

**Date :** August 23, 2021

**CERTIFICATE OF ANALYSIS – GC PROFILING**

**SAMPLE IDENTIFICATION**

**Internal code :** 21H09-PTH04

**Customer identification :** Catnip - CW0105209R

**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 :** Sylvain Mercier, M. Sc., Chimiste 2014-005

**Analysis date :** August 11, 2021

Checked and approved by :

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Alexis St-Gelais, M. Sc., Chimiste 2013-174

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*PHYSICOCHEMICAL DATA*

**Physical aspect:** Yellow liquid

**Refractive index:**  $1.4896 \pm 0.0003$  (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
Dimethylsulfide	tr	Aliphatic sulfide
Isobutyral	0.01	Aliphatic aldehyde
3-Buten-2-one	0.01	Aliphatic ketone
Acetic acid	tr	Aliphatic acid
Isovaleral	0.03	Aliphatic aldehyde
2-Methylbutyral	0.03	Aliphatic aldehyde
Penten-3-ol	tr	Aliphatic alcohol
3-Pentanone	0.02	Aliphatic ketone
2-Ethylfuran	0.03	Furan
2-Methylbutanol	tr	Aliphatic alcohol
Senecionitrile	0.14	Aliphatic nitrile
Methyl 2-methylbutyrate	0.02	Aliphatic ester
Hexanal	0.01	Aliphatic aldehyde
Octane	tr	Alkane
Dimethyl sulfoxide	0.01	Aliphatic sulfoxide
(2E)-Hexenal	0.09	Aliphatic aldehyde
(3Z)-Hexenol	0.02	Aliphatic alcohol
Styrene	0.04	Simple phenolic
(3Z)-Hexenyl formate	tr	Aliphatic ester
$\alpha$ -Thujene	0.02	Monoterpene
$\alpha$ -Pinene	0.21	Monoterpene
Camphene	0.01	Monoterpene
Sabinene	0.09	Monoterpene
$\beta$ -Pinene	0.96	Monoterpene
3-Butenyl isothiocyanate	0.01	Aliphatic thioester
Octen-3-ol	0.01	Aliphatic alcohol
Octan-3-one	0.02	Aliphatic ketone
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
2-Pentylfuran	0.01	Furan
Myrcene	0.02	Monoterpene
$\alpha$ -Phellandrene	0.02	Monoterpene
$\alpha$ -Terpinene	0.03	Monoterpene
para-Cymene	0.04	Monoterpene
Limonene	0.13	Monoterpene
$\beta$ -Phellandrene	0.02	Monoterpene
1,8-Cineole	0.01	Monoterpenic ether
(Z)- $\beta$ -Ocimene	0.09	Monoterpene
(E)- $\beta$ -Ocimene	0.28	Monoterpene
$\gamma$ -Terpinene	0.05	Monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene isomer	0.02	Monoterpene
Terpinolene	0.01	Monoterpene
Linalool	0.05	Monoterpenic alcohol
Nonanal	0.03	Aliphatic aldehyde
trans-Verbenol	0.02	Monoterpenic alcohol

