Date : 2025-06-27

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 25F11-PTH04
Customer Identification : Orange Essence - Brazil - OQ0110R
Type : Essential Oil
Source : *Citrus sinensis*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

This report is an update of the version first issued on June 26, 2025 to make a minor correction.

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 : Anne Retaillaud
Date : 2025-06-26

Physicochemical data

Refractive index : 1.4723 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2025-06-12

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
Ethyl acetate	tr	Aliphatic ester
Heptane	tr	Alkane
Diethyl acetal	tr	Aliphatic acetal
Ethyl butyrate	0.04	Aliphatic ester
(2*E*)-Hexenal	0.01	Aliphatic aldehyde
α-Thujene	0.01	Monoterpene
α-Pinene	0.52	Monoterpene
Camphene	0.01	Monoterpene
β-Pinene	0.05	Monoterpene
Sabinene	0.36	Monoterpene
Myrcene	1.65	Monoterpene
α-Phellandrene	0.01	Monoterpene
Octanal	0.19	Aliphatic aldehyde
Δ3-Carene	0.14	Monoterpene
para-Cymene	0.10	Monoterpene
Limonene	93.41	Monoterpene
(*E*)-β-Ocimene	0.01	Monoterpene
γ-Terpinene	0.02	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.07	Aliphatic alcohol
Terpinolene	0.02	Monoterpene
6,7-Epoxymyrcene	0.01	Monoterpenic ether
Linalool	0.44	Monoterpenic alcohol
Nonanal	0.02	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.05	Monoterpenic alcohol
cis-Limonene oxide	0.17	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.04	Monoterpenic alcohol
trans-Limonene oxide	0.09	Monoterpenic ether
Citronellal	0.03	Monoterpenic aldehyde
Borneol	0.03	Monoterpenic alcohol
Terpinen-4-ol	0.03	Monoterpenic alcohol
α-Terpineol	0.09	Monoterpenic alcohol
cis-Piperitol	0.03	Monoterpenic alcohol
trans-Isopiperitenol	0.03	Monoterpenic alcohol
trans-Dihydrocarvone	0.02	Monoterpenic ketone
Decanal	0.18	Aliphatic aldehyde
Octyl acetate	0.01	Aliphatic ester
trans-Carveol	0.07	Monoterpenic alcohol
cis-Carveol	0.04	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol

Neral	tr	Monoterpenic aldehyde
Carvone	0.11	Monoterpenic ketone
Geraniol	0.01	Monoterpenic alcohol
Perillaldehyde	0.02	Monoterpenic aldehyde
Geranial	0.06	Monoterpenic aldehyde
Decanol	0.02	Aliphatic alcohol
Limonen-10-ol	0.02	Monoterpenic alcohol
cis-para-Mentha-2,8-diene-1-hydroperoxide	0.17	Monoterpenic peroxide
trans-para-Mentha-2,8-diene-1-hydroperoxide	0.15	Monoterpenic peroxide
para-Mentha-1,8-diene-4-hydroperoxide	0.07	Monoterpenic peroxide
Citronellyl acetate	0.08	Monoterpenic ester
trans-para-Mentha-6,8-diene-2-hydroperoxide	0.18	Monoterpenic peroxide
Neryl acetate	0.01	Monoterpenic ester
α-Copaene	0.02	Sesquiterpene
cis-para-Mentha-6,8-diene-2-hydroperoxide	0.17	Monoterpenic peroxide
β-Elemene	0.02	Sesquiterpene
Dodecanal	0.01	Aliphatic aldehyde
β-Caryophyllene	0.02	Sesquiterpene
β-Copaene	0.02	Sesquiterpene
α-Humulene	0.01	Sesquiterpene
(*E*)-β-Farnesene	0.01	Sesquiterpene
Aristolochene	0.02	Sesquiterpene
α-Selinene	0.02	Sesquiterpene
Valencene	0.24	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
δ-Cadinene	0.02	Sesquiterpene
β-Sinensal	0.01	Sesquiterpenic aldehyde
α-Sinensal	0.01	Sesquiterpenic aldehyde
Consolidated total	**99.56**	

