Date : 2024-12-20

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24L09-PTH03
Customer Identification : Organic Green Mandarin - Brazil - MI0107R
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

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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 : 2024-12-20

Physicochemical data

Refractive index : 1.4764 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2024-12-10

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
Heptanal	0.01	Aliphatic aldehyde
α-Thujene	0.74	Monoterpene
α-Pinene	2.02	Monoterpene
α-Fenchene	tr	Monoterpene
Camphene	0.02	Monoterpene
Sabinene	0.25	Monoterpene
β-Pinene	1.52	Monoterpene
Myrcene	1.75	Monoterpene
α-Phellandrene	0.06	Monoterpene
Octanal	0.09	Aliphatic aldehyde
α-Terpinene	0.35	Monoterpene
para-Cymene	0.68	Monoterpene
Limonene	68.41	Monoterpene
β-Phellandrene	0.21	Monoterpene
1,8-Cineole	0.01	Monoterpenic ether
(*Z*)-β-Ocimene	tr	Monoterpene
(*E*)-β-Ocimene	0.02	Monoterpene
γ-Terpinene	18.90	Monoterpene
cis-Sabinene hydrate	0.04	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.83	Monoterpene
trans-Sabinene hydrate	0.08	Monoterpenic alcohol
Linalool	0.13	Monoterpenic alcohol
Nonanal	0.04	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	tr	Monoterpenic alcohol
cis-Limonene oxide	0.02	Monoterpenic ether
trans-Limonene oxide	0.02	Monoterpenic ether
Epoxyterpinolene	0.02	Monoterpenic ether
Citronellal	0.03	Monoterpenic aldehyde
Borneol	0.02	Monoterpenic alcohol
Terpinen-4-ol	0.07	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	0.24	Monoterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Decanal	0.09	Aliphatic aldehyde
trans-Carveol	0.01	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Citronellol	0.05	Monoterpenic alcohol
Neral	0.01	Monoterpenic aldehyde

Perillaldehyde	0.05	Monoterpenic aldehyde
Geranial	0.01	Monoterpenic aldehyde
Unknown	0.01	Oxygenated monoterpene
cis-Ascaridole glycol	0.01	Monoterpenic alcohol
Perilla alcohol	0.01	Monoterpenic alcohol
Thymol	0.11	Monoterpenic alcohol
Undecanal	0.01	Aliphatic aldehyde
Neryl acetate	tr	Monoterpenic ester
α-Copaene	0.01	Sesquiterpene
β-Cubebene	0.01	Sesquiterpene
β-Elemene	0.01	Sesquiterpene
Dimethyl anthranilate	0.66	Phenolic ester
Dodecanal	0.03	Aliphatic aldehyde
β-Caryophyllene	0.14	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
(2*E*)-Dodecenal	0.02	Aliphatic aldehyde
Germacrene D	0.01	Sesquiterpene
trans-β-Bergamotene	0.01	Sesquiterpene
α-Selinene	0.07	Sesquiterpene
Bicyclogermacrene	0.01	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.39	Sesquiterpene
δ-Cadinene	0.02	Sesquiterpene
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
(2*E*)-Tetradecenal	0.01	Aliphatic aldehyde
α-Sinensal	0.37	Sesquiterpenic aldehyde
Myristic acid	0.02	Aliphatic acid
meta-Camphorene	0.02	Diterpene
Palmitic acid	0.11	Aliphatic acid
Phytol	0.03	Diterpenic alcohol
Linoleic acid	0.07	Aliphatic acid
Oleic acid	0.07	Aliphatic acid
β-Sinensal	tr	Sesquiterpenic aldehyde
Stearic acid	0.01	Aliphatic acid
Tangeretin	0.32	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.06	Flavonoid
Nobiletin	0.13	Flavonoid
Consolidated total	**99.66**	

