

**Date :** January 19, 2023

**CERTIFICATE OF ANALYSIS – GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 23A12-PTH04

**Customer identification :** Catnip - Canada - CW0106R

**Type :** Essential oil

**Source :** *Nepeta cataria*

**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 :** January 18, 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:** Yellow liquid

**Refractive index:**  $1.4894 \pm 0.0003$  (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
Isobutyral	0.01	Aliphatic aldehyde
Isovaleral	0.06	Aliphatic aldehyde
2-Methylbutyral	0.04	Aliphatic aldehyde
Penten-3-ol	tr	Aliphatic alcohol
3-Pentanone	0.02	Aliphatic ketone
2-Ethylfuran	0.05	Furan
2-Methylbutanol	tr	Aliphatic alcohol
Senecionitrile	0.16	Aliphatic nitrile
Methyl 2-methylbutyrate	0.02	Aliphatic ester
Hexanal	0.02	Aliphatic aldehyde
Octane	0.01	Alkane
Dimethyl sulfoxide	0.02	Aliphatic sulfoxide
(2E)-Hexenal	0.10	Aliphatic aldehyde
(3Z)-Hexenol	0.02	Aliphatic alcohol
Styrene	0.03	Simple phenolic
$\alpha$ -Thujene	0.01	Monoterpene
$\alpha$ -Pinene	0.79	Monoterpene
Camphene	0.03	Monoterpene
$\beta$ -Pinene	0.70	Monoterpene
Sabinene	0.16	Monoterpene
Octen-3-ol	0.02	Aliphatic alcohol
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
Octan-3-one	0.01	Aliphatic ketone
Myrcene	0.01	Monoterpene
2-Pentylfuran	0.02	Furan
$\alpha$ -Phellandrene	0.02	Monoterpene
Octanal	0.01	Aliphatic aldehyde
para-Cymene	0.03	Monoterpene
Limonene	0.08	Monoterpene
$\beta$ -Phellandrene	0.01	Monoterpene
(Z)- $\beta$ -Ocimene	0.07	Monoterpene
(E)- $\beta$ -Ocimene	0.16	Monoterpene
$\gamma$ -Terpinene	0.02	Monoterpene
Terpinolene isomer	0.01	Monoterpene
Terpinolene	0.01	Monoterpene
Linalool	0.05	Monoterpenic alcohol
Nonanal	0.06	Aliphatic aldehyde
trans-Pinocarveol	0.01	Monoterpenic alcohol
trans-Verbenol	0.01	Monoterpenic alcohol
Terpinen-4-ol	0.02	Monoterpenic alcohol
Dill ether	0.01	Monoterpenic ether
Methyl salicylate	0.05	Phenolic ester
$\alpha$ -Terpineol	0.02	Monoterpenic alcohol
cis-Dihydrocarvone	0.03	Monoterpenic ketone
Dihydrocarveol	0.01	Monoterpenic alcohol

