CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24G10-PTH04
Customer Identification : Organic Green Mandarin - Brazil - MI0106R
Type : Essential Oil
Source : *Citrus reticulata cv. Mandarine*
Customer : Plant Therapy

Checked an approved by:

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

MÉTHODE CERTIFIÉE
*-ISO 17025:2017
CERTIFIED METHOD

Laboratoire PhytoChemia

628 Boulevard du Saguenay Ouest, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

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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 : Sylvain Mercier, M. Sc., Chimiste 2014-005
Date : 2024-07-19

PHYSICOCHEMICAL DATA

Refractive index : 1.4769 ± 0.0003 (20 ℃)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2024-07-11

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

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ANALYSIS SUMMARY - CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Nonane	0.01	Alkane
α-Thujene	0.87	Monoterpene
α-Pinene	2.30	Monoterpene
Camphene	0.03	Monoterpene
Sabinene	0.29	Monoterpene
β-Pinene	1.78	Monoterpene
Myrcene	1.74	Monoterpene
α-Phellandrene	0.07	Monoterpene
Octanal	0.08	Aliphatic aldehyde
α-Terpinene	0.40	Monoterpene
para-Cymene	1.07	Monoterpene
β-Phellandrene	0.23	Monoterpene
Limonene	64.36	Monoterpene
(*Z*)-β-Ocimene	0.01	Monoterpene
(*E*)-β-Ocimene	0.04	Monoterpene
γ-Terpinene	21.32	Monoterpene
cis-Sabinene hydrate	0.06	Monoterpenic alcohol
Terpinolene	0.94	Monoterpene
trans-Sabinene hydrate	0.10	Monoterpenic alcohol
Linalool	0.14	Monoterpenic alcohol
Nonanal	0.03	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.04	Monoterpenic ether
trans-Limonene oxide	0.05	Monoterpenic ether
Epoxyterpinolene	0.07	Monoterpenic ether
Citronellal	0.03	Monoterpenic aldehyde
Borneol	0.05	Monoterpenic alcohol
Nonanol	0.01	Aliphatic alcohol
Terpinen-4-ol	0.06	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	0.25	Monoterpenic alcohol
Unknown	0.02	Unknown
Unknown	0.02	Unknown
Decanal	0.07	Aliphatic aldehyde
Nerol	0.01	Monoterpenic alcohol
Citronellol	0.04	Monoterpenic alcohol
Carvone	0.01	Monoterpenic ketone
Isopiperitenone	0.01	Monoterpenic ketone
Perillaldehyde	0.07	Monoterpenic aldehyde
Thymol	0.17	Monoterpenic alcohol

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Compound	Value	Class
Undecanal	0.02	Aliphatic aldehyde
α-Copaene	0.02	Sesquiterpene
β-Cubebene	0.01	Sesquiterpene
Dimethyl anthranilate	0.71	Phenolic ester
β-Caryophyllene	0.16	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
(2*E*)-Dodecenal	0.01	Aliphatic aldehyde
Germacrene D	0.01	Sesquiterpene
α-Selinene	0.08	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.35	Sesquiterpene
δ-Cadinene	0.02	Sesquiterpene
Caryophyllene oxide	0.02	Sesquiterpenic ether
(2*E*)-Tetradecenal	tr	Aliphatic aldehyde
β-Sinensal	0.01	Sesquiterpenic aldehyde
α-Sinensal	0.39	Sesquiterpenic aldehyde
Phytone	0.02	Terpenic ketone
Palmitic acid	0.06	Aliphatic acid
Phytol	0.01	Diterpenic alcohol
Oleic acid	0.06	Aliphatic acid
cis-Vaccenic acid?	0.05	Aliphatic acid
Tangeretin	0.37	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.07	Flavonoid
Nobiletin	0.15	Flavonoid
Consolidated total	**99.53**	

