Date : 2024-07-15

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24F28-PTH05
Customer Identification : Pink Grapefruit - USA - G50113R
Type : Essential Oil
Source : *Citrus x paradisi cv. Red*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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 : Rachel Fontaine, B. Sc. Chimiste, 2019-109
Date : 2024-07-09

Physicochemical data

Refractive index : 1.4765 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2024-06-28

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	0.01	Monoterpene
α-Pinene	0.53	Monoterpene
β-Pinene	0.07	Monoterpene
Sabinene	0.44	Monoterpene
Myrcene	1.83	Monoterpene
α-Phellandrene	0.03	Monoterpene
Octanal	0.37	Aliphatic aldehyde
Δ3-Carene	0.02	Monoterpene
Limonene	93.52	Monoterpene
para-Cymene	0.03	Monoterpene
β-Phellandrene	[0.29]	Monoterpene
1,8-Cineole	[0.29]	Monoterpenic ether
(*Z*)-β-Ocimene	0.02	Monoterpene
(*E*)-β-Ocimene	0.08	Monoterpene
γ-Terpinene	0.04	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.03	Aliphatic alcohol
Terpinolene	0.02	Monoterpene
Linalool	0.07	Monoterpenic alcohol
Nonanal	0.06	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
cis-Limonene oxide	0.03	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
trans-Limonene oxide	0.02	Monoterpenic ether
Citronellal	0.04	Monoterpenic aldehyde
Terpinen-4-ol	0.02	Monoterpenic alcohol
α-Terpineol	0.04	Monoterpenic alcohol
Decanal	0.16	Aliphatic aldehyde
Octyl acetate	0.03	Aliphatic ester
trans-Carveol	0.02	Monoterpenic alcohol
cis-Carveol	0.01	Monoterpenic alcohol
Neral	0.04	Monoterpenic aldehyde
Geranial	0.04	Monoterpenic aldehyde
α-Terpinyl acetate	0.02	Monoterpenic ester
Limonene hydroperoxide IV	0.01	Monoterpenic peroxide
α-Copaene	0.05	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
β-Cubebene	0.04	Sesquiterpene
β-Elemene	0.02	Sesquiterpene
Dodecanal	0.01	Aliphatic aldehyde

β-Caryophyllene	0.12	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
(*E*)-β-Farnesene	0.02	Sesquiterpene
Germacrene D	0.03	Sesquiterpene
Bicyclogermacrene	0.02	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
δ-Cadinene	0.06	Sesquiterpene
α-Elemol	0.02	Sesquiterpenic alcohol
β-Sinensal	0.02	Sesquiterpenic aldehyde
Nootkatone	0.05	Sesquiterpenic ketone
Osthole	0.04	Coumarin
Linoleic acid	0.05	Aliphatic acid
Oleic acid	0.05	Aliphatic acid
Isoauraptene	0.08	Coumarin
Meranzin	0.18	Coumarin
Auraptenol	0.03	Coumarin
Meranzin hydrate	0.01	Coumarin
Auraptene	0.76	Coumarin
Epoxyaurapten	0.21	Coumarin
Tangeretin	0.04	Flavonoid
Consolidated total	**99.92**	