Hexyl butyrate	0.01	Aliphatic ester
Unknown	0.78	Oxygenated monoterpene
$\beta$ -Cyclocitral	0.03	Monoterpenic aldehyde
(3Z)-Hexenyl isovalerate	0.02	Aliphatic ester
Carvone	0.12	Monoterpenic ketone
Neral	0.01	Monoterpenic aldehyde
Geraniol	0.01	Monoterpenic alcohol
(2E)-Decenal	0.03	Aliphatic aldehyde
Geranial	0.03	Monoterpenic aldehyde
Tridecane	0.02	Alkane
Eugenol	0.13	Phenylpropanoid
4 $\alpha$ ,7 $\alpha$ ,7 $\alpha$ -Nepetalactone	23.54	Monoterpenic lactone
Nepetalactone isomer I	0.28	Unknown
4 $\alpha$ ,7 $\alpha$ ,7 $\beta$ -Nepetalactone	48.25	Monoterpenic lactone
4 $\alpha$ ,7 $\beta$ ,7 $\alpha$ -Nepetalactone	2.64	Monoterpenic lactone
Isocaryophyllene	0.28	Sesquiterpene
Isodihydronepetalactone	0.24	Monoterpenic lactone
$\beta$ -Caryophyllene	5.75	Sesquiterpene
Nepetalactone analog I	0.18	Monoterpenic lactone
Unknown	0.01	Unknown
$\alpha$ -Humulene	0.55	Sesquiterpene
Unknown	0.15	Unknown
(E)- $\beta$ -Farnesene	0.22	Sesquiterpene
(E)- $\beta$ -Ionone	0.06	Apocarotenoid
(3Z,6E)- $\alpha$ -Farnesene	0.08	Sesquiterpene
Nepetalic acid A	0.22	Monoterpenic acid
$\beta$ -Bisabolene	0.09	Sesquiterpene
Nepetalic acid B	0.58	Monoterpenic acid
Nepetalic acid C	3.15	Monoterpenic acid
(E)-Nerolidol	0.04	Sesquiterpenic alcohol
Nepetalactone analog VII	0.07	Monoterpenic lactone
Caryophyllene oxide	1.55	Sesquiterpenic ether
Caryophyllene oxide isomer	0.26	Sesquiterpenic ether
Humulene epoxide I	0.11	Sesquiterpenic ether
Humulene epoxide II	0.12	Sesquiterpenic ether
Unknown	0.04	Unknown
Unknown	0.03	Unknown
Unknown	0.04	Unknown
Nepetalactone analog II	0.02	Monoterpenic lactone
Unknown	0.08	Unknown
Unknown	0.10	Unknown
Unknown	0.48	Unknown
Unknown	0.09	Unknown
Unknown	0.10	Unknown
Unknown	1.31	Unknown
Unknown	0.22	Unknown
Unknown	0.09	Unknown
Unknown	0.03	Unknown
Phytone	0.14	Terpenic ketone
Nepetalactone analog III	0.05	Monoterpenic lactone
Unknown	0.14	Unknown
Unknown	0.10	Unknown

Unknown	0.31	Unknown
Unknown	0.06	Unknown
Nepetalactone analog IV	0.04	Monoterpenic lactone
Nepetalactone analog V	0.01	Aliphatic lactone
Nepetalactone analog VI	0.02	Monoterpenic lactone
Unknown	0.07	Unknown
Unknown	0.19	Unknown
Unknown	0.03	Unknown
Unknown	0.04	Unknown
Unknown	0.02	Unknown
Unknown	0.05	Unknown
Unknown	0.05	Unknown
Unknown	0.02	Unknown
Unknown	0.02	Unknown
Unknown	0.15	Unknown
Unknown	0.09	Unknown
<b>Consolidated total</b>	<b>96.85%</b>	

