Date : 2025-02-14

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 25B03-PTH04
Customer Identification : Tangerine - USA - T10114R
Type : Essential Oil
Source : *Citrus reticulata cv. Tangerine*
Customer : Plant Therapy

Checked an approved by:

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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 : 2025-02-14

Physicochemical data

Refractive index : 1.4743 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2025-02-03

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
α-Thujene	0.04	Monoterpene
α-Pinene	0.65	Monoterpene
Camphene	tr	Monoterpene
β-Pinene	0.12	Monoterpene
Sabinene	0.27	Monoterpene
Myrcene	1.79	Monoterpene
α-Phellandrene	0.04	Monoterpene
Octanal	0.11	Aliphatic aldehyde
Δ3-Carene	0.04	Monoterpene
α-Terpinene	0.02	Monoterpene
para-Cymene	0.10	Monoterpene
Limonene	92.11	Monoterpene
β-Phellandrene	0.26	Monoterpene
(*Z*)-β-Ocimene	0.01	Monoterpene
(*E*)-β-Ocimene	0.14	Monoterpene
γ-Terpinene	0.82	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.03	Aliphatic alcohol
Terpinolene	0.06	Monoterpene
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Linalool	0.50	Monoterpenic alcohol
Nonanal	0.03	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.01	Monoterpenic ether
trans-Limonene oxide	0.01	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
Citronellal	0.04	Monoterpenic aldehyde
Terpinen-4-ol	0.01	Monoterpenic alcohol
α-Terpineol	0.17	Monoterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Decanal	0.14	Aliphatic aldehyde
Octyl acetate	0.03	Aliphatic ester
trans-Carveol	0.01	Monoterpenic alcohol
Nerol	0.04	Monoterpenic alcohol
Citronellol	0.07	Monoterpenic alcohol
Thymol methyl ether	0.02	Monoterpenic ether
Neral	0.04	Monoterpenic aldehyde
Geraniol	0.03	Monoterpenic alcohol
Perillaldehyde	0.03	Monoterpenic aldehyde

Geranial	0.03	Monoterpenic aldehyde
Limonen-10-ol	0.01	Monoterpenic alcohol
Thymol	0.02	Monoterpenic alcohol
Undecanal	0.01	Aliphatic aldehyde
para-Mentha-1,8-diene-4-hydroperoxide	0.03	Monoterpenic peroxide
Limonene *trans*-glycol	0.01	Monoterpenic alcohol
Unknown	0.01	Sesquiterpene
Neryl acetate	0.05	Monoterpenic ester
α-Copaene	0.05	Sesquiterpene
β-Cubebene	0.04	Sesquiterpene
Geranyl acetate	0.03	Monoterpenic ester
β-Elemene	0.04	Sesquiterpene
Dodecanal	0.04	Aliphatic aldehyde
β-Caryophyllene	0.04	Sesquiterpene
β-Copaene	0.01	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
(*E*)-β-Farnesene	0.01	Sesquiterpene
Germacrene D	0.07	Sesquiterpene
Valencene	0.04	Sesquiterpene
α-Selinene	0.02	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.02	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
δ-Cadinene	0.07	Sesquiterpene
α-Elemol	0.02	Sesquiterpenic alcohol
(*E*)-Nerolidol	0.01	Sesquiterpenic alcohol
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
β-Sinensal	0.03	Sesquiterpenic aldehyde
α-Sinensal	0.04	Sesquiterpenic aldehyde
meta-Camphorene	0.01	Diterpene
Palmitic acid	0.04	Aliphatic acid
Linoleic acid	0.03	Aliphatic acid
Oleic acid	0.07	Aliphatic acid
cis-Vaccenic acid?	0.02	Aliphatic acid
Stearic acid	0.08	Aliphatic acid
Tangeretin	0.03	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.12	Flavonoid
Nobiletin	0.09	Flavonoid
Consolidated total	**99.14**	