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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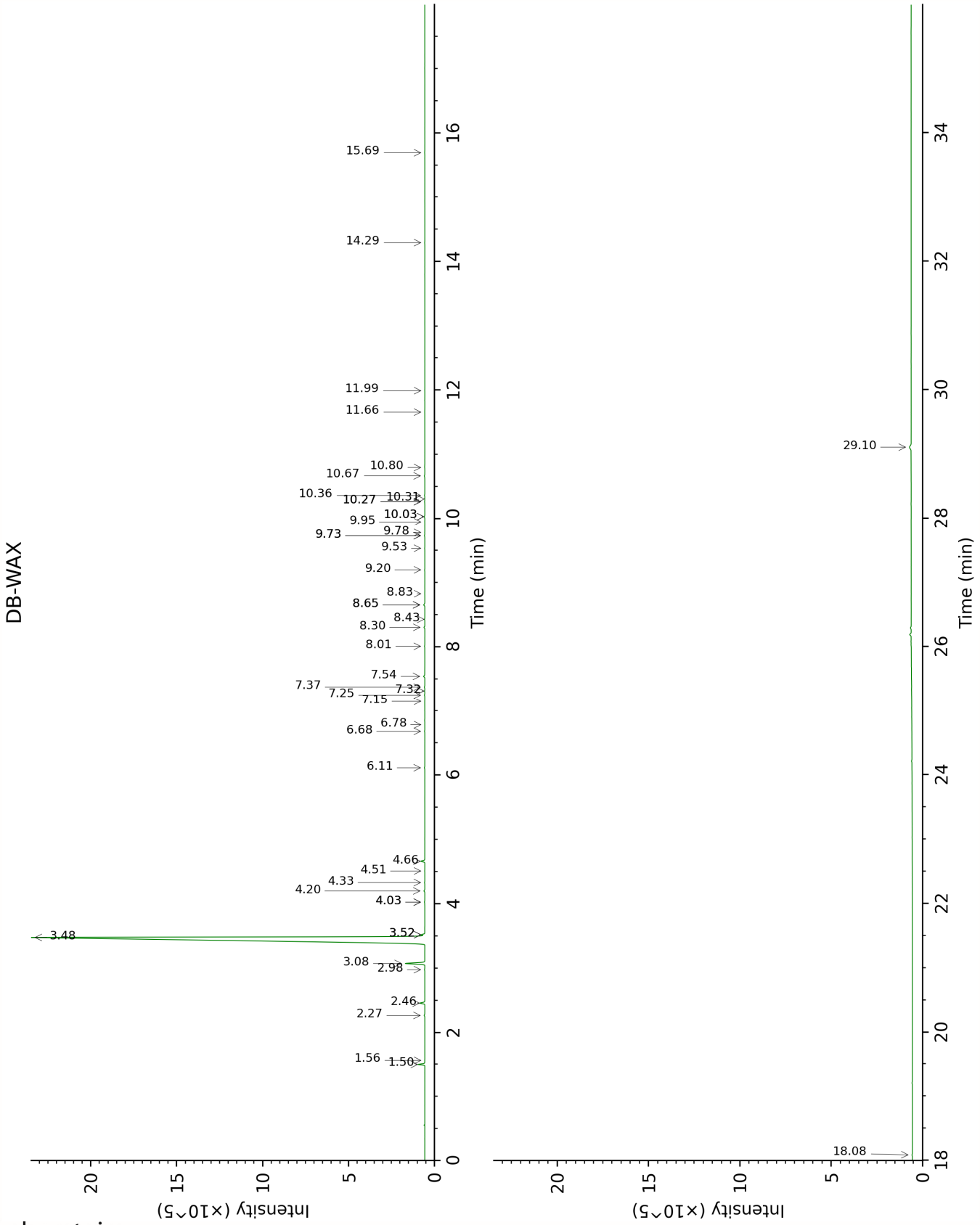