tr: The compound has been detected below 0.005% of the total signal
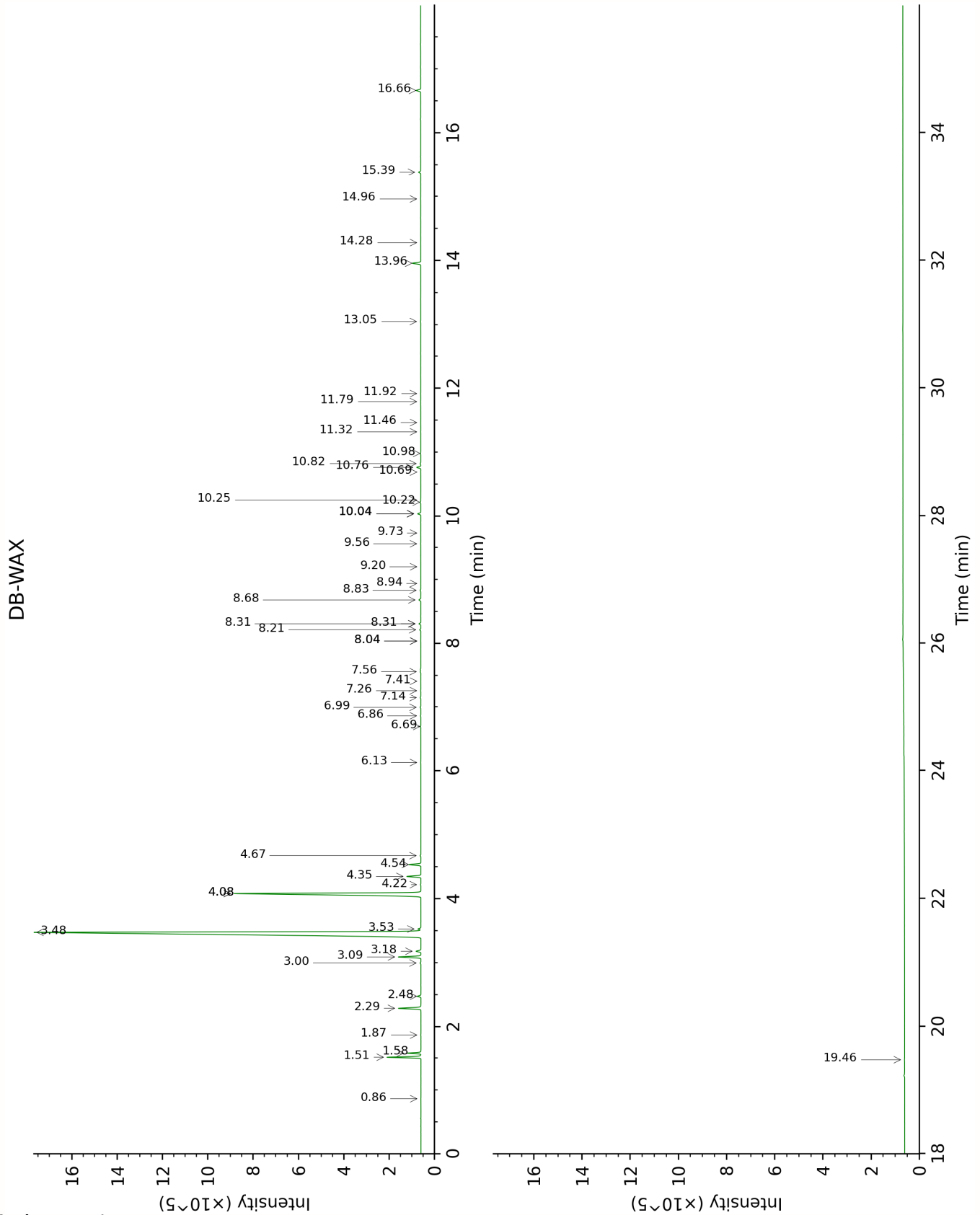
