

Date : 2023-08-08

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23G20-NPA05

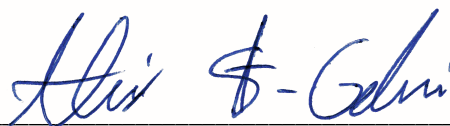
Customer Identification : Mandarin - Citrus deliciosa - Italy - NPS00088 - Lot # NP0179

Type : Essential Oil

Source : Citrus reticulata cv. Mandarine

Customer : Nature Packaged

Checked and approved by:



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

Notes: 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.

This report is an update from the first version issued on 2023-08-03 to format it for online publication.



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 : Amélie Simard, Analyste

Date : 2023-08-01

PHYSICOCHEMICAL DATA

Refractive index : 1.4742 ± 0.0003 (20 °C)

Method : PC-MAT-016 - Measure of the refractive index of a liquid.

Analyst : Cindy Caron B. Sc.

Date : 2023-07-20

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
Heptanal	0.01	Aliphatic aldehyde
α -Thujene	0.73	Monoterpene
α -Pinene	2.10	Monoterpene
Camphene	0.03	Monoterpene
α -Fenchene	tr	Monoterpene
Sabinene	0.23	Monoterpene
β -Pinene	1.74	Monoterpene
Myrcene	1.59	Monoterpene
α -Phellandrene	0.05	Monoterpene
Octanal	0.15	Aliphatic aldehyde
Δ^3 -Carene	0.01	Monoterpene
α -Terpinene	0.28	Monoterpene
<i>meta</i> -Cymene	0.01	Monoterpene
<i>para</i> -Cymene	0.37	Monoterpene
Limonene	72.47	Monoterpene
(<i>Z</i>)- β -Ocimene	0.01	Monoterpene
(<i>E</i>)- β -Ocimene	0.04	Monoterpene
γ -Terpinene	16.97	Monoterpene
<i>cis</i> -Sabinene hydrate	0.03	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.58	Monoterpene
<i>trans</i> -Sabinene hydrate	0.04	Monoterpenic alcohol
Linalool	0.08	Monoterpenic alcohol
Nonanal	0.03	Aliphatic aldehyde
<i>trans-para</i> -Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
<i>cis</i> -Limonene oxide	0.01	Monoterpenic ether
<i>cis-para</i> -Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
<i>trans</i> -Limonene oxide	0.01	Monoterpenic ether
Epoxyterpinolene	0.02	Monoterpenic ether
Citronellal	0.02	Monoterpenic aldehyde
Borneol	0.01	Monoterpenic alcohol
Terpinen-4-ol	0.06	Monoterpenic alcohol
α -Terpineol	0.15	Monoterpenic alcohol
Unknown	0.01	Unknown
Decanal	0.08	Aliphatic aldehyde
<i>trans</i> -Carveol	0.02	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Citronellol	0.03	Monoterpenic alcohol
Carvone	0.02	Monoterpenic ketone
Geraniol	0.01	Monoterpenic alcohol

Isopiperitenone	0.01	Monoterpenic ketone
Geranial	0.05	Monoterpenic aldehyde
<i>cis</i> -Ascaridole glycol	0.01	Monoterpenic alcohol
Thymol	0.04	Monoterpenic alcohol
Undecanal	0.02	Aliphatic aldehyde
α -Copaene	0.02	Sesquiterpene
β -Cubebene	0.01	Sesquiterpene
Dimethyl anthranilate	0.44	Phenolic ester
Dodecanal	0.03	Aliphatic aldehyde
β -Caryophyllene	0.07	Sesquiterpene
α -Humulene	0.01	Sesquiterpene
(2 <i>E</i>)-Dodecenal	0.02	Aliphatic aldehyde
Germacrene D	0.01	Sesquiterpene
α -Selinene	0.03	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	0.12	Sesquiterpene
δ -Cadinene	0.02	Sesquiterpene
Tetradecanal?	0.02	Aliphatic aldehyde
(2 <i>E</i>)-Tetradecenal	0.02	Aliphatic aldehyde
α -Sinensal	0.23	Sesquiterpenic aldehyde
Tangeretin	0.08	Flavonoid
Nobiletin	0.02	Flavonoid
Consolidated total	99.35	