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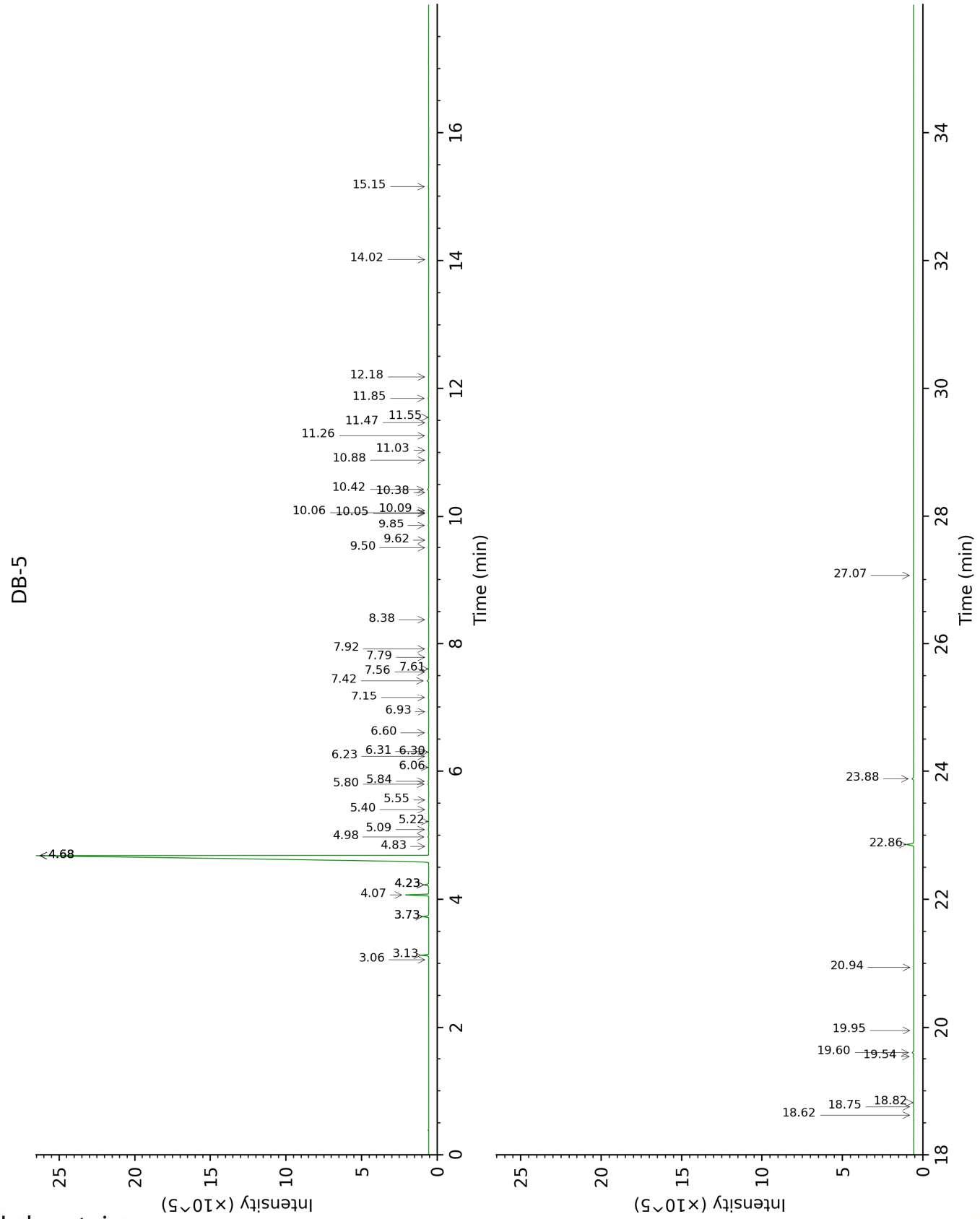
DB-5
Intensity (×10^5)
Time (min)
15.15
14.02
12.18
11.85
11.47
11.55
11.26
11.03
10.88
10.42
10.38
10.06
10.05
10.09
9.85
9.62
9.50
8.38
7.92
7.79
7.56
7.61
7.42
7.15
6.93
6.60
6.23
6.31
6.30
6.06
5.80
5.84
5.55
5.40
5.22
5.09
4.98
4.83
4.68
4.23
4.07
3.73
3.06
3.13
27.07
23.88
22.86
20.94
19.95
19.60
19.54
18.82
18.75
18.62