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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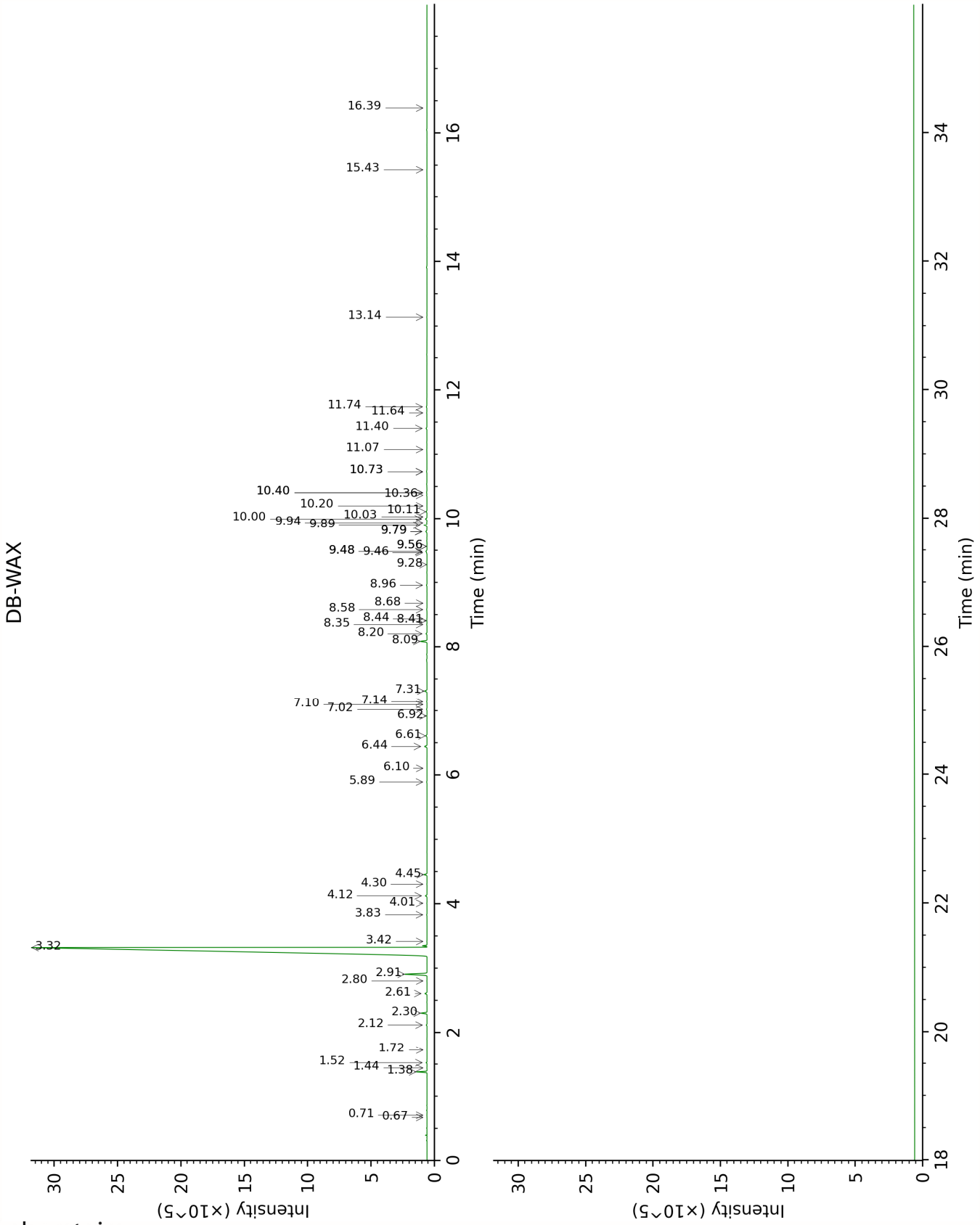

