

**Date :** March 09, 2023

**CERTIFICATE OF ANALYSIS – GC PROFILING**

**SAMPLE IDENTIFICATION**

**Internal code :** 23C02-PTH01

**Customer identification :** Oregano ORGANIC - Greece - O50113R

**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 :** Amélie Simard, Analyste

**Analysis date :** March 07, 2023

Checked and approved by :

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

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#### PHYSICOCHEMICAL DATA

**Physical aspect:** Faintly yellow liquid

**Refractive index:**  $1.5113 \pm 0.0003$  (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
Methyl 2-methylbutyrate	tr	Aliphatic ester
(2E)-Hexenal	0.01	Aliphatic aldehyde
(3Z)-Hexenol	0.01	Aliphatic alcohol
Hashishene	0.01	Monoterpene
Tricyclene	0.02	Monoterpene
$\alpha$ -Thujene	0.53	Monoterpene
$\alpha$ -Pinene	0.64	Monoterpene
Camphene	0.23	Monoterpene
$\alpha$ -Fenchene	0.01	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
$\beta$ -Pinene	0.72	Monoterpene
Sabinene	0.01	Monoterpene
Unknown	0.03	Monoterpene
Octen-3-ol	0.45	Aliphatic alcohol
Octan-3-one	0.22	Aliphatic ketone
Myrcene	1.21	Monoterpene
$\alpha$ -Phellandrene	0.02	Monoterpene
Pseudolimonene	0.03	Monoterpene
<i>cis</i> -Dehydroxylinalool oxide	0.01	Monoterpenic ether
$\Delta^3$ -Carene	0.02	Monoterpene
$\alpha$ -Terpinene	1.08	Monoterpene
meta-Cymene	0.03	Monoterpene
para-Cymene	5.78	Monoterpene
Limonene	0.76	Monoterpene
1,8-Cineole	1.15	Monoterpenic ether
ortho-Cymene	0.02	Monoterpene
(Z)- $\beta$ -Ocimene	0.01	Monoterpene
(E)- $\beta$ -Ocimene	0.02	Monoterpene
$\gamma$ -Terpinene	4.06	Monoterpene
<i>cis</i> -Sabinene hydrate	0.03	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
<i>trans</i> -Linalool oxide (fur.)	tr	Monoterpenic alcohol
Terpinolene	0.02	Monoterpene
<i>trans</i> -Sabinene hydrate	0.02	Monoterpenic alcohol
Linalool	2.83	Monoterpenic alcohol
Hotrienol	0.01	Monoterpenic alcohol
<i>cis</i> -para-Menth-2-en-1-ol	0.01	Monoterpenic alcohol
Camphor	0.63	Monoterpenic ketone
Isoborneol	0.01	Monoterpenic alcohol
Unknown	0.01	Unknown
Borneol	1.12	Monoterpenic alcohol
<i>trans</i> -2-Caren-4-ol?	0.01	Monoterpenic alcohol
Terpinen-4-ol	0.65	Monoterpenic alcohol

α-Terpineol	0.39	Monoterpenic alcohol
Myrtenal	0.03	Monoterpenic aldehyde
cis-Dihydrocarvone	0.40	Monoterpenic ketone
trans-Piperitol	0.01	Monoterpenic alcohol
Thymol methyl ether analog I (isothymol methyl ether?)	0.01	Monoterpenic ether
Carvacrol methyl ether	0.23	Monoterpenic ether
Geraniol	0.01	Monoterpenic alcohol
Linalyl acetate	0.01	Monoterpenic ester
Bornyl acetate	0.01	Monoterpenic ester
Thymol analogue I (isothymol?)	0.01	Monoterpenic alcohol
Thymol	2.06	Monoterpenic alcohol
Carvacrol	70.27	Monoterpenic alcohol
2-Methyl-6-propylphenol?	0.05	Miscellaneous
α-Terpinyl acetate	0.04	Monoterpenic ester
Eugenol	0.13	Phenylpropanoid
α-Copaene	0.03	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
β-Elemene	0.01	Sesquiterpene
Methyleugenol	0.02	Phenylpropanoid
β-Caryophyllene	2.38	Sesquiterpene
β-Copaene	0.01	Sesquiterpene
9-epi-Isocaryophyllene	0.06	Sesquiterpene
α-Humulene	0.58	Sesquiterpene
(E)-β-Farnesene	0.01	Sesquiterpene
allo-Aromadendr-9-ene	0.01	Sesquiterpene
Viridiflorene	0.01	Sesquiterpene
(3Z,6E)-α-Farnesene	0.01	Sesquiterpene
β-Bisabolene	0.04	Sesquiterpene
δ-Cadinene	0.01	Sesquiterpene
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.08	Sesquiterpenic ether
Humulene epoxide II	0.02	Sesquiterpenic ether
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	0.01	Sesquiterpenic alcohol
Unknown	0.02	Unknown
Unknown	0.02	Unknown
Unknown	0.01	Unknown
meta-Camphorene	0.01	Diterpene
Unknown	0.01	Unknown
Unknown	0.02	Unknown
<b>Consolidated total</b>	<b>99.54%</b>	