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

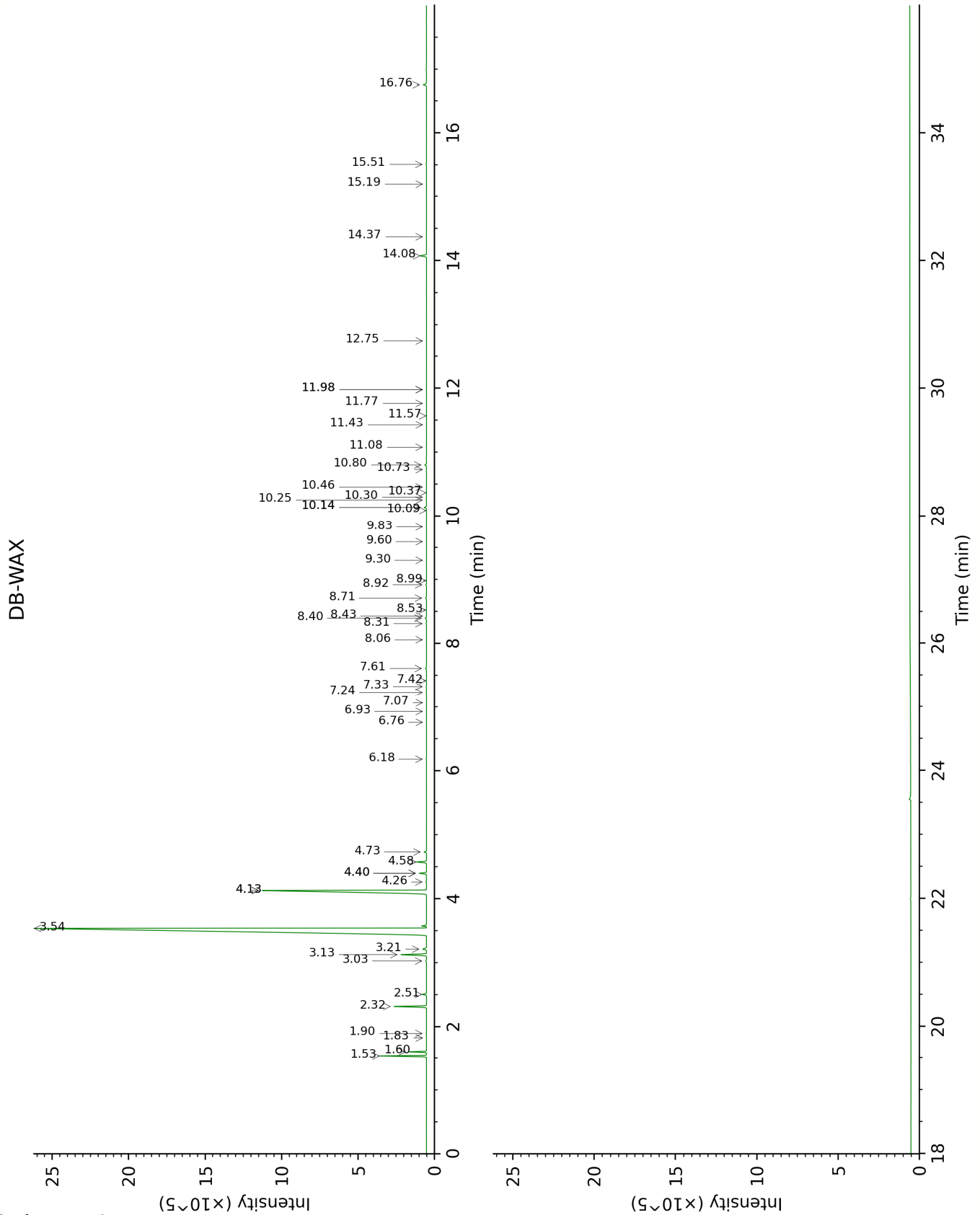
Note: no correction