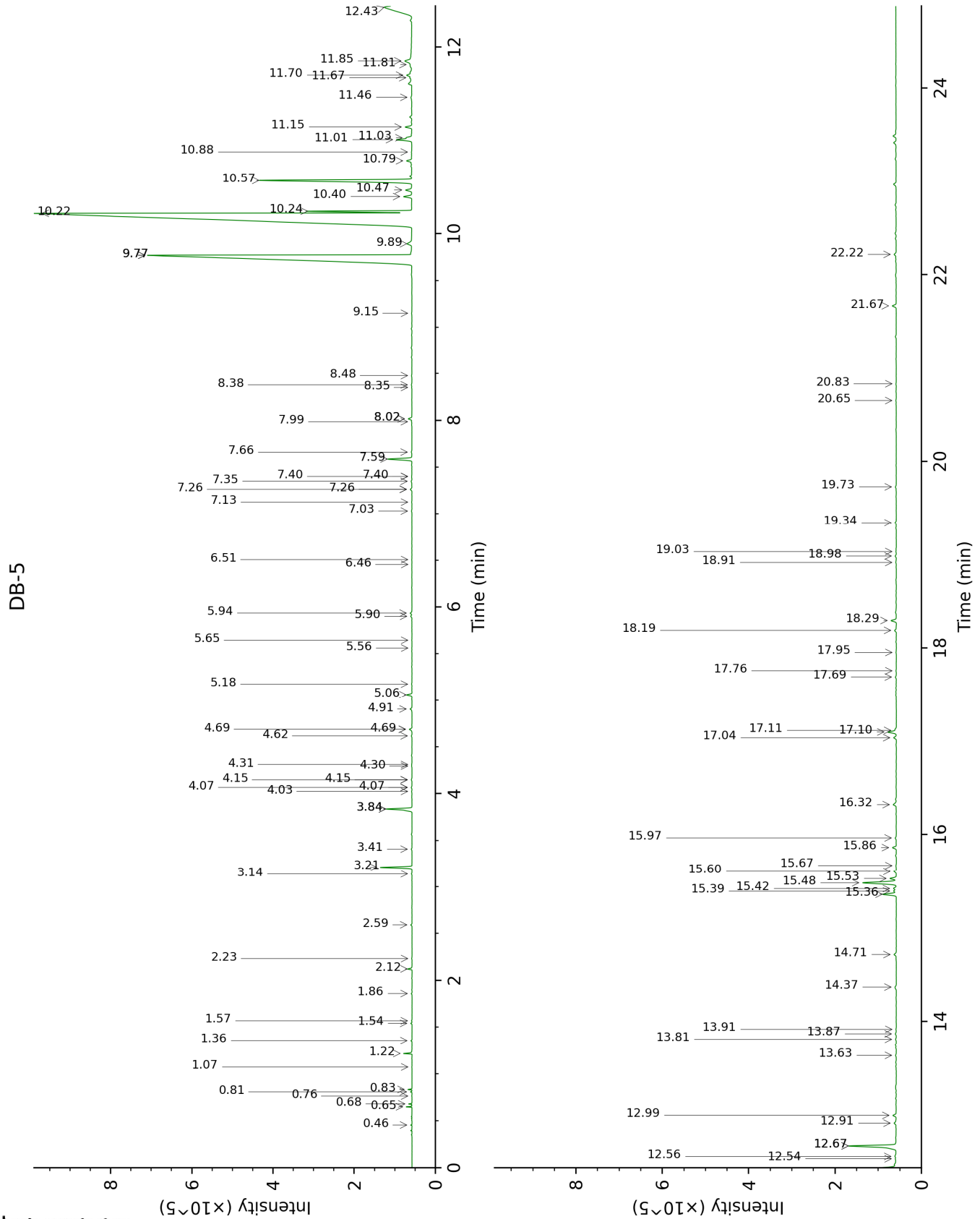
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