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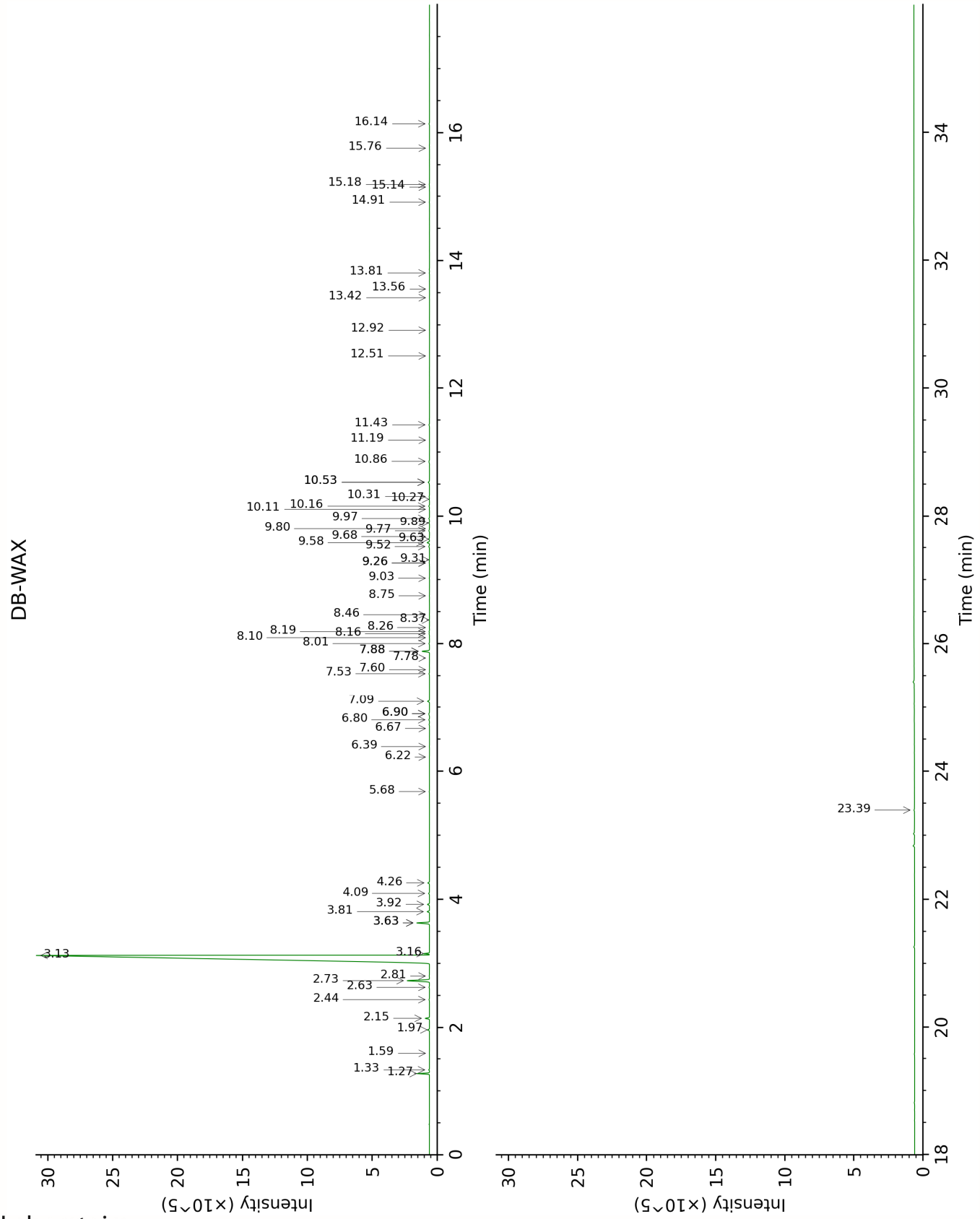