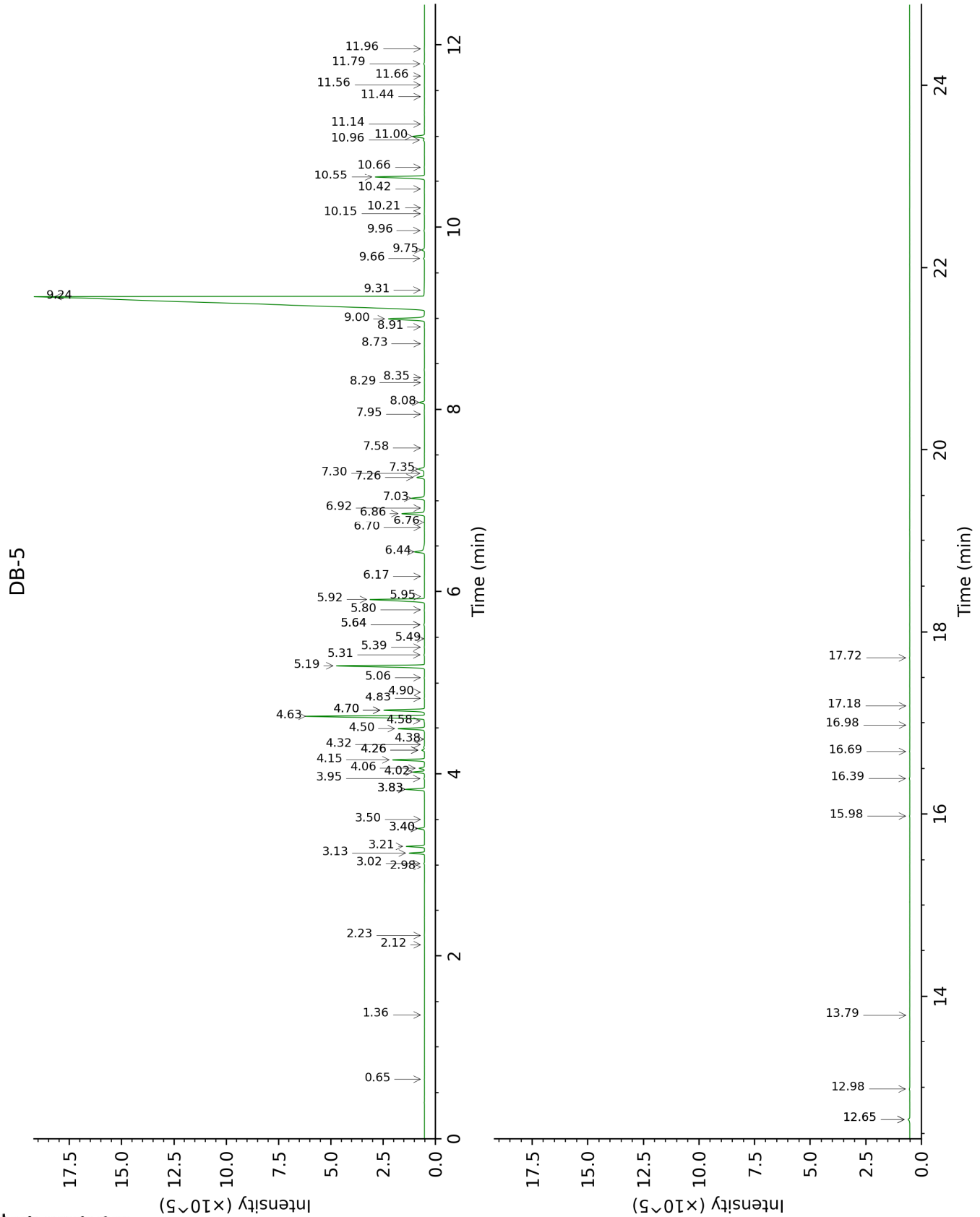
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