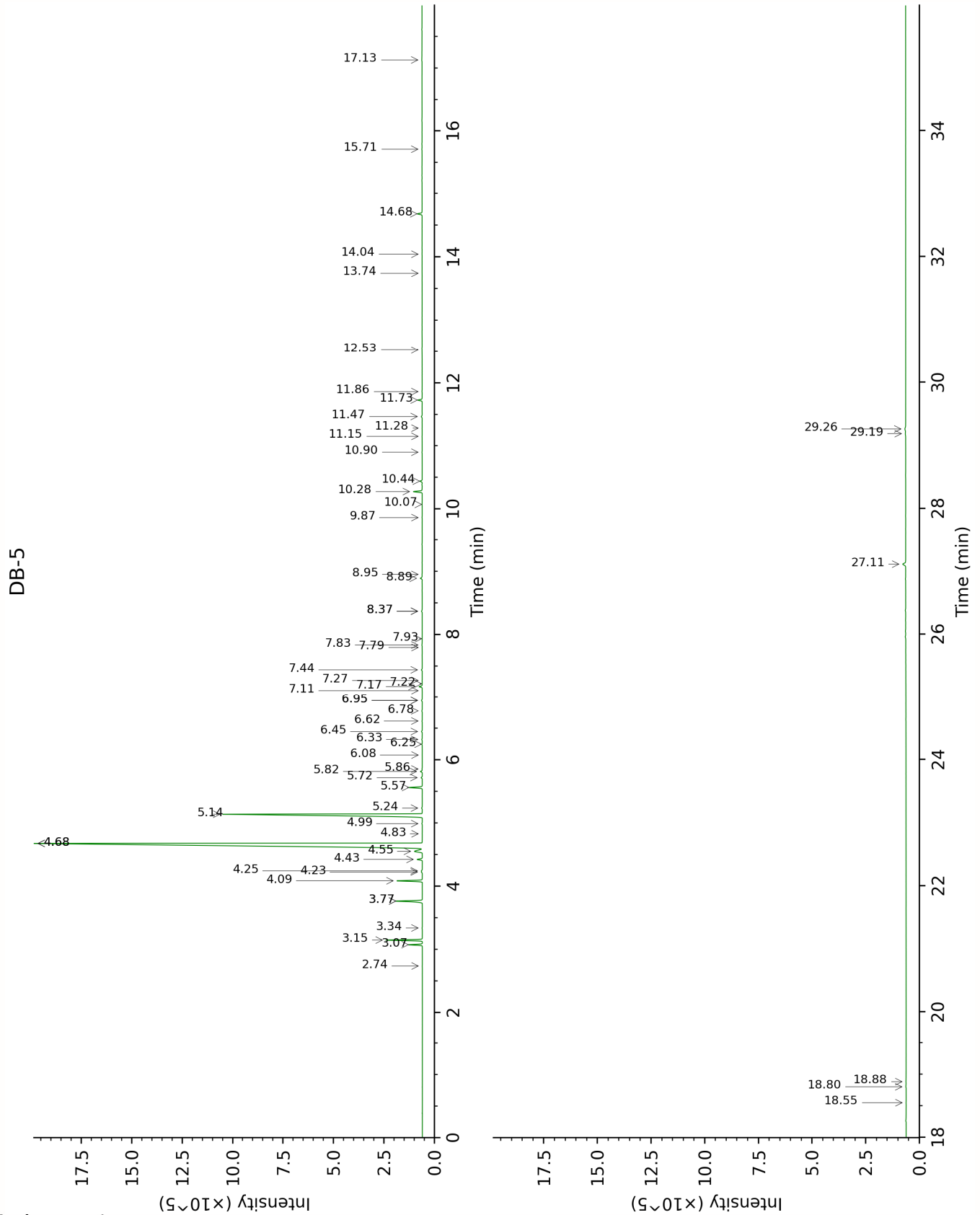Note: no correction factor was applied