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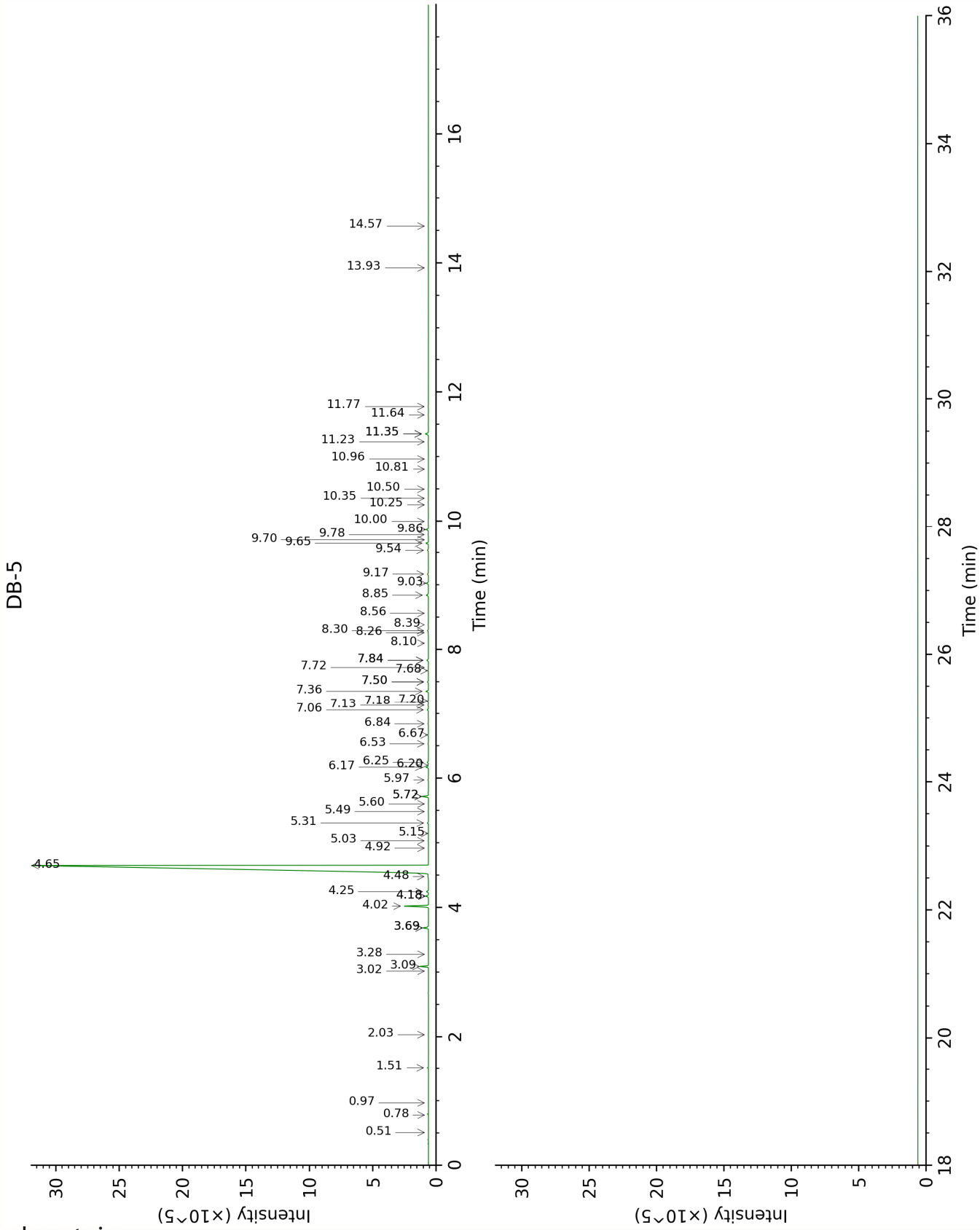
DB-5
Time (min)
Intensity (×10^5)
14.57
13.93
11.77
11.64
11.35
11.23
10.96
10.81
10.50
10.35
10.25
10.00
9.86
9.78
9.70
9.65
9.54
9.17
9.03
8.85
8.56
8.39
8.30
8.26
8.10
7.84
7.72
7.68
7.50
7.36
7.20
7.18
7.13
7.06
6.84
6.67
6.53
6.25
6.20
6.17
5.97
5.72
5.60
5.49
5.31
5.15
5.03
4.92
4.65
4.48
4.25
4.18
4.02
3.69
3.28
3.09
3.02
2.03
1.51
0.97
0.78
0.51