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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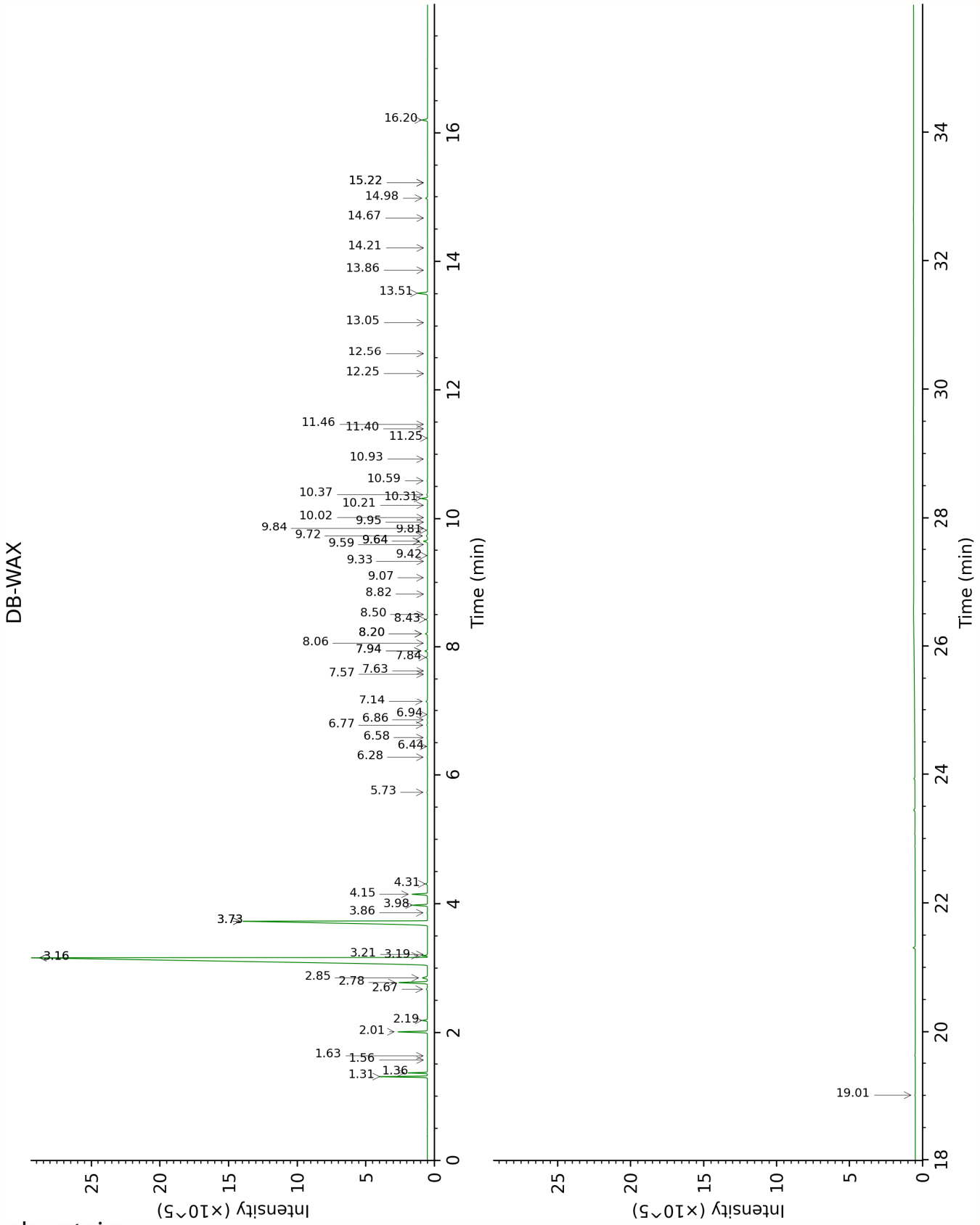
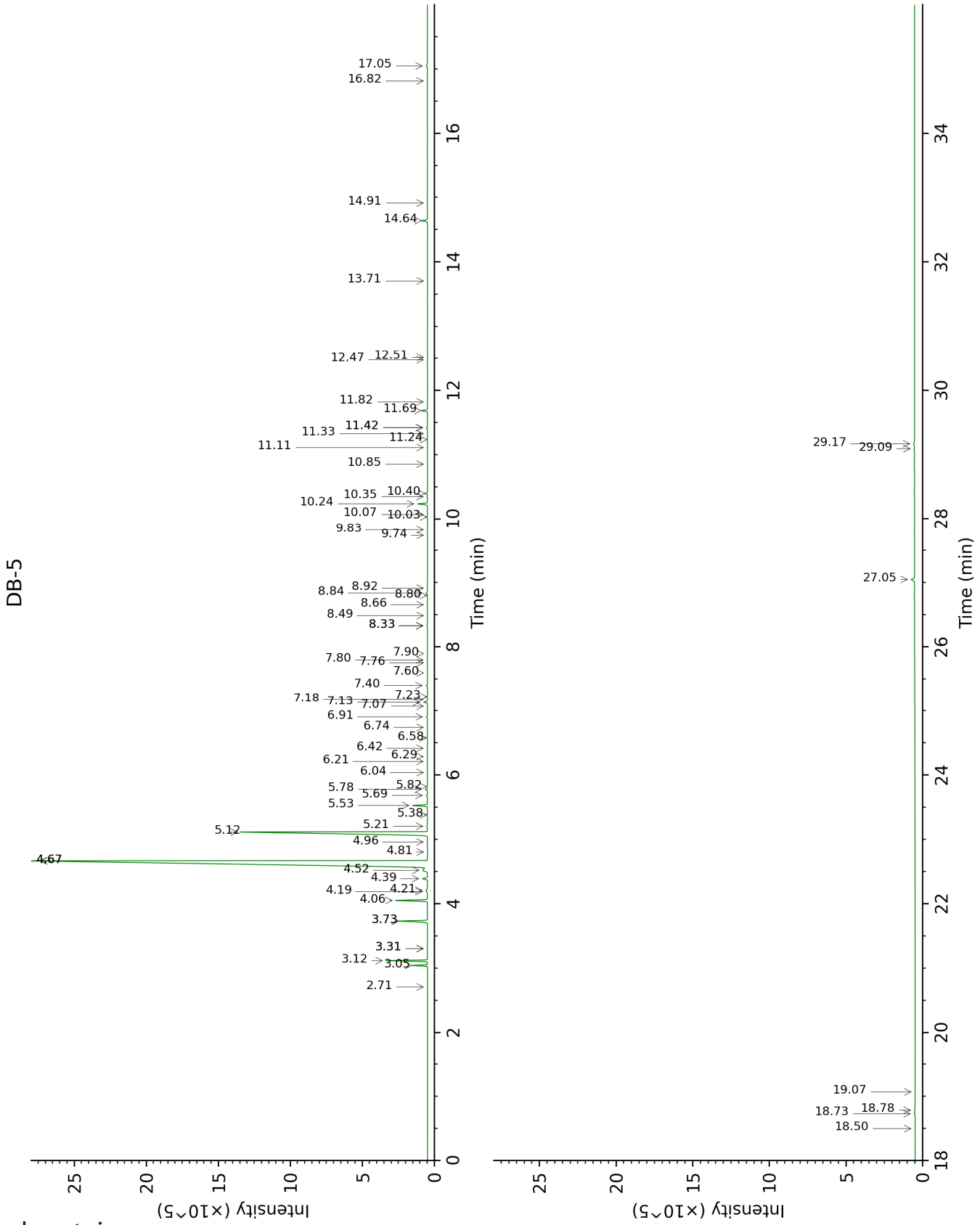

