Geranyl acetate	10.77	1714.0	0.03	10.05	1384.9	0.02
β -Elemene	8.62*	1542.1	[0.02]	10.10	1388.6	0.01
Methyleugenol	13.52	1955.6	0.11	10.31	1403.7	0.11
β -Caryophyllene	8.68*	1546.2	[0.86]	10.43	1412.5	0.80
β -Copaene	8.68*	1546.2	[0.86]	10.57	1423.0	0.02
α -Maaliene	8.81*	1556.6	[0.18]	10.62	1426.8	0.02
Aromadendrene	8.78*	1554.1	[0.65]	10.70	1432.2	0.17
Selina-5,11-diene	8.92	1564.7	0.03	10.76	1436.8	0.02
α -Humulene	9.54*	1614.1	[0.07]	10.89	1446.4	0.05
allo-Aromadendrene	9.26	1591.3	0.02	10.99	1453.8	0.02
(<i>E</i>)- β -Farnesene	9.84*	1637.9	[0.10]	11.03	1457.1	0.05
<i>trans</i> -Cadina-1(6),4-diene	9.54*	1614.1	[0.07]	11.18	1468.1	0.01
γ -Muurolene	9.84*	1637.9	[0.10]	11.23	1471.6	0.04
allo-Aromadendr-9-ene	9.84*	1637.9	[0.10]	11.35	1480.7	0.04
α -Selinene	10.21*	1667.9	[0.17]	11.46*	1489.0	[0.09]
Viridiflorene	9.91	1643.7	0.08	11.46*	1489.0	[0.09]
(3 <i>Z</i> ,6 <i>E</i>)- α -Farnesene	10.45	1687.4	0.02	11.52	1493.8	0.02
α -Muurolene	10.29	1674.5	0.02	11.55	1495.4	0.02
β -Bisabolene	10.42*	1684.6	[2.25]	11.70*	1506.9	[2.38]
γ -Cadinene	10.66*†	1704.7	[0.13]	11.70*	1506.9	[2.38]
δ -Cadinene	10.67*†	1705.4	[0.08]	11.85*†	1518.8	[0.07]
β -Sesquiphellandrene	10.87	1722.6	0.05	11.87*†	1520.7	[0.06]
(<i>E</i>)- α -Bisabolene	10.97	1730.7	0.04	12.13	1540.9	0.04
Spathulenol	14.63	2060.6	0.10	12.50	1570.0	0.08
Caryophyllene oxide isomer	12.95	1903.1	0.02	12.54*	1573.1	[0.20]
Caryophyllene oxide	13.02	1910.1	0.21	12.54*	1573.1	[0.20]
Humulene epoxide II	13.61*	1964.5	[0.01]	12.87	1599.3	0.02
1,10-diepi-Cubenol	13.94	1995.1	0.03	12.98	1607.5	0.03
10-epi-Cubenol?	13.61*	1964.5	[0.01]	13.14	1621.0	0.01
Caryophylladienol I	16.26	2223.6	0.03	13.18	1624.6	0.01
Caryophylladienol II	16.31	2228.6	0.01	13.23	1628.5	0.01
τ -Cadinol	15.15	2111.5	0.37	13.30	1634.5	0.14
α -Muurolol	15.46	2142.5	0.06	13.35	1638.6	0.04

Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109 (40)... 204 (35), 222 (2)]	15.41	2137.9	0.01	13.43	1645.4	0.02
α -Cadinol	15.68*	2164.9	[0.16]	13.47	1648.3	0.01
Unknown CHZI XV [m/z 161, 59 (67), 95 (45), 93 (40), 105 (40), 149 (39), 81 (39), 43 (38), 204 (37)... 220 (5)]	14.89*	2085.9	[0.01]	13.50	1650.7	0.01
(3Z)-Caryophylla-3,8(13)-dien-5 β -ol	17.03	2303.6	0.01	13.68	1665.7	0.01
epi- α -Bisabolol	15.68*	2164.9	[0.16]	13.84	1678.5	0.05
Phytone	14.89*	2085.9	[0.01]	15.74	1844.2	0.01
Unknown ORVU II [m/z 81, 150 (90), 136 (88), 135 (74), 93 (54), 121 (41)...]				15.86	1855.5	0.02
Unknown ORVU III [m/z 81, 150 (83), 136 (81), 135 (67), 93 (48), 121 (36)...]				16.27	1892.7	0.03
Unknown ORVU XIV [m/z 93, 149 (98), 150 (85), 135 (55), 43 (29)...]				16.43	1907.0	0.01
Unknown ORVU X [m/z 136, 81 (81), 150 (74), 135 (52), 93 (46), 121 (42)...]	16.20	2217.3	0.07	16.57	1920.2	0.06
Unknown ORVU XV [m/z 81, 136 (71), 150 (57), 93 (47), 135 (42)...]				16.76	1938.6	0.02
Unknown ORVU XVI [m/z 150, 135 (59), 81 (32), 136 (26), 257 (21)...]				17.14	1974.7	0.03
Unknown ORVU VII [m/z 135, 150 (95), 93 (41), 109 (34), 43 (20)...]				17.81	2039.7	0.01
Unknown ORVU XVII				18.42	2100.9	0.02

[m/z 255, 270 (52), 119 (31), 122 (26), 91 (22), 256 (22)...] Unknown MOFI VI					
[m/z 69, 41 (74), 166 (36), 91 (32), 105 (28), 43 (25)...]			18.65	2124.3	0.01
Total reported		98.66%		99.43%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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