Terpinen-4-ol	0.04	Monoterpenic alcohol
Dill ether	0.03	Monoterpenic ether
Methyl salicylate	0.04	Phenolic ester
$\alpha$ -Terpineol	0.04	Monoterpenic alcohol
Hexyl butyrate	0.01	Aliphatic ester
Dihydrocarveol	0.02	Monoterpenic alcohol
Unknown	1.29	Oxygenated monoterpene
$\beta$ -Cyclocitral	0.03	Monoterpenic aldehyde
(3Z)-Hexenyl isovalerate	0.02	Aliphatic ester
Carvone	0.27	Monoterpenic ketone
(2E)-Decenal	0.01	Aliphatic aldehyde
Geranial	0.02	Monoterpenic aldehyde
Tridecane	0.02	Alkane
Eugenol	0.05	Phenylpropanoid
4 $\alpha$ ,7 $\alpha$ ,7 $\alpha$ -Nepetalactone	15.92	Monoterpenic lactone
Nepetalactone isomer I	0.13	Unknown
4 $\alpha$ ,7 $\alpha$ ,7 $\beta$ -Nepetalactone	55.23	Monoterpenic lactone
4 $\alpha$ ,7 $\beta$ ,7 $\alpha$ -Nepetalactone	1.31	Monoterpenic lactone
Isocaryophyllene	0.21	Sesquiterpene
Isodihydronepetalactone	0.22	Monoterpenic lactone
$\beta$ -Caryophyllene	6.89	Sesquiterpene
Nepetalactone analog I	0.13	Monoterpenic lactone
Unknown	0.01	Unknown
$\alpha$ -Humulene	0.59	Sesquiterpene
Unknown	0.07	Unknown
(E)- $\beta$ -Farnesene	0.26	Sesquiterpene
Nepetalic acid A	0.17	Monoterpenic acid
Nepetalic acid B	0.37	Monoterpenic acid
$\beta$ -Bisabolene	0.07	Sesquiterpene
Nepetalic acid C	2.96	Monoterpenic acid
(E)-Nerolidol	0.03	Sesquiterpenic alcohol
Nepetalactone analog VII	0.06	Monoterpenic lactone
Caryophyllene oxide	1.98	Sesquiterpenic ether
Caryophyllene oxide isomer	0.10	Sesquiterpenic ether
Humulene epoxide I	0.01	Sesquiterpenic ether
Humulene epoxide II	0.11	Sesquiterpenic ether
Caryophylladienol II	0.05	Sesquiterpenic alcohol
Unknown	0.08	Unknown
Unknown	0.02	Unknown
Unknown	0.05	Unknown
Nepetalactone analog II	0.02	Monoterpenic lactone
Unknown	0.07	Unknown
Unknown	0.01	Unknown
Unknown	0.09	Unknown
Unknown	0.71	Unknown
Unknown	0.10	Unknown
Unknown	0.11	Unknown
Unknown	1.89	Unknown
Unknown	0.20	Unknown
Unknown	0.28	Unknown
Unknown	0.10	Unknown
Phytone	0.17	Terpenic ketone

Nepetalactone analog III	0.11	Monoterpenic lactone
Unknown	0.16	Unknown
Unknown	0.12	Unknown
Unknown	0.05	Unknown
Unknown	0.52	Unknown
Nepetalactone analog IV	0.05	Monoterpenic lactone
Nepetalactone analog V	0.04	Aliphatic lactone
Nepetalactone analog VI	0.04	Monoterpenic lactone
Unknown	0.07	Unknown
Unknown	0.16	Unknown
Unknown	0.02	Unknown
Unknown	0.06	Unknown
Unknown	0.06	Unknown
Unknown	0.02	Unknown
Unknown	0.03	Unknown
Unknown	0.04	Unknown
Unknown	0.05	Unknown
Unknown	0.05	Unknown
Unknown	0.09	Unknown
Unknown	0.14	Unknown
<b>Consolidated total</b>	<b>97.17%</b>	