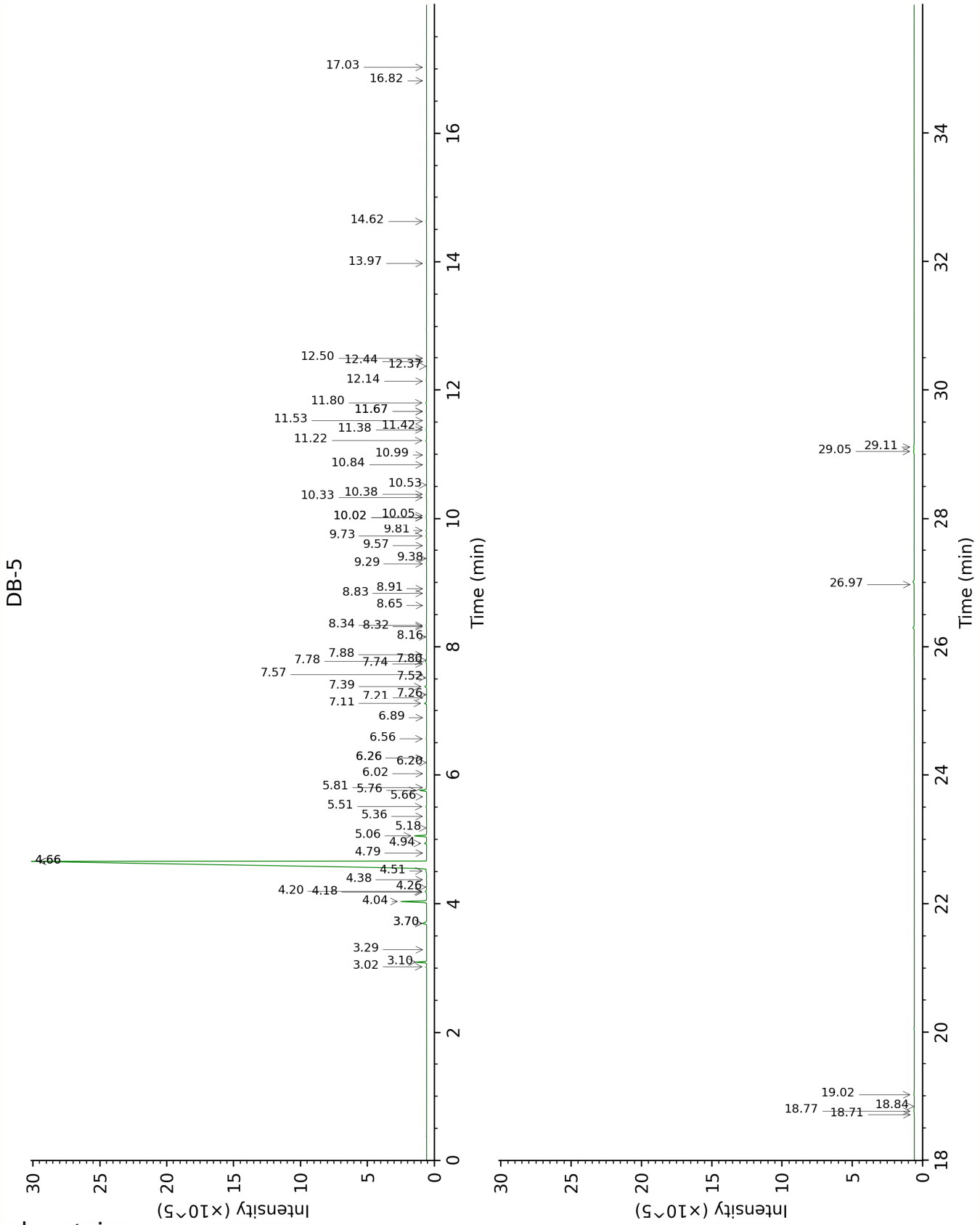
628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com