factor was applied

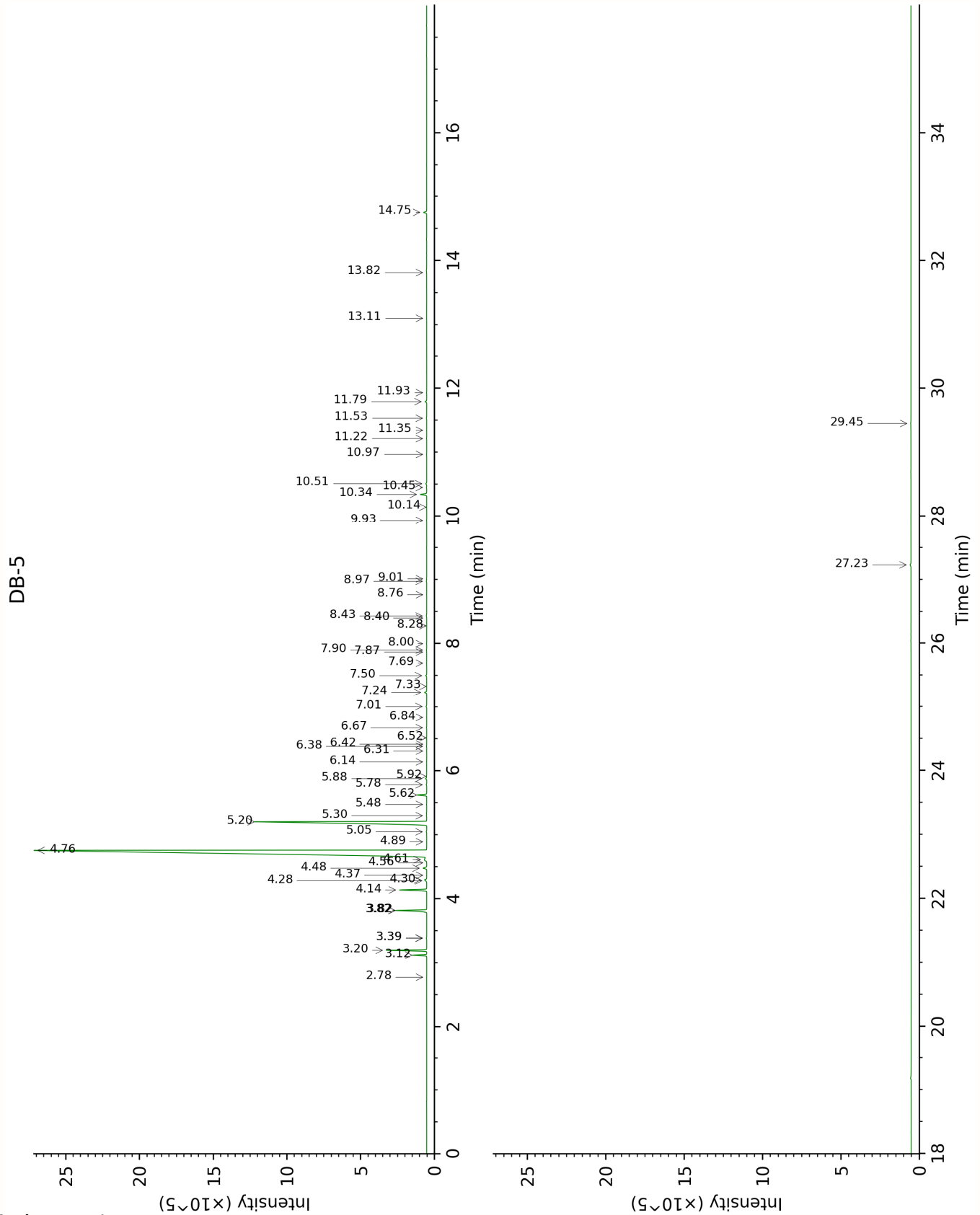
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