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

Note: no correction factor was applied

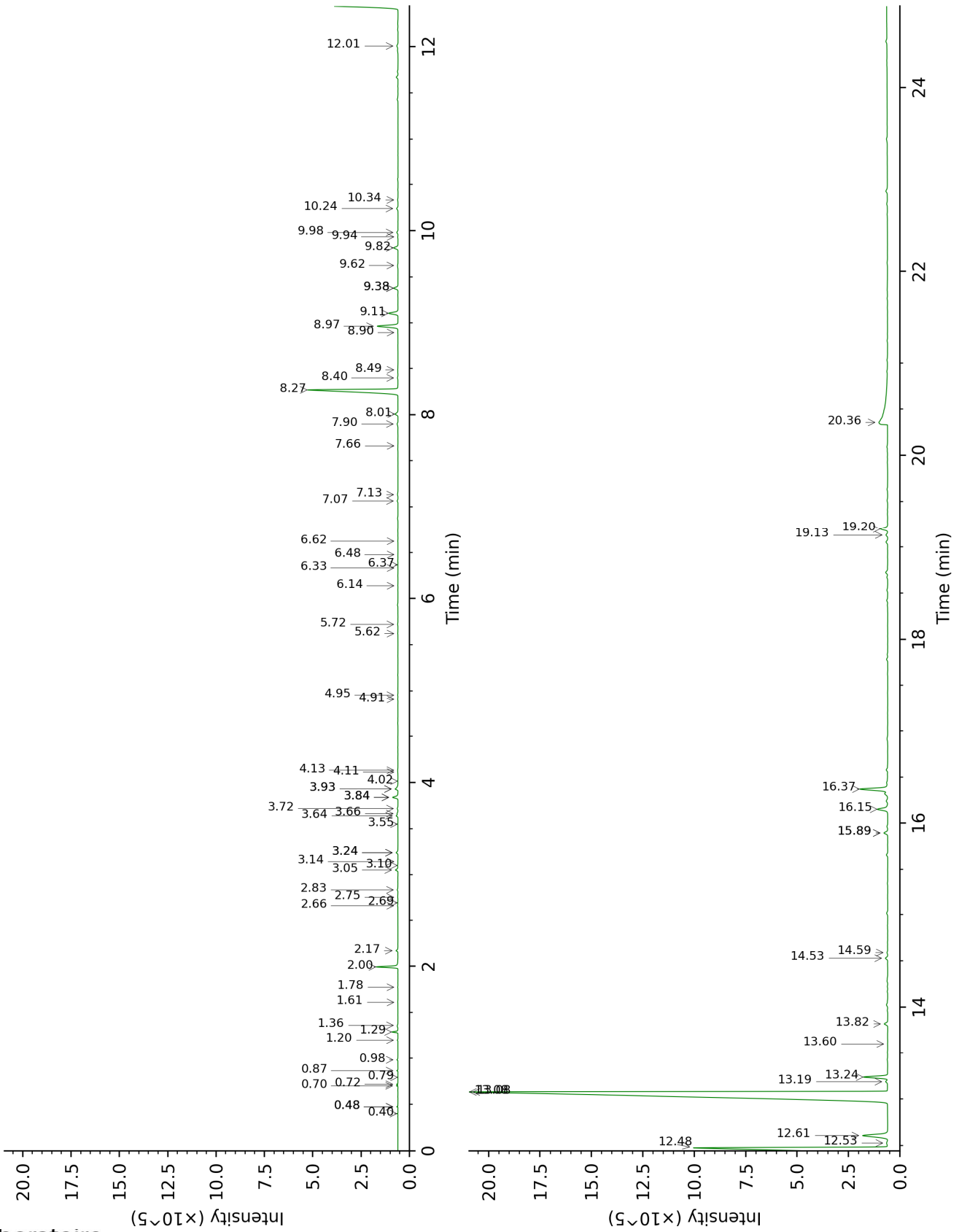
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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	%
Dimethylsulfide	0.37	510	tr	0.40	718	0.01
Isobutyral	0.40	535	0.01	0.48*	782	0.02
3-Buten-2-one	0.43	571	0.01	0.79	906	tr
Acetic acid	0.46	595	tr	6.48	1408	0.01
Isovaleral	0.56	641	0.03	0.72	886	0.03
2-Methylbutyral	0.59	651	0.03	0.70	880	0.03
Penten-3-ol	0.66	677	tr	2.69	1128	0.01
3-Pentanone	0.70	694	0.02	0.98	938	0.03
2-Ethylfuran	0.72	700	0.03	0.87	918	0.02
2-Methylbutanol	0.93	734	tr	3.24*	1173	0.10
Senecionitrile	1.06	754	0.14	3.93*	1226	0.19
Methyl 2-methylbutyrate	1.19	774	0.02	1.20	976	0.02
Hexanal	1.36	800	0.01	1.78	1043	0.01
Octane	1.37	802	tr	0.48*	782	[0.02]
Dimethyl sulfoxide	1.65	827	0.01	7.66	1497	0.01
(2E)-Hexenal	1.90	849	0.09	3.24*	1173	[0.10]
(3Z)-Hexenol	2.00	857	0.02	5.62	1346	0.01
Styrene	2.34	886	0.04	3.72	1210	0.04
(3Z)-Hexenyl formate	2.84	924	tr	4.02	1233	0.01
$\alpha$ -Thujene	2.86	926	0.02	1.36	1001	0.02
$\alpha$ -Pinene	2.93	930	0.21	1.29	991	0.20
Camphene	3.12	943	0.01	1.61	1026	0.01
Sabinene	3.54*	971	1.03	2.17	1083	0.09
$\beta$ -Pinene	3.54*	971	[1.03]	2.00	1065	0.96
3-Butenyl isothiocyanate	3.67	980	0.01	6.37	1400	0.01
Octen-3-ol	3.69	982	0.01	6.62	1419	0.01
Octan-3-one	3.78*	988	0.03	3.84*	1220	0.31
6-Methyl-5-hepten-2-one	3.78*	988	[0.03]	4.95	1298	0.02
2-Pentylfuran	3.85*	993	0.02	3.55	1198	0.01
Myrcene	3.85*	993	[0.02]	2.75	1133	0.02
$\alpha$ -Phellandrene	3.99	1002	0.02	2.66	1126	0.02
$\alpha$ -Terpinene	4.19	1014	0.03	2.83	1139	0.03
para-Cymene	4.30	1022	0.04	3.93*	1226	[0.19]
Limonene	4.37*	1026	0.16	3.05	1157	0.13
$\beta$ -Phellandrene	4.37*	1026	[0.16]	3.10	1161	0.02
1,8-Cineole	4.37*	1026	[0.16]	3.14	1165	0.01
(Z)- $\beta$ -Ocimene	4.59	1040	0.09	3.64	1205	0.08
(E)- $\beta$ -Ocimene	4.75	1050	0.28	3.84*	1220	[0.31]
$\gamma$ -Terpinene	4.86	1057	0.05	3.66	1206	0.05
cis-Linalool oxide (fur.)	5.04	1068	0.01	6.33	1398	0.01
Terpinolene isomer	5.23	1080	0.02	4.13	1242	0.02
Terpinolene	5.32	1086	0.01	4.11	1240	0.01
Linalool	5.57	1102	0.05	7.90	1515	0.07
Nonanal	5.62	1105	0.03	5.72	1353	0.02
trans-Verbenol	6.18	1141	0.02	9.38*	1632	0.26
Terpinen-4-ol	6.69	1174	0.04	8.40	1554	0.04
Dill ether	6.80	1181	0.03	7.14	1458	0.04