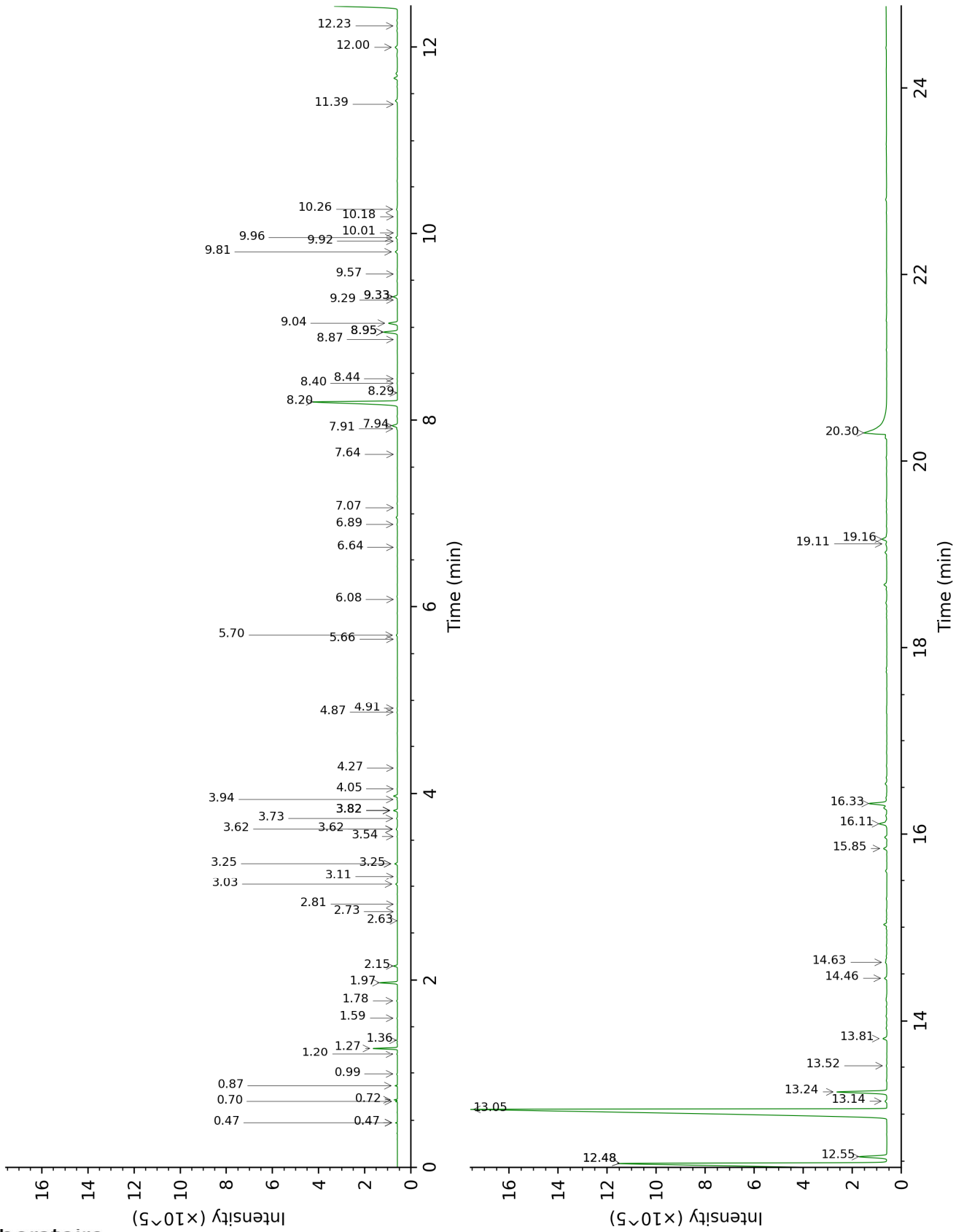
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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	%
Isobutylal	0.46	538	0.01	0.48*	783	0.04
Isovaleral	0.65	641	0.06	0.72	889	0.07
2-Methylbutylal	0.68	651	0.04	0.70	882	0.04
Penten-3-ol	0.76	678	tr	2.73	1132	0.01
3-Pentanone	0.81	693	0.02	0.99	940	0.03
2-Ethylfuran	0.83	702	0.05	0.87	918	0.05
2-Methylbutanol	1.07	735	tr	3.25*	1175	0.12
Senecionitrile	1.22	755	0.16	3.82*	1220	0.17
Methyl 2-methylbutyrate	1.36	774	0.02	1.20	977	0.02
Hexanal	1.54	799	0.02	1.78	1044	0.03
Octane	1.57	803	0.01	0.48*	783	[0.04]
Dimethyl sulfoxide	1.86	827	0.02	7.64	1498	0.01
(2E)-Hexenal	2.12	848	0.10	3.25*	1175	[0.12]
(3Z)-Hexenol	2.23	857	0.02	5.66	1351	0.02
Styrene	2.59	887	0.03	3.73	1213	0.04
$\alpha$ -Thujene	3.14	926	0.01	1.36	1000	0.02
$\alpha$ -Pinene	3.21	931	0.79	1.27	989	0.80
Camphene	3.41	944	0.03	1.59	1024	0.02
$\beta$ -Pinene	3.84*	972	0.85	1.97	1064	0.70
Sabinene	3.84*	972	[0.85]	2.15	1083	0.16
Octen-3-ol	4.03	984	0.02	6.64	1423	0.02
6-Methyl-5-hepten-2-one	4.07*	987	0.03	4.91	1297	0.02
Octan-3-one	4.07*	987	[0.03]	3.82*	1220	[0.17]
Myrcene	4.15*	992	0.03	2.81	1139	0.01
2-Pentylfuran	4.15*	992	[0.03]	3.54	1198	0.02
$\alpha$ -Phellandrene	4.30	1002	0.02	2.63	1124	0.01
Octanal	4.31	1003	0.01	4.27	1254	0.01
para-Cymene	4.62	1022	0.03	3.94	1228	0.02
Limonene	4.69*	1026	0.09	3.03	1156	0.08
$\beta$ -Phellandrene	4.69*	1026	[0.09]	3.11	1164	0.01
(Z)- $\beta$ -Ocimene	4.91	1040	0.07	3.62*	1204	0.07
(E)- $\beta$ -Ocimene	5.06	1050	0.16	3.82*	1220	[0.17]
$\gamma$ -Terpinene	5.18	1057	0.02	3.62*	1204	[0.07]
Terpinolene isomer	5.56	1081	0.01			
Terpinolene	5.65	1086	0.01	4.05	1237	0.02
Linalool	5.90	1102	0.05	7.91	1519	0.04
Nonanal	5.94	1104	0.06	5.70	1354	0.06
trans-Pinocarveol	6.46	1137	0.01	8.95*	1600	0.78
trans-Verbenol	6.51	1140	0.01	9.33*	1630	0.22
Terpinen-4-ol	7.03	1174	0.02	8.40	1557	0.02
Dill ether	7.13	1180	0.01	7.07	1455	0.01
Methyl salicylate	7.26*	1188	0.06	10.26	1707	0.05
$\alpha$ -Terpineol	7.26*	1188	[0.06]	9.57	1650	0.02
cis-Dihydrocarvone	7.35	1194	0.03	8.29	1549	0.01
Dihydrocarveol	7.40*	1197	0.02	10.18	1700	0.01
Hexyl butyrate	7.40*	1197	[0.02]	6.08	1382	0.01