DB-WAX
Time (min)
Intensity (×10^5)
16.20
15.22
14.98
14.67
14.21
13.86
13.51
13.05
12.56
12.25
11.46
11.40
11.25
10.93
10.59
10.37
10.31
10.21
10.02
9.95
9.84
9.81
9.72
9.64
9.59
9.42
9.33
9.07
8.82
8.50
8.43
8.20
8.06
7.94
7.84
7.63
7.57
7.14
6.94
6.86
6.77
6.58
6.44
6.28
5.73
4.31
4.15
3.98
3.86
3.73
3.21
3.19
3.16
2.85
2.78
2.67
2.19
2.01
1.63
1.56
1.36
1.31
19.01


DB-5
17.05
16.82
14.91
14.64
13.71
12.47
12.51
11.82
11.69
11.33
11.42
11.24
11.11
10.85
10.24
10.35
10.40
10.07
10.03
9.83
9.74
8.84
8.92
8.80
8.66
8.49
8.33
7.80
7.90
7.76
7.60
7.40
7.18
7.23
7.13
7.07
6.91
6.74
6.58
6.42
6.29
6.21
6.04
5.78
5.82
5.69
5.53
5.38
5.12
5.21
4.96
4.81
4.67
4.52
4.39
4.19
4.21
4.06
3.73
3.31
3.12
3.05
2.71
Time (min)
Intensity (×10^5)
29.17
29.09
27.05
19.07
18.73
18.78
18.50
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Heptanal	3.16*	1164.8	[68.42]	2.71	904.0	0.01
α-Thujene	1.36	999.1	0.75	3.05	926.3	0.74
α-Pinene	1.31	991.0	2.03	3.12	931.2	2.02
α-Fenchene	1.56	1019.5	tr	3.31*	943.6	[0.02]
Camphene	1.63	1026.2	0.02	3.31*	943.6	[0.02]
Sabinene	2.19	1084.0	0.25	3.74*	972.1	[1.76]
β-Pinene	2.01	1065.8	1.52	3.74*	972.1	[1.76]
Myrcene	2.78	1134.0	1.76	4.06	993.4	1.75
α-Phellandrene	2.67	1125.7	0.06	4.19	1002.5	0.06
Octanal	4.31	1252.2	0.09	4.21	1003.9	0.09
α-Terpinene	2.85	1139.8	0.36	4.39	1015.1	0.35
para-Cymene	3.98	1227.8	0.78	4.52	1023.3	0.68
Limonene	3.16*	1164.8	[68.42]	4.67*	1032.5	[68.54]
β-Phellandrene	3.20	1167.4	0.21	4.67*	1032.5	[68.54]
1,8-Cineole	3.21	1168.8	0.01	4.67*	1032.5	[68.54]
(*Z*)-β-Ocimene	3.73*	1209.3	[18.93]	4.81	1041.1	tr
(*E*)-β-Ocimene	3.86	1219.0	0.03	4.96	1050.8	0.02
γ-Terpinene	3.73*	1209.3	[18.93]	5.12	1060.6	18.90
cis-Sabinene hydrate	6.77	1431.5	0.04	5.21	1066.2	0.04
Octanol	8.06	1528.5	0.02	5.38	1077.3	0.01
Terpinolene	4.15	1240.3	0.83	5.53	1086.5	0.83
trans-Sabinene hydrate	7.84	1511.3	0.08	5.69	1096.3	0.08
Linalool	7.94*	1519.1	[0.14]	5.78	1102.4	0.13
Nonanal	5.73	1355.2	0.03	5.82	1105.0	0.04
trans-para-Mentha-2,8-dien-1-ol	8.82	1587.7	0.01	6.04	1118.9	tr
cis-Limonene oxide	6.28	1394.6	0.02	6.21	1130.0	0.02
trans-Limonene oxide	6.44	1406.9	0.02	6.29	1134.8	0.02
Epoxyterpinolene	6.58	1417.2	0.03	6.42	1143.0	0.02
Citronellal	6.86	1437.7	0.03	6.58	1153.4	0.03
Borneol	9.64*	1654.0	[0.24]	6.74	1163.7	0.02
Terpinen-4-ol	8.42	1557.1	0.07	6.91	1174.2	0.07
para-Cymen-8-ol	11.40	1801.4	0.01	7.07	1184.8	0.01
α-Terpineol	9.64*	1654.0	[0.24]	7.14	1188.8	0.24
Unknown MISC XXXI [m/z 121, 79 (98), 93 (87), 94 (73), 91 (63), 105 (45)...]	7.63	1495.1	0.01	7.18	1191.7	0.01
Unknown MISC XXXII [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39), 84 (37)...]	7.94*	1519.1	[0.14]	7.23	1194.9	0.01