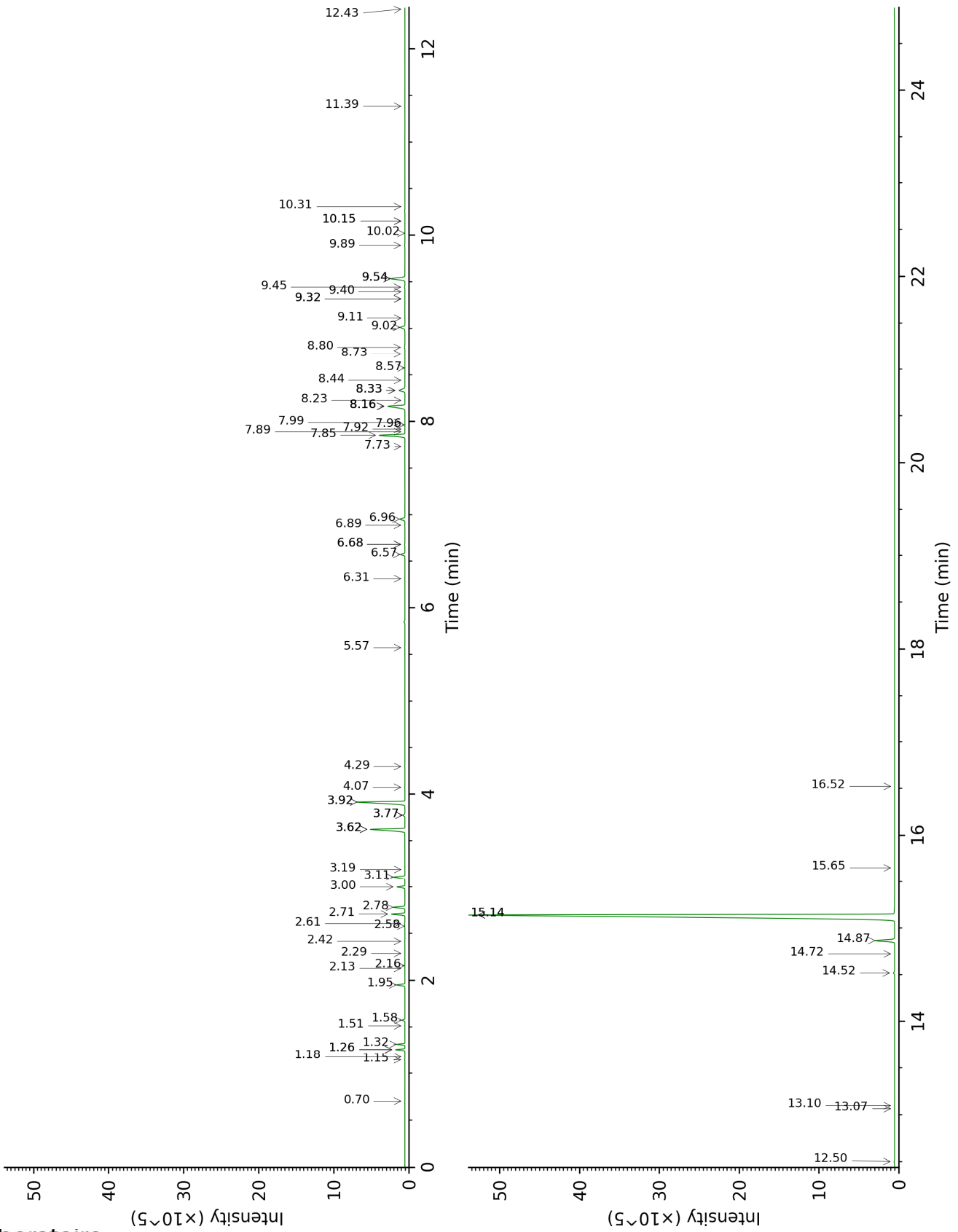
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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



DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.65	640	tr	0.70	886	tr
Methyl 2-methylbutyrate	1.36	774	tr	1.18	975	tr
(2E)-Hexenal	2.12	849	0.01	3.19	1172	0.01
(3Z)-Hexenol	2.23	857	0.01	5.57	1349	0.01
Hashishene	2.98	916	0.01	1.26*	989	0.66
Tricyclene	3.02	918	0.02	1.15	969	0.02
$\alpha$ -Thujene	3.14	926	0.53	1.32	998	0.54
$\alpha$ -Pinene	3.21	931	0.64	1.26*	989	[0.66]
Camphene	3.40*	943	0.25	1.58	1024	0.23
$\alpha$ -Fenchene	3.40*	943	[0.25]	1.51	1018	0.01
Thuja-2,4(10)-diene	3.50	950	0.01	2.16	1085	0.01
$\beta$ -Pinene	3.83*	971	0.74	1.95	1064	0.72
Sabinene	3.83*	971	[0.74]	2.13	1082	0.01
Unknown [m/z 93, 79 (73), 67 (49), 95 (42), 91 (41), 121 (38)...]	3.95	979	0.03	2.29	1098	0.01
Octen-3-ol	4.02	984	0.45	6.57	1421	0.46
Octan-3-one	4.06	987	0.22	3.78*	1219	0.22
Myrcene	4.15	993	1.21	2.71	1133	1.21
$\alpha$ -Phellandrene	4.26*	1000	0.11	2.58	1122	0.02
Pseudolimonene	4.26*	1000	[0.11]	2.61	1124	0.03
<i>cis</i> -Dehydroxylinalool oxide	4.32	1004	0.01	3.62*	1207	4.09
$\Delta$ 3-Carene	4.38	1007	0.02	2.42	1109	0.01
$\alpha$ -Terpinene	4.50	1014	1.08	2.78	1139	1.08
meta-Cymene	4.58	1020	0.03	3.92*	1229	5.82
para-Cymene	4.63	1023	5.78	3.92*	1229	[5.82]
Limonene	4.70*	1027	1.91	3.00	1156	0.76
1,8-Cineole	4.70*	1027	[1.91]	3.11	1166	1.15
ortho-Cymene	4.83	1035	0.02	4.30	1258	0.01
(Z)- $\beta$ -Ocimene	4.90	1040	0.01	3.62*	1207	[4.09]
(E)- $\beta$ -Ocimene	5.06	1050	0.02	3.78*	1219	[0.22]
$\gamma$ -Terpinene	5.19	1058	4.06	3.62*	1207	[4.09]
<i>cis</i> -Sabinene hydrate	5.31	1065	0.03	6.68*	1429	0.03
<i>cis</i> -Linalool oxide (fur.)	5.39	1070	0.02	6.31	1402	0.01
Octanol	5.49	1076	0.01	7.96	1526	0.01
<i>trans</i> -Linalool oxide (fur.)	5.64*	1086	0.04	6.68*	1429	[0.03]
Terpinolene	5.64*	1086	[0.04]	4.07	1241	0.02
<i>trans</i> -Sabinene hydrate	5.80	1096	0.02	7.73	1508	0.01
Linalool	5.92	1103	2.83	7.85	1517	2.84