DB-WAX
Time (min)
Intensity (×10^5)
16.14
15.76
15.18
15.14
14.91
13.81
13.56
13.42
12.92
12.51
11.43
11.19
10.86
10.53
10.31
10.27
10.11
10.16
9.97
9.89
9.80
9.77
9.68
9.63
9.58
9.52
9.26
9.31
9.03
8.75
8.46
8.37
8.26
8.19
8.16
8.10
8.01
7.88
7.78
7.60
7.53
7.09
6.90
6.80
6.67
6.39
6.22
5.68
4.26
4.09
3.92
3.81
3.63
3.16
3.13
2.81
2.73
2.63
2.44
2.15
1.97
1.59
1.33
1.27
23.39


DB-5
17.03
16.82
14.62
13.97
12.50
12.44
12.37
12.14
11.80
11.67
11.53
11.38
11.42
11.22
10.99
10.84
10.53
10.33
10.38
10.02
10.05
9.81
9.73
9.57
9.29
9.38
8.91
8.83
8.65
8.34
8.32
8.16
7.88
7.78
7.74
7.80
7.57
7.52
7.39
7.21
7.26
7.11
6.89
6.56
6.26
6.20
6.02
5.81
5.76
5.66
5.51
5.36
5.18
5.06
4.94
4.79
4.66
4.51
4.38
4.26
4.20
4.18
4.04
3.70
3.29
3.10
3.02
29.05
29.11
26.97
19.02
18.84
18.77
18.71
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
α-Thujene	1.33	1000.6	0.04	3.02	927.0	0.04
α-Pinene	1.27	990.6	0.65	3.10	931.8	0.65
Camphene	1.59	1027.2	tr	3.29	944.5	tr
β-Pinene	1.96	1065.5	0.12	3.70*	971.7	[0.38]
Sabinene	2.14	1083.8	0.27	3.70*	971.7	[0.38]
Myrcene	2.73	1134.5	1.80	4.04	994.2	1.79
α-Phellandrene	2.63	1126.2	0.03	4.18	1003.8	0.04
Octanal	4.26	1252.4	0.11	4.20	1004.6	0.11
Δ3-Carene	2.44	1110.9	0.03	4.26	1008.8	0.04
α-Terpinene	2.80	1140.2	0.02	4.38	1016.0	0.02
para-Cymene	3.92	1227.5	0.13	4.51	1024.5	0.10
Limonene	3.13	1165.8	92.11	4.66*	1033.8	[92.40]
β-Phellandrene	3.16	1168.2	0.26	4.66*	1033.8	[92.40]
(*Z*)-β-Ocimene	3.63*	1206.2	[0.84]	4.79	1041.8	0.01
(*E*)-β-Ocimene	3.81	1219.2	0.14	4.94	1051.3	0.14
γ-Terpinene	3.63*	1206.2	[0.84]	5.06	1058.7	0.82
cis-Sabinene hydrate	6.67	1427.3	0.01	5.18	1066.3	0.01
Octanol	8.01	1528.0	0.04	5.36	1077.6	0.03
Terpinolene	4.10	1240.3	0.06	5.51	1087.1	0.06
trans-Sabinene hydrate	7.78	1510.4	0.01	5.66	1096.7	0.01
Linalool	7.88*	1518.6	[0.52]	5.76	1102.9	0.50
Nonanal	5.68	1355.7	0.02	5.81	1105.6	0.03
trans-para-Mentha-2,8-dien-1-ol	8.75	1585.9	0.01	6.02	1119.4	0.01
cis-Limonene oxide	6.22	1394.5	0.01	6.20	1130.4	0.01
trans-Limonene oxide	6.39	1406.4	0.01	6.26*	1134.7	[0.03]
cis-para-Mentha-2,8-dien-1-ol	9.26*	1626.8	[0.03]	6.26*	1134.7	[0.03]
Citronellal	6.80	1437.5	0.05	6.56	1153.9	0.04
Terpinen-4-ol	8.37	1556.5	0.01	6.89	1174.8	0.01
α-Terpineol	9.58	1652.7	0.17	7.11	1189.0	0.17
Unknown MISC XXXI [m/z 121, 79 (98), 93 (87), 94 (73), 91 (63), 105 (45)...]	7.60	1496.5	0.01	7.21	1195.2	0.01
Unknown MISC XXXII [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39), 84 (37)...]	7.88*	1518.6	[0.52]	7.26	1198.3	0.01
Decanal	7.09	1459.0	0.14	7.39	1206.5	0.14
Octyl acetate	6.90*	1444.6	[0.08]	7.52	1215.5	0.03
trans-Carveol	11.19	1787.4	0.01	7.57	1218.9	0.01