Decanal	7.14	1459.0	0.09	7.40	1206.1	0.09
trans-Carveol	11.25	1788.9	0.01	7.60	1219.3	0.01
Nerol	10.92	1761.1	0.02	7.76	1229.8	0.01
Citronellol	10.59	1732.6	0.03	7.80	1232.8	0.05
Neral	9.33	1628.6	0.01	7.90	1239.4	0.01
Perillaldehyde	10.37	1714.3	0.05	8.33*	1268.3	[0.06]
Geranial	9.95	1678.9	0.01	8.33*	1268.3	[0.06]
Unknown CIAU V [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	12.25	1877.4	0.01	8.49	1278.8	0.01
cis-Ascaridole glycol	14.67	2104.8	0.01	8.66	1290.3	0.01
Perilla alcohol	13.05	1950.5	0.01	8.80	1300.0	0.01
Thymol	14.98	2135.4	0.11	8.84	1302.5	0.11
Undecanal	8.50	1563.1	0.01	8.92	1307.8	0.01
Neryl acetate	10.02	1684.7	0.01	9.74	1365.8	tr
α-Copaene	6.94	1443.9	0.02	9.83	1372.0	0.01
β-Cubebene	7.57	1491.2	0.01	10.03	1386.6	0.01
β-Elemene	8.20*	1539.8	[0.13]	10.07	1389.1	0.01
Dimethyl anthranilate	13.51	1992.6	0.65	10.24	1401.0	0.66
Dodecanal	9.81	1667.8	0.02	10.35	1409.2	0.03
β-Caryophyllene	8.20*	1539.8	[0.13]	10.40	1412.9	0.14
α-Humulene	9.07	1607.9	0.02	10.85	1446.8	0.02
(2*E*)-Dodecenal	11.46	1807.5	0.02	11.11	1466.1	0.02
Germacrene D	9.59	1649.8	0.01	11.24	1475.3	0.01
trans-β-Bergamotene	9.42	1635.9	0.01	11.33	1482.2	0.01
α-Selinene	9.72	1660.7	0.07	11.42*	1489.1	[0.07]
Bicyclogermacrene	9.84	1670.2	0.01	11.42*	1489.1	[0.07]
(3*E*,6*E*)-α-Farnesene	10.32	1709.4	0.38	11.68	1509.1	0.39
δ-Cadinene	10.21	1700.4	0.02	11.82	1519.7	0.02
Spathulenol	14.21	2059.9	0.01	12.48	1571.1	0.01
Caryophyllene oxide	12.56	1905.4	0.01	12.51	1574.2	0.01
(2*E*)-Tetradecenal	13.86	2026.7	0.01	13.70	1671.1	0.01
α-Sinensal	16.20	2260.1	0.37	14.64	1750.5	0.37
Myristic acid				14.91	1774.1	0.02
meta-Camphorene	15.22*	2159.2	[0.02]	16.82	1948.1	0.02
Palmitic acid				17.05	1970.3	0.11
Phytol	19.01	2569.6	0.03	18.50	2113.1	0.03
Linoleic acid				18.73	2137.0	0.07
Oleic acid				18.78	2142.8	0.07
β-Sinensal	15.22*	2159.2	[0.02]			
Stearic acid				19.07	2172.3	0.01
Tangeretin				27.05	3144.2	0.32
3,3',4',5,6,7,8-Heptamethoxyflavone				29.09	3325.4	0.06

Nobiletin				29.17	3330.6	0.13
Total reported	98.99%				99.54%	

*: 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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