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
α-Thujene	1.56	998.7	0.01	3.06	926.4	0.01
α-Pinene	1.50	991.1	0.53	3.13	931.1	0.53
β-Pinene	2.27	1066.5	0.07	3.73*	971.1	[0.49]
Sabinene	2.46	1084.8	0.44	3.73*	971.1	[0.49]
Myrcene	3.08	1133.7	1.86	4.07	993.5	1.83
α-Phellandrene	2.98	1126.4	0.03	4.23*	1003.9	[0.42]
Octanal	4.66	1249.4	0.37	4.23*	1003.9	[0.42]
Δ3-Carene				4.23*	1003.9	[0.42]
Limonene	3.48	1164.2	93.52	4.68*	1032.5	[93.07]
para-Cymene	4.33	1226.2	0.03	4.68*	1032.5	[93.07]
β-Phellandrene	3.52*	1167.4	[0.29]	4.68*	1032.5	[93.07]
1,8-Cineole	3.52*	1167.4	[0.29]	4.68*	1032.5	[93.07]
(*Z*)-β-Ocimene	4.03*	1204.8	[0.04]	4.83	1041.6	0.02
(*E*)-β-Ocimene	4.20	1217.1	0.08	4.98	1050.8	0.08
γ-Terpinene	4.03*	1204.8	[0.04]	5.09	1058.0	0.04
cis-Sabinene hydrate	7.15	1431.2	0.01	5.22	1066.0	0.01
Octanol	8.43	1526.1	0.04	5.40	1077.6	0.03
Terpinolene	4.51	1238.8	0.01	5.55	1087.0	0.02
Linalool	8.30	1516.6	0.08	5.80	1102.5	0.07
Nonanal	6.11	1357.1	0.05	5.84	1105.3	0.06
trans-para-Mentha-2,8-dien-1-ol	9.20	1584.7	0.02	6.06	1119.2	0.02
cis-Limonene oxide	6.68	1397.0	0.03	6.23	1130.2	0.03
cis-para-Mentha-2,8-dien-1-ol	9.73*	1626.8	[0.04]	6.30	1134.4	0.01
trans-Limonene oxide	6.78	1404.5	0.01	6.31	1134.9	0.02
Citronellal	7.25	1438.6	0.04	6.60	1153.7	0.04
Terpinen-4-ol	8.83	1556.4	0.02	6.93	1174.7	0.02
α-Terpineol	10.03*	1651.2	[0.06]	7.15	1189.0	0.04
Decanal	7.54	1460.0	0.14	7.42	1206.4	0.16
Octyl acetate	7.32	1443.4	0.03	7.56	1215.6	0.03
trans-Carveol	11.66	1785.3	0.02	7.61	1218.9	0.02
cis-Carveol	11.99	1814.3	0.01	7.79	1231.0	0.01
Neral	9.73*	1626.8	[0.04]	7.92	1239.7	0.04
Geranial	10.36	1677.4	0.03	8.38	1270.3	0.04
α-Terpinyl acetate	9.95	1644.6	0.01	9.50	1347.8	0.02
Limonene hydroperoxide IV				9.62	1356.1	0.01
α-Copaene	7.37	1447.7	0.05	9.85	1372.3	0.05

Geranyl acetate	10.80	1713.2	0.03	10.05	1386.2	0.01
β-Cubebene	8.01	1494.1	0.03	10.06	1387.1	0.04
β-Elemene	8.65*	1543.2	[0.13]	10.09	1389.5	0.02
Dodecanal	10.27*	1669.8	[0.04]	10.38	1409.7	0.01
β-Caryophyllene	8.65*	1543.2	[0.13]	10.42	1413.3	0.12
α-Humulene	9.53	1611.2	0.02	10.88	1447.3	0.02
(*E*)-β-Farnesene	9.78	1630.9	0.02	11.03	1458.7	0.02
Germacrene D	10.03*	1651.2	[0.06]	11.26	1475.6	0.03
Bicyclogermacrene	10.31	1673.1	0.01	11.47	1490.9	0.02
α-Muurolene	10.27*	1669.8	[0.04]	11.55	1497.1	0.01
δ-Cadinene	10.67	1702.4	0.06	11.84	1520.0	0.06
α-Elemol	14.29	2023.5	0.02	12.18	1546.2	0.02
β-Sinensal	15.69	2160.6	0.02	14.02	1695.0	0.02
Nootkatone	18.08	2412.8	0.05	15.15	1793.0	0.05
Osthole				18.62	2123.3	0.04
Linoleic acid				18.75	2136.9	0.05
Oleic acid				18.82	2143.6	0.05
Isoauraptene				19.54	2219.0	0.08
Meranzin				19.60	2225.5	0.18
Auraptenol				19.96	2264.0	0.03
Meranzin hydrate				20.94	2372.8	0.01
Auraptene	29.10	3799.9	0.36	22.86	2598.7	0.76
Epoxyaurapten				23.88	2727.8	0.21
Tangeretin				27.07	3141.6	0.04
Total reported		98.75%			99.15%	

*: 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