Hotrienol	5.95	1105	0.01	8.57	1573	0.01
<i>cis</i> -para-Menth-2-en-1-ol	6.17	1119	0.01	7.92	1522	0.01
Camphor	6.44	1136	0.63	6.96	1450	0.60
Isoborneol	6.70	1153	0.01	9.11	1616	0.01
Unknown [m/z 123, 81 (46), 43 (45), 95 (34), 166 (30)]	6.76	1157	0.01	8.73	1585	0.01
Borneol	6.86	1163	1.12	9.54*	1650	1.88
<i>trans</i> -2-Caren-4-ol?	6.92	1167	0.01			
Terpinen-4-ol	7.03	1174	0.65	8.33*	1554	0.88
$\alpha$ -Terpineol	7.26	1188	0.39	9.54*	1650	[1.88]
Myrtenal	7.30	1191	0.03	8.44	1563	0.01
<i>cis</i> -Dihydrocarvone	7.35	1194	0.40	8.23	1546	0.02
<i>trans</i> -Piperitol	7.58	1209	0.01	10.15*	1700	0.01
Thymol methyl ether analog I (isothymol methyl ether?)	7.95	1234	0.01	8.16*	1541	2.38
Carvacrol methyl ether	8.08	1242	0.23	8.33*	1554	[0.88]
Geraniol	8.29	1257	0.01	11.39	1805	0.02
Linalyl acetate	8.35	1260	0.01	7.89	1520	0.01
Bornyl acetate	8.73	1286	0.01	7.99	1528	0.01
Thymol analogue I (isothymol?)	8.91	1298	0.01	14.72	2116	0.01
Thymol	9.00	1304	2.06	14.87	2130	2.05
Carvacrol	9.24	1321	70.27	15.14*	2158	70.39
2-Methyl-6-propylphenol?	9.31	1326	0.05			
$\alpha$ -Terpinyl acetate	9.66	1350	0.04	9.44	1643	0.04
Eugenol	9.75	1357	0.13	14.52	2096	0.14
$\alpha$ -Copaene	9.96	1372	0.03	6.89	1445	0.02
Geranyl acetate	10.15	1385	0.01	10.31	1713	0.01
$\beta$ -Elemene	10.21	1389	0.01	8.16*	1541	[2.38]
Methyleugenol	10.42	1404	0.02	13.07	1957	0.01
$\beta$ -Caryophyllene	10.55	1414	2.38	8.16*	1541	[2.38]
$\beta$ -Copaene	10.66	1422	0.01	8.16*	1541	[2.38]
9-epi-Isocaryophyllene	10.96	1444	0.06	8.80	1591	0.07
$\alpha$ -Humulene	11.00	1447	0.58	9.02	1608	0.59
( <i>E</i> )- $\beta$ -Farnesene	11.14	1457	0.01	9.32*	1632	0.02
allo-Aromadendren-9-ene	11.44	1479	0.01	9.32*	1632	[0.02]
Viridiflorene	11.56	1489	0.01	9.40	1639	0.01
(3 <i>Z</i> ,6 <i>E</i> )- $\alpha$ -Farnesene	11.66	1496	0.01	10.02	1689	0.01
$\beta$ -Bisabolene	11.80	1506	0.04	9.89	1679	0.04
$\delta$ -Cadinene	11.96	1519	0.01	10.15*	1700	[0.01]

Caryophyllene oxide isomer	12.65*	1573	0.10	12.43	1898	0.02
Caryophyllene oxide	12.65*	1573	[0.10]	12.50	1905	0.08
Humulene epoxide II	12.98	1599	0.02	13.10	1960	0.02
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.79	1666	0.01	16.52	2302	0.01
Unknown [m/z 81, 150 (90), 136 (88), 135 (74), 93 (54), 121 (41)...]	15.98	1856	0.02			
Unknown [m/z 81, 150 (83), 136 (81), 135 (67), 93 (48), 121 (36)...]	16.39	1893	0.02			
Unknown [m/z 136, 81 (81), 150 (74), 135 (52), 93 (46), 121 (42)...]	16.69	1920	0.01	15.65	2210	0.01
meta-Camphorene	16.98	1948	0.01	15.14*	2158	[70.39]
Unknown [m/z 151, 135 (46), 109 (41), 43 (26), 150 (24), 107 (23)...]	17.18	1968	0.01			
Unknown [m/z 135, 150 (66), 43 (38), 109 (27), 93 (25), 137 (20)...]	17.72	2019	0.02			
<b>Total identified</b>		<b>99.54%</b>			<b>99.39%</b>	
<b>Total reported</b>		<b>99.65%</b>			<b>99.43%</b>	

\*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total

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