Unknown [m/z 123, 138 (67), 81 (60), 95 (42), 67 (41), 80 (33)]	7.59	1209	0.78	8.95*	1600	[0.78]
β-Cyclocitral	7.66	1214	0.03	8.44	1560	0.02
(3Z)-Hexenyl isovalerate	7.99	1236	0.02	6.89	1442	0.03
Carvone	8.02*	1238	0.12	9.81	1669	0.12
Neral	8.02*	1238	[0.12]	9.29	1628	0.01
Geraniol	8.35	1260	0.01	11.39	1803	0.01
(2E)-Decenal	8.38	1262	0.03	8.87	1593	0.01
Geranial	8.48	1268	0.03	9.92	1679	0.02
Tridecane	9.15	1314	0.02	4.87	1300	0.02
Eugenol	9.77*	1357	23.67	14.63	2102	0.13
4α,7α,7α-Nepetalactone	9.77*	1357	[23.67]	12.48*	1899	23.81
Nepetalactone isomer I	9.89	1366	0.28			
4α,7α,7β-Nepetalactone	10.22	1389	48.25	13.05	1952	48.07
4α,7β,7α-Nepetalactone	10.24	1390	2.64	13.24	1969	2.72
Isocaryophyllene	10.40	1401	0.28	7.94	1522	0.30
Isodihydronepetalactone	10.47	1406	0.24	13.81	2023	0.23
β-Caryophyllene	10.57	1414	5.75	8.20	1541	5.76
Nepetalactone analog I	10.79	1430	0.18	12.00	1856	0.14
Unknown [m/z 57, 71 (93), 43 (87), 85 (48), 41 (40), 81 (36), 55 (30)...]	10.88	1437	0.01			
α-Humulene	11.01	1447	0.55	9.04	1608	0.50
Unknown [m/z 57, 71 (92), 43 (69), 85 (49), 41 (31), 55 (23)...]	11.03	1448	0.15			
(E)-β-Farnesene	11.15	1457	0.22	9.33*	1630	[0.22]
(E)-β-Ionone	11.46	1480	0.06	12.23	1877	0.04
(3Z,6E)-α-Farnesene	11.67	1496	0.08	10.01	1686	0.01
Nepetalic acid A	11.70	1498	0.22			
β-Bisabolene	11.81	1507	0.09	9.96	1682	0.08
Nepetalic acid B	11.85	1510	0.58			
Nepetalic acid C	12.43	1555	3.15	20.30	2725	4.60
(E)-Nerolidol	12.54	1563	0.04	13.52	1995	0.04
Nepetalactone analog VII	12.56	1565	0.07			
Caryophyllene oxide	12.67*	1574	1.81	12.55	1906	1.55
Caryophyllene oxide isomer	12.67*	1574	[1.81]	12.48*	1899	[23.81]
Humulene epoxide I	12.91	1593	0.11			
Humulene epoxide II	13.00	1599	0.12	13.14	1960	0.11
Unknown [m/z 81, 95 (42), 43 (41), 137 (40), 123 (35), 41 (34)...]	13.63	1651	0.04			
Unknown [m/z 81, 43 (86), 109 (82), 166 (81), 71 (54), 41 (47)...]	13.81	1666	0.03			