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





FULL ANALYSIS DATA

Heptanal	Column DB-WAX			Column DB-5		
				2.78	903.7	0.01
α -Thujene	1.60	996.9	0.72	3.12	926.4	0.73
α -Pinene	1.53	990.6	2.09	3.20	931.4	2.10
Camphene	1.90	1025.3	0.03	3.39*	943.9	[0.04]
α -Fenchene	1.83	1018.7	tr	3.39*	943.9	[0.04]
Sabinene	2.51	1083.6	0.23	3.82*	972.3	[1.96]
β -Pinene	2.32	1065.6	1.74	3.82*	972.3	[1.96]
Myrcene	3.13	1133.0	1.59	4.14	993.3	1.59
α -Phellandrene	3.03	1125.3	0.06	4.28	1002.9	0.05
Octanal	4.73	1253.4	0.14	4.30	1003.7	0.15
Δ^3 -Carene				4.37	1008.2	0.01
α -Terpinene	3.21	1139.6	0.28	4.48	1015.1	0.28
<i>meta</i> -Cymene	4.40*	1229.1	[0.42]	4.56	1020.4	0.01
<i>para</i> -Cymene	4.40*	1229.1	[0.42]	4.61	1023.5	0.37
Limonene	3.54	1164.7	72.30	4.76	1032.5	72.47
(<i>Z</i>)- β -Ocimene	4.13*	1209.5	[17.00]	4.89	1040.9	0.01
(<i>E</i>)- β -Ocimene	4.26	1219.3	0.04	5.05	1050.6	0.04
γ -Terpinene	4.13*	1209.5	[17.00]	5.20	1060.4	16.97
<i>cis</i> -Sabinene hydrate	7.24	1429.8	0.03	5.30	1066.3	0.03
Octanol	8.53	1526.7	0.02	5.48	1077.4	0.02
Terpinolene	4.58	1242.1	0.58	5.62	1086.5	0.58
<i>trans</i> -Sabinene hydrate	8.31	1510.2	0.04	5.78	1096.6	0.04
Linalool	8.40	1516.9	0.09	5.88	1102.5	0.08
Nonanal	6.18	1353.0	0.03	5.92	1104.8	0.03
<i>trans-para</i> -Mentha-2,8-dien-1-ol	9.30	1586.4	0.01	6.14	1119.2	0.01
<i>cis</i> -Limonene oxide	6.76	1394.5	0.01	6.31	1130.0	0.01
<i>cis-para</i> -Mentha-2,8-dien-1-ol	9.83	1628.5	0.02	6.38	1134.6	0.02
<i>trans</i> -Limonene oxide	6.93	1407.1	0.01	6.42	1136.8	0.01
Epoxyterpinolene	7.07	1417.3	0.01	6.52	1143.1	0.02
Citronellal	7.33	1436.6	0.03	6.68	1153.2	0.02
Borneol	10.14*	1653.5	[0.15]	6.84	1163.5	0.01
Terpinen-4-ol	8.92	1557.0	0.05	7.01	1174.3	0.06
α -Terpineol	10.14*	1653.5	[0.15]	7.24	1188.9	0.15
Unknown MISC XXXII [m/z 121, 79 (61), 93 (55),	8.43	1519.4	0.01	7.33	1195.0	0.01

Laboratoire
PhytoChemia

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94 (40), 91 (39), 84 (37)...						
Decanal	7.61	1457.6	0.07	7.50	1205.8	0.08
<i>trans</i> -Carveol	11.77	1788.4	0.01	7.69	1218.8	0.02
Nerol	11.43	1760.4	0.01	7.87	1230.4	0.01
Citronellol	11.08	1731.0	0.02	7.90	1232.6	0.03
Carvone	10.37	1672.0	0.02	8.00	1239.2	0.02
Geraniol	11.98*	1807.2	[0.02]	8.28	1257.8	0.01
Isopiperitenone	11.57	1772.0	0.01	8.40	1265.9	0.01
Geranial	10.46	1679.1	0.01	8.43	1268.1	0.05
<i>cis</i> -Ascaridole glycol	15.19	2100.7	0.01	8.76	1290.2	0.01
Thymol	15.51	2132.0	0.04	8.97	1304.3	0.04
Undecanal	8.99	1562.1	0.01	9.01	1307.1	0.02
α -Copaene	7.42	1443.3	0.01	9.93	1371.9	0.02
β -Cubebene	8.06	1490.9	0.01	10.14	1386.6	0.01
Dimethyl anthranilate	14.08	1994.8	0.45	10.34	1400.6	0.44
Dodecanal	10.30	1666.6	0.02	10.45	1408.6	0.03
β -Caryophyllene	8.71	1541.0	0.07	10.51	1412.9	0.07
α -Humulene	9.60	1609.9	0.01	10.97	1447.0	0.01
(2 <i>E</i>)-Dodecenal	11.98*	1807.2	[0.02]	11.22	1465.4	0.02
Germacrene D	10.09	1649.6	0.01	11.34	1475.0	0.01
α -Selinene	10.25	1662.7	0.03	11.53	1489.0	0.03
(3 <i>E</i> ,6 <i>E</i>)- α - Farnesene	10.80	1707.8	0.11	11.79	1508.5	0.12
δ -Cadinene	10.73	1701.8	0.02	11.93	1519.5	0.02
Tetradecanal?	12.75	1874.5	0.01	13.10	1611.7	0.02
(2 <i>E</i>)-Tetradecenal	14.37	2022.7	0.02	13.82	1670.3	0.02
α -Sinensal	16.76	2256.4	0.24	14.75	1749.8	0.23
Tangeretin				27.23	3141.0	0.08
Nobiletin				29.45	3327.5	0.02
Total reported		98.95%			99.35%	

*: 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