Methyl salicylate	6.92*	1189	0.10	10.34	1710	0.04
α-Terpineol	6.92*	1189	[0.10]	9.62	1652	0.04
Hexyl butyrate	7.03	1196	0.01	6.14	1384	0.01
Dihydrocarveol	7.07	1198	0.02	10.24	1702	0.09
Unknown [m/z 123, 138 (67), 81 (60), 95 (42), 67 (41), 80 (33)]	7.26	1211	1.29	8.97	1598	1.31
β-Cyclocitral	7.33	1215	0.03	8.49	1561	0.02
(3Z)-Hexenyl isovalerate	7.65	1237	0.02	7.07	1452	0.05
Carvone	7.68	1239	0.27	9.82	1668	0.27
(2E)-Decenal	8.05	1264	0.01	8.90	1593	0.01
Geranial	8.15	1270	0.02	9.94	1677	0.02
Tridecane	8.64	1304	0.02	4.91	1301	0.02
Eugenol	9.42*	1359	15.63	14.59	2096	0.05
4αα,7α,7αα-Nepetalactone	9.42*	1359	[15.63]	12.48	1896	15.92
Nepetalactone isomer I	9.56	1368	0.13			
4αα,7α,7αβ-Nepetalactone	9.91	1393	55.23	13.08*	1952	56.01
4αα,7β,7αα-Nepetalactone	9.92	1394	1.31	13.24	1967	1.36
Isocaryophyllene	10.04	1402	0.21	8.01	1524	0.20
Isodihydronepetalactone	10.13	1409	0.22	13.82	2022	0.22
β-Caryophyllene	10.21	1415	6.89	8.27	1544	7.00
Nepetalactone analog I	10.44	1433	0.13	12.01	1855	0.10
Unknown [m/z 57, 71 (93), 43 (87), 85 (48), 41 (40), 81 (36), 55 (30)...]	10.53	1439	0.01			
α-Humulene	10.64	1447	0.59	9.11	1610	0.59
Unknown [m/z 57, 71 (92), 43 (69), 85 (49), 41 (31), 55 (23)...]	10.68	1450	0.07			
(E)-β-Farnesene	10.80	1459	0.26	9.38*	1632	[0.26]
Nepetalic acid A	11.18	1487	0.17			
Nepetalic acid B	11.44*	1507	0.44			
β-Bisabolene	11.44*	1507	[0.44]	9.98	1681	0.07
Nepetalic acid C	12.04	1554	2.96	20.36	2731	3.41
(E)-Nerolidol	12.13	1561	0.03	13.60	2001	0.01
Nepetalactone analog VII	12.20	1567	0.06			
Caryophyllene oxide	12.30*	1575	2.01	12.61	1909	1.98
Caryophyllene oxide isomer	12.30*	1575	[2.01]	12.53	1901	0.10
Humulene epoxide I	12.50	1590	0.01	13.08*	1952	[56.01]
Humulene epoxide II	12.62	1600	0.11	13.19	1962	0.12
Caryophylladienol II	12.93	1625	0.05	15.90*	2228	0.25
Unknown [m/z 81, 95 (42), 43 (41), 137 (40), 123 (35), 41 (34)...]	13.27	1654	0.08			
Unknown [m/z 81, 43 (86), 109 (82), 166 (81), 71 (54), 41 (47)...]	13.42	1666	0.02			