Nerol	10.86	1759.3	0.04	7.74	1229.9	0.04
Citronellol	10.53*	1731.6	[0.12]	7.78	1232.6	0.07
Thymol methyl ether	8.26	1547.3	0.01	7.80	1233.9	0.02
Neral	9.26*	1626.8	[0.03]	7.88	1239.5	0.04
Geraniol	11.43	1808.3	0.05	8.16	1258.0	0.03
Perillaldehyde	10.53*	1731.6	[0.12]	8.32	1268.6	0.03
Geranial	9.89	1677.8	0.03	8.34	1270.0	0.03
Limonen-10-ol	12.92	1942.4	0.01	8.65	1290.7	0.01
Thymol	14.91	2134.1	0.02	8.83	1303.2	0.02
Undecanal	8.46	1562.9	0.01	8.91	1308.2	0.01
para-Mentha-1,8-diene-4-hydroperoxide				9.29	1335.5	0.03
Limonene *trans*-glycol	15.76	2220.7	0.01	9.38	1341.3	0.01
Unknown PIMA XXVI [m/z 43, 81 (96), 95 (85), 67 (74), 69 (68), 41 (66)...204 (1)]				9.58	1355.4	0.01
Neryl acetate	9.97	1684.2	0.05	9.73	1366.0	0.05
α-Copaene	6.90*	1444.6	[0.08]	9.81	1372.0	0.05
β-Cubebene	7.53	1491.8	0.04	10.02*	1386.7	[0.05]
Geranyl acetate	10.31	1712.6	0.03	10.02*	1386.7	[0.05]
β-Elemene	8.16	1539.8	0.03	10.05	1389.2	0.04
Dodecanal	9.77	1667.8	0.05	10.33	1409.1	0.04
β-Caryophyllene	8.19	1542.5	0.03	10.38	1412.9	0.04
β-Copaene	8.10	1535.0	0.01	10.53	1423.6	0.01
α-Humulene	9.02	1607.5	0.02	10.84	1446.9	0.02
(*E*)-β-Farnesene	9.31	1630.9	0.02	10.99	1458.3	0.01
Germacrene D	9.52	1647.7	0.06	11.22	1474.9	0.07
Valencene	9.64	1657.1	0.05	11.38	1487.2	0.04
α-Selinene	9.68	1660.3	0.01	11.42	1490.1	0.02
α-Muurolene	9.80	1670.4	0.01	11.53	1498.1	0.01
(3*E*,6*E*)-α-Farnesene	10.27	1709.1	0.02	11.67*	1508.9	[0.04]
γ-Cadinene	10.11	1695.9	0.02	11.67*	1508.9	[0.04]
δ-Cadinene	10.16	1699.9	0.06	11.80	1519.3	0.07
α-Elemol	13.81	2026.2	0.02	12.14	1545.7	0.02
(*E*)-Nerolidol	13.56	2002.1	0.01	12.37	1563.9	0.01
Germacrene D-4-ol	13.42	1989.3	0.01	12.44	1569.5	0.01
Caryophyllene oxide	12.50	1904.2	0.01	12.50	1573.6	0.01
β-Sinensal	15.18	2161.8	0.03	13.98	1694.1	0.03
α-Sinensal	16.14	2260.6	0.04	14.62	1749.8	0.04
meta-Camphorene	15.14	2157.6	0.01	16.82	1948.9	0.01
Palmitic acid				17.03	1968.7	0.04
Linoleic acid				18.71	2136.0	0.03
Oleic acid	23.39	3147.4	0.05	18.77	2141.7	0.07

cis-Vaccenic acid?				18.84	2149.3	0.02
Stearic acid				19.02	2168.1	0.08
Tangeretin				26.97	3138.6	0.03
3,3',4',5,6,7,8-Heptamethoxyflavone				29.05	3326.3	0.12
Nobiletin				29.12	3330.9	0.09
Total reported		98.74%			99.14%	

*: 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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