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.

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

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DB-WAX

Time (min)

Intensity (×10^5)

Time (min)

Intensity (×10^5)

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DB-5

Time (min)

Time (min)

Intensity (×10^5)

Intensity (×10^5)

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FULL ANALYSIS DATA

Nonane	**Column DB-WAX**			**Column DB-5**		
	0.86	892.4	0.01	2.74	905.1	0.01
α-Thujene	1.58	1000.5	0.88	3.07	927.4	0.87
α-Pinene	1.51	994.0	2.30	3.15	932.3	2.30
Camphene	1.87	1028.7	0.02	3.34	945.0	0.03
Sabinene	2.48	1086.4	0.29	3.77*	973.2	[2.03]
β-Pinene	2.29	1068.6	1.78	3.77*	973.2	[2.03]
Myrcene	3.09	1135.0	1.76	4.09	994.5	1.74
α-Phellandrene	3.00	1127.7	0.08	4.23	1003.7	0.07
Octanal	4.67	1250.3	0.07	4.24	1004.9	0.08
α-Terpinene	3.18	1141.7	0.42	4.43	1016.3	0.40
para-Cymene	4.35	1227.6	1.11	4.55	1024.3	1.07
β-Phellandrene	3.53	1168.0	0.23	4.68*	1032.2	[64.15]
Limonene	3.48	1164.1	64.36	4.68*	1032.2	[64.15]
(*Z*)-β-Ocimene	4.08*	1208.8	[21.49]	4.83	1041.7	0.01
(*E*)-β-Ocimene	4.22	1218.5	0.04	4.99	1051.8	0.04
γ-Terpinene	4.08*	1208.8	[21.49]	5.14	1061.2	21.32
cis-Sabinene hydrate	7.14	1430.9	0.06	5.24	1067.3	0.06
Terpinolene	4.54	1240.5	0.95	5.57	1087.8	0.94
trans-Sabinene hydrate	8.22	1509.8	0.10	5.72	1097.5	0.10
Linalool	8.31*	1516.9	[0.15]	5.82	1103.7	0.14
Nonanal	6.13	1358.2	0.02	5.86	1106.2	0.03
trans-*para*-Mentha-2,8-dien-1-ol	9.20	1584.9	0.01	6.08	1120.3	0.01
cis-Limonene oxide	6.69	1398.0	0.04	6.25	1131.3	0.04
trans-Limonene oxide	6.86	1410.2	0.04	6.33	1136.1	0.05
Epoxyterpinolene	6.99	1419.8	0.07	6.45	1144.1	0.07
Citronellal	7.26	1439.6	0.02	6.62	1154.8	0.03
Borneol	10.04*	1651.7	[0.26]	6.78	1165.1	0.05
Nonanol	9.73	1626.6	0.01	6.95*	1175.7	[0.07]
Terpinen-4-ol	8.83	1556.8	0.06	6.95*	1175.7	[0.07]
para-Cymen-8-ol	11.79	1796.9	0.02	7.11	1186.2	0.01
α-Terpineol	10.04*	1651.7	[0.26]	7.18	1190.3	0.25
Unknown MISC XXXI [m/z 121, 79 (98), 93 (87), 94 (73), 91 (63), 105 (45)...]	8.04*	1496.3	[0.03]	7.22	1193.2	0.02
Unknown MISC XXXII [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39), 84 (37)...]	8.31*	1516.9	[0.15]	7.27	1196.6	0.02
Decanal	7.56	1461.3	0.06	7.44	1207.5	0.07
Nerol	11.32	1756.9	0.02	7.80	1231.2	0.01

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Citronellol	10.98	1728.7	0.04	7.84	1233.9	0.04
Carvone	10.25	1668.8	0.02	7.93	1240.5	0.01
Isopiperitenone	11.46	1769.1	0.01	8.37*	1269.7	[0.07]
Perillaldehyde	10.82	1715.4	0.07	8.37*	1269.7	[0.07]
Thymol	15.39	2129.9	0.17	8.89	1304.7	0.17
Undecanal	8.94	1564.9	0.01	8.95	1309.0	0.02
α-Copaene	7.41	1450.4	0.01	9.86	1373.4	0.02
β-Cubebene	8.04*	1496.3	[0.03]	10.07	1388.1	0.01
Dimethyl anthranilate	13.96	1991.6	0.73	10.28	1402.5	0.71
β-Caryophyllene	8.68	1545.3	0.17	10.44	1414.7	0.16
α-Humulene	9.56	1613.2	0.02	10.90	1448.8	0.02
(2*E*)-Dodecenal	11.92	1807.9	0.02	11.15	1467.6	0.01
Germacrene D	10.04*	1651.7	[0.26]	11.28	1477.3	0.01
α-Selinene	10.22	1666.0	0.08	11.47	1491.0	0.08
(3*E*,6*E*)-α-Farnesene	10.76	1710.4	0.34	11.73	1510.7	0.35
δ-Cadinene	10.69	1704.3	0.02	11.86	1521.3	0.02
Caryophyllene oxide	13.05	1908.3	0.04	12.53	1573.5	0.02
(2*E*)-Tetradecenal	14.28	2022.3	0.01	13.74	1672.4	tr
β-Sinensal				14.04	1697.4	0.01
α-Sinensal	16.66	2260.2	0.41	14.68	1752.3	0.39
Phytone	14.96	2087.4	0.03	15.71	1843.8	0.02
Palmitic acid				17.13	1975.4	0.06
Phytol	19.46	2571.1	0.02	18.55	2115.9	0.01
Oleic acid				18.80	2142.1	0.06
cis-Vaccenic acid?				18.88	2150.6	0.05
Tangeretin				27.11	3145.7	0.37
3,3',4',5,6,7,8-Heptamethoxyflavone				29.19	3327.5	0.07
Nobiletin				29.26	3332.5	0.15
Total reported		99.00%			99.05%	

*: 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

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