Unknown [m/z 81, 43 (84), 166 (84), 109 (74), 71 (58), 41 (58)...]	13.87	1671	0.04			
Nepetalactone analog II	13.92	1675	0.02			
Unknown [m/z 81, 109 (68), 41 (57), 69 (53), 167 (36), 67 (31)...]	14.37	1712	0.08			
Unknown [m/z 153, 82 (85), 43 (81), 67 (69), 81 (46)...]	14.71	1742	0.10			
Unknown [m/z 82, 81 (67), 67 (64), 55 (42), 167 (39), 41 (24), 83 (23)...]	15.36	1798	0.48	16.11	2252	0.55
Unknown [m/z 81, 96 (74), 43 (57), 87 (50), 109 (46), 166 (43)...]	15.39	1801	0.09			
Unknown [m/z 81, 109 (56), 55 (56), 41 (40), 82 (36), 67 (35)...]	15.42	1803	0.10			
Unknown [m/z 82, 81 (68), 67 (65), 55 (46), 167 (34)...]	15.48	1809	1.31	16.33	2275	1.09
Unknown [m/z 81, 166 (95), 109 (80), 43 (64), 96 (51), 87 (41)...]	15.53	1813	0.22	15.85	2225	0.19
Unknown [m/z 82, 81 (64), 67 (61), 55 (37), 41 (24), 167 (23)...]	15.60	1820	0.09			
Unknown [m/z 81, 166 (64), 109 (60), 43 (55), 55 (45), 96 (43), 41 (42)...]	15.67	1826	0.03			
Phytone	15.86	1844	0.14	14.46	2085	0.16
Nepetalactone analog III	15.97	1853	0.05			
Unknown [m/z 82, 81 (73), 67 (50), 55 (49), 83 (46), 41 (35)...]	16.32	1885	0.14			
Unknown [m/z 82, 81 (84), 58 (57), 55 (48), 83 (47), 67 (46)...]	17.04	1952	0.10			
Unknown [m/z 82, 81 (65), 83 (47), 55 (42), 67 (41), 167 (38)...]	17.10	1958	0.31	19.16	2588	0.35
Unknown [m/z 82, 81 (76), 83 (45), 55 (39), 167 (36), 67 (30)...]	17.11	1960	0.06			
Nepetalactone analog IV	17.69	2015	0.04			
Nepetalactone analog V	17.76	2021	0.01			
Nepetalactone analog VI	17.95	2041	0.02			
Unknown [m/z 93, 81 (59), 69 (52), 121 (38), 80 (35), 41 (33)...]	18.19	2064	0.07			

Unknown [m/z 93, 69 (55), 81 (52), 80 (41), 121 (35), 41 (28)...]	18.29	2074	0.19	19.11	2582	0.08
Unknown [m/z 81, 69 (68), 41 (64), 55 (57), 67 (51), 43 (42)...]	18.91	2137	0.03			
Unknown [m/z 69, 81 (98), 93 (92), 41 (55), 80 (52), 68 (43)...]	18.98	2144	0.04			
Unknown [m/z 81, 69 (63), 41 (49), 95 (49), 55 (48), 67 (45)...]	19.03	2149	0.02			
Unknown [m/z 69, 81 (80), 93 (65), 41 (49), 80 (42), 121 (40)...]	19.34	2182	0.05			
Unknown [m/z 81, 93 (68), 69 (61), 83 (48), 41 (47), 67 (42)...]	19.73	2222	0.05			
Unknown [m/z 81, 91 (64), 131 (54), 120 (38), 195 (32), 41 (31)...]	20.65	2322	0.02			
Unknown [m/z 81, 166 (96), 55 (62), 69 (52), 109 (51), 41 (50)...]	20.83	2342	0.02			
Unknown [m/z 81, 167 (96), 166 (23), 123 (19), 43 (17), 55 (17)...]	21.67	2438	0.15			
Unknown [m/z 81, 167 (44), 91 (31), 131 (29), 93 (27), 105 (26), 146 (26)...]	22.22	2501	0.09			
<b>Total identified</b>		<b>91.92%</b>			<b>92.34%</b>	
<b>Total reported</b>		<b>96.83%</b>			<b>94.59%</b>	

\*: 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