Date : 2025-05-20

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 25E05-PTH01
Customer Identification : Organic Bergamot - Italy - BQ0112R
Type : Essential Oil
Source : *Citrus aurantium var. bergamia*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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 : 2025-05-13

Physicochemical data

Refractive index : 1.465 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2025-05-06

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
Nonane	tr	Alkane
Tricyclene	tr	Monoterpene
α-Thujene	0.31	Monoterpene
α-Pinene	1.17	Monoterpene
Camphene	0.04	Monoterpene
β-Pinene	5.94	Monoterpene
Sabinene	1.07	Monoterpene
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
Myrcene	1.10	Monoterpene
α-Phellandrene	0.03	Monoterpene
Octanal	0.04	Aliphatic aldehyde
α-Terpinene	0.15	Monoterpene
meta-Cymene	0.01	Monoterpene
para-Cymene	0.83	Monoterpene
β-Phellandrene	0.22	Monoterpene
Limonene	42.33	Monoterpene
(*Z*)-β-Ocimene	0.07	Monoterpene
(*E*)-β-Ocimene	0.31	Monoterpene
γ-Terpinene	6.90	Monoterpene
cis-Sabinene hydrate	0.04	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.33	Monoterpene
trans-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Linalool	13.30	Monoterpenic alcohol
Nonanal	0.02	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.02	Monoterpenic ether
trans-Limonene oxide	0.01	Monoterpenic ether
Camphor	0.01	Monoterpenic ketone
Epoxyterpinolene	0.01	Monoterpenic ether
Citronellal	0.01	Monoterpenic aldehyde
Terpinen-4-ol	0.04	Monoterpenic alcohol
α-Terpineol	0.17	Monoterpenic alcohol
Decanal	0.04	Aliphatic aldehyde
Octyl acetate	0.10	Aliphatic ester
Nerol	0.09	Monoterpenic alcohol
Citronellol	0.01	Monoterpenic alcohol
Neral	0.23	Monoterpenic aldehyde

Linalyl acetate	22.46	Monoterpenic ester
Geraniol	0.04	Monoterpenic alcohol
Geranial	0.32	Monoterpenic aldehyde
Bornyl acetate	0.02	Monoterpenic ester
cis-para-Mentha-2,8-diene-1-hydroperoxide	0.01	Monoterpenic peroxide
trans-para-Mentha-2,8-diene-1-hydroperoxide	0.01	Monoterpenic peroxide
para-Mentha-1,8-diene-4-hydroperoxide	0.01	Monoterpenic peroxide
Linalyl propionate	0.03	Monoterpenic ester
Hodiendiol derivative	0.01	Oxygenated monoterpene
α-Terpinyl acetate	0.12	Monoterpenic ester
Unknown	0.02	Monoterpenic ester
Unknown	0.03	Oxygenated monoterpene
Neryl acetate	0.34	Monoterpenic ester
Geranyl acetate	0.32	Monoterpenic ester
Dodecanal	0.01	Aliphatic aldehyde
cis-α-Bergamotene	0.02	Sesquiterpene
β-Caryophyllene	0.28	Sesquiterpene
α-Santalene	0.01	Sesquiterpene
trans-α-Bergamotene	0.24	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
(*E*)-β-Farnesene	0.05	Sesquiterpene
Germacrene D	0.04	Sesquiterpene
(*Z*)-α-Bisabolene	0.03	Sesquiterpene
β-Bisabolene	0.26	Sesquiterpene
(*E*)-α-Bisabolene	0.01	Sesquiterpene
(*E*)-Nerolidol	0.01	Sesquiterpenic alcohol
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
α-Bisabolol	tr	Sesquiterpenic alcohol
Consolidated total	**99.77**	

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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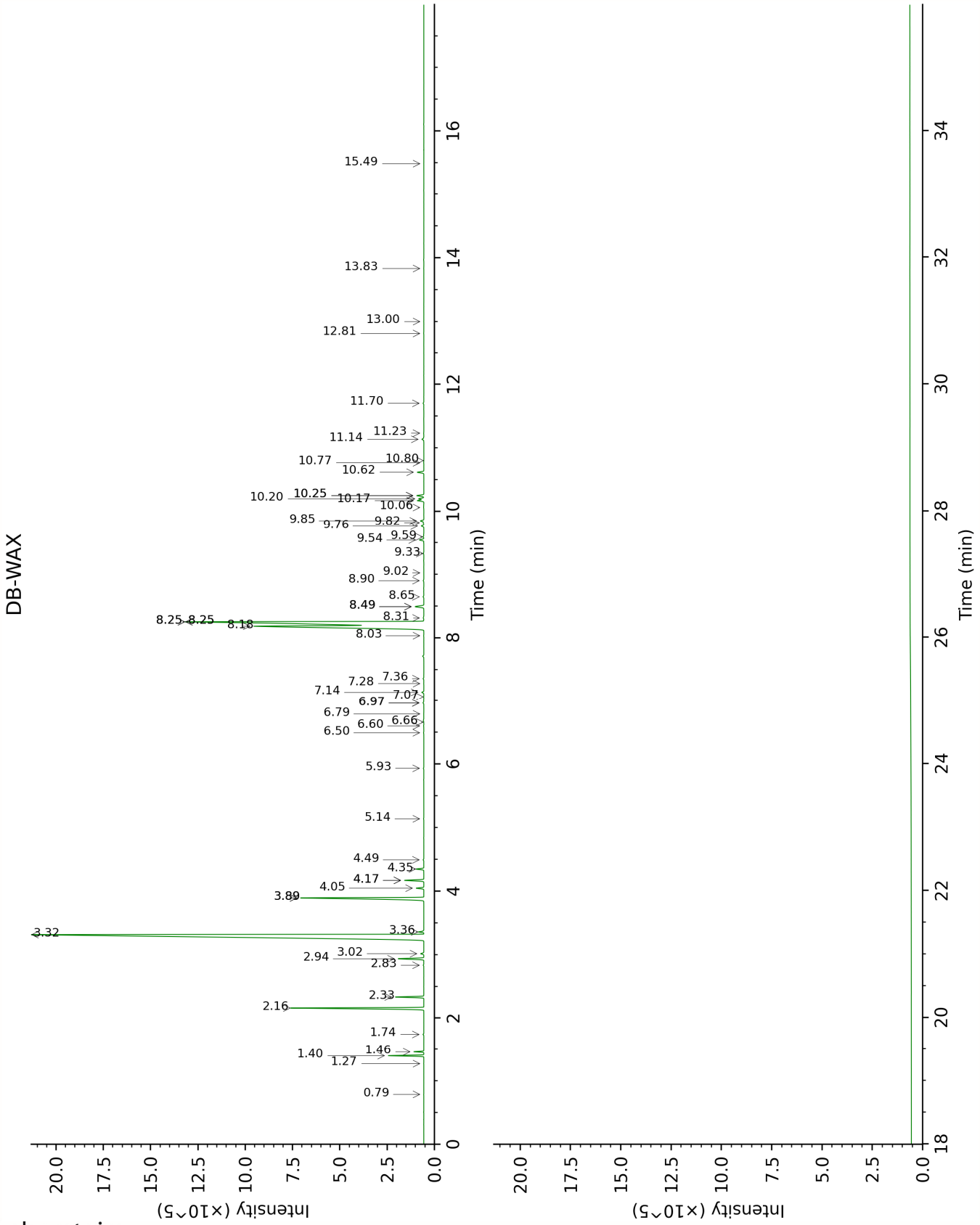