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Ethyl acetate	0.67	853.3	tr	0.51	606.4	tr
Heptane				0.78	702.1	tr
Diethyl acetal	0.71	865.8	0.01	0.97	730.6	tr
Ethyl butyrate	1.52	1008.2	0.04	1.51	806.5	0.04
(2*E*)-Hexenal	3.42	1175.7	0.01	2.03	850.5	0.01
α-Thujene	1.44	1000.1	0.01	3.02	927.2	0.01
α-Pinene	1.38	992.0	0.52	3.09	932.0	0.52
Camphene	1.72	1027.9	tr	3.28	944.6	0.01
β-Pinene	2.12	1066.9	0.05	3.69*	972.0	[0.40]
Sabinene	2.30	1085.4	0.36	3.69*	972.0	[0.40]
Myrcene	2.91	1135.5	1.67	4.02	994.6	1.65
α-Phellandrene	2.80	1127.3	0.01	4.18*	1004.9	[0.20]
Octanal	4.45	1254.0	0.19	4.18*	1004.9	[0.20]
Δ3-Carene	2.61	1111.8	0.15	4.25	1009.3	0.14
para-Cymene	4.12	1229.6	0.11	4.48	1024.1	0.10
Limonene	3.32	1168.1	93.91	4.65	1034.9	93.41
(*E*)-β-Ocimene	4.01	1221.1	0.01	4.92	1051.9	0.01
γ-Terpinene	3.83	1207.9	0.02	5.03	1059.2	0.02
cis-Sabinene hydrate	6.92	1429.8	0.01	5.15	1066.4	0.01
Octanol	8.20	1526.6	0.07	5.31	1076.6	0.07
Terpinolene	4.30	1243.0	0.01	5.49	1087.9	0.02
6,7-Epoxymyrcene	6.10	1370.3	0.01	5.60	1095.4	0.01
Linalool	8.09	1517.5	0.44	5.72*	1102.7	[0.44]
Nonanal	5.89	1354.9	0.02	5.72*	1102.7	[0.44]
trans-para-Mentha-2,8-dien-1-ol	8.96	1585.0	0.04	5.98	1119.2	0.05
cis-Limonene oxide	6.44	1394.6	0.18	6.17	1132.1	0.17
cis-para-Mentha-2,8-dien-1-ol	9.46	1625.5	0.02	6.20	1134.1	0.04
trans-Limonene oxide	6.61	1406.9	0.08	6.25	1136.8	0.09
Citronellal	7.02	1437.5	0.03	6.53	1155.5	0.03
Borneol	9.79*	1652.2	[0.11]	6.67	1164.4	0.03
Terpinen-4-ol	8.58	1555.7	0.03	6.84	1175.6	0.03
α-Terpineol	9.79*	1652.2	[0.11]	7.06	1189.6	0.09
cis-Piperitol	9.56*	1633.4	[0.02]	7.14	1194.5	0.03
trans-Isopiperitenol	10.40*	1702.1	[0.04]	7.18	1197.8	0.03

trans-Dihydrocarvone	8.68	1563.4	0.01	7.20	1199.0	0.02
Decanal	7.31	1459.2	0.18	7.36	1209.1	0.18
Octyl acetate	7.10	1443.1	0.01	7.50*	1219.0	[0.07]
trans-Carveol	11.40	1786.8	0.07	7.50*	1219.0	[0.07]
cis-Carveol	11.74	1816.1	0.05	7.68	1230.9	0.04
Nerol	11.08	1759.0	0.01	7.72	1234.2	0.01
Neral	9.48*	1627.1	[0.10]	7.84*	1241.8	[0.12]
Carvone	10.00	1668.7	0.11	7.84*	1241.8	[0.12]
Geraniol	11.64	1807.8	0.02	8.10	1259.8	0.01
Perillaldehyde	10.73*	1729.7	[0.04]	8.26	1270.9	0.02
Geranial	10.11	1677.9	0.06	8.30	1273.1	0.06
Decanol	10.73*	1729.7	[0.04]	8.39	1279.3	0.02
Limonen-10-ol	13.14	1942.2	0.02	8.56	1291.4	0.02
cis-para-Mentha-2,8-diene-1-hydroperoxide				8.84	1307.1	0.17
trans-para-Mentha-2,8-diene-1-hydroperoxide				9.03	1320.3	0.15
para-Mentha-1,8-diene-4-hydroperoxide				9.17	1330.3	0.07
Citronellyl acetate	9.48*	1627.1	[0.10]	9.54	1356.5	0.08
trans-para-Mentha-6,8-diene-2-hydroperoxide				9.65	1364.3	0.18
Neryl acetate	10.20	1685.2	0.01	9.70	1368.0	0.01
α-Copaene	7.14	1446.4	0.03	9.78	1373.7	0.02
cis-para-Mentha-6,8-diene-2-hydroperoxide				9.86	1379.4	0.17
β-Elemene	8.44	1544.5	0.01	10.00	1389.0	0.02
Dodecanal	10.03	1671.3	0.01	10.25	1407.4	0.01
β-Caryophyllene	8.41	1542.4	0.01	10.35	1415.0	0.02
β-Copaene	8.35	1537.8	0.02	10.50	1425.6	0.02
α-Humulene	9.28	1610.5	0.01	10.81	1448.8	0.01
(*E*)-β-Farnesene	9.56*	1633.4	[0.02]	10.96	1460.5	0.01
Aristolochene				11.23	1480.5	0.02
α-Selinene	9.94	1663.8	0.02	11.35*	1489.6	[0.26]

Valencene	9.89	1660.5	0.24	11.35*	1489.6	[0.26]
γ-Cadinene	10.36	1698.7	0.02	11.64	1512.1	0.02
δ-Cadinene	10.40*	1702.1	[0.04]	11.77	1522.2	0.02
β-Sinensal	15.43	2163.5	0.01	13.92	1696.5	0.01
α-Sinensal	16.39	2262.2	0.01	14.57	1752.1	0.01
Total reported		99.22%			99.53%	

*: 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