Unknown [m/z 81, 43 (84), 166 (84), 109 (74), 71 (58), 41 (58)...]	13.51	1673	0.05			
Nepetalactone analog II	13.56	1677	0.02			
Unknown [m/z 81, 109 (68), 41 (57), 69 (53), 167 (36), 67 (31)...]	14.01	1715	0.07			
Unknown [m/z 153, 82 (85), 43 (81), 67 (69), 81 (46)...]	14.31	1741	0.01			
Unknown [m/z 153, 43 (81), 81 (59), 55 (40), 41 (37), 82 (33)...]	14.36	1745	0.09			
Unknown [m/z 82, 81 (67), 67 (64), 55 (42), 167 (39), 41 (24), 83 (23)...]	15.00	1801	0.71	16.15	2254	0.75
Unknown [m/z 81, 96 (74), 43 (57), 87 (50), 109 (46), 166 (43)...]	15.03	1804	0.10			
Unknown [m/z 81, 109 (56), 55 (56), 41 (40), 82 (36), 67 (35)...]	15.06	1806	0.11			
Unknown [m/z 82, 81 (68), 67 (65), 55 (46), 167 (34)...]	15.13*	1813	2.12	16.37	2277	1.89
Unknown [m/z 81, 166 (95), 109 (80), 43 (64), 96 (51), 87 (41)...]	15.13*	1813	[2.12]	15.90*	2228	[0.25]
Unknown [m/z 82, 81 (64), 67 (61), 55 (37), 41 (24), 167 (23)...]	15.17	1816	0.28			
Unknown [m/z 81, 166 (64), 109 (60), 43 (55), 55 (45), 96 (43), 41 (42)...]	15.24	1823	0.10			
Phytone	15.50	1847	0.17	14.53	2090	0.15
Nepetalactone analog III	15.60	1855	0.11			
Unknown [m/z 82, 81 (73), 67 (50), 55 (49), 83 (46), 41 (35)...]	15.95	1888	0.16			
Unknown [m/z 82, 81 (84), 58 (57), 55 (48), 83 (47), 67 (46)...]	16.66	1955	0.12			
Unknown [m/z 82, 81 (76), 83 (45), 55 (39), 167 (36), 67 (30)...]	16.73*	1961	0.57			
Unknown [m/z 82, 81 (65), 83 (47), 55 (42), 67 (41), 167 (38)...]	16.73*	1961	[0.57]	19.20	2592	0.52
Nepetalactone analog IV	17.32	2018	0.05			
Nepetalactone analog V	17.38	2024	0.04			
Nepetalactone analog VI	17.58	2043	0.04			

Unknown [m/z 93, 81 (59), 69 (52), 121 (38), 80 (35), 41 (33)...]	17.82	2067	0.07			
Unknown [m/z 93, 69 (55), 81 (52), 80 (41), 121 (35), 41 (28)...]	17.92	2078	0.16	19.13	2584	0.12
Unknown [m/z 81, 69 (68), 41 (64), 55 (57), 67 (51), 43 (42)...]	18.49	2135	0.02			
Unknown [m/z 69, 81 (98), 93 (92), 41 (55), 80 (52), 68 (43)...]	18.54	2141	0.06			
Unknown [m/z 81, 69 (63), 41 (49), 95 (49), 55 (48), 67 (45)...]	18.61	2148	0.06			
Unknown [m/z 69, 81 (80), 93 (65), 41 (49), 80 (42), 121 (40)...]	18.91	2179	0.02			
Unknown [m/z 81, 93 (68), 69 (61), 83 (48), 41 (47), 67 (42)...]	19.35	2226	0.03			
Unknown [m/z 81, 43 (86), 44 (67), 166 (58), 55 (57), 67 (55)...]	19.95	2290	0.04			
Unknown [m/z 81, 91 (64), 131 (54), 120 (38), 195 (32), 41 (31)...]	20.26	2324	0.05			
Unknown [m/z 81, 166 (96), 55 (62), 69 (52), 109 (51), 41 (50)...]	20.45	2345	0.05			
Unknown [m/z 81, 167 (96), 166 (23), 123 (19), 43 (17), 55 (17)...]	21.28	2440	0.09			
Unknown [m/z 81, 167 (44), 91 (31), 131 (29), 93 (27), 105 (26), 146 (26)...]	21.83	2504	0.14			
<b>Total identified</b>		<b>92.72%</b>		<b>91.13%</b>		
<b>Total reported</b>		<b>96.79%</b>		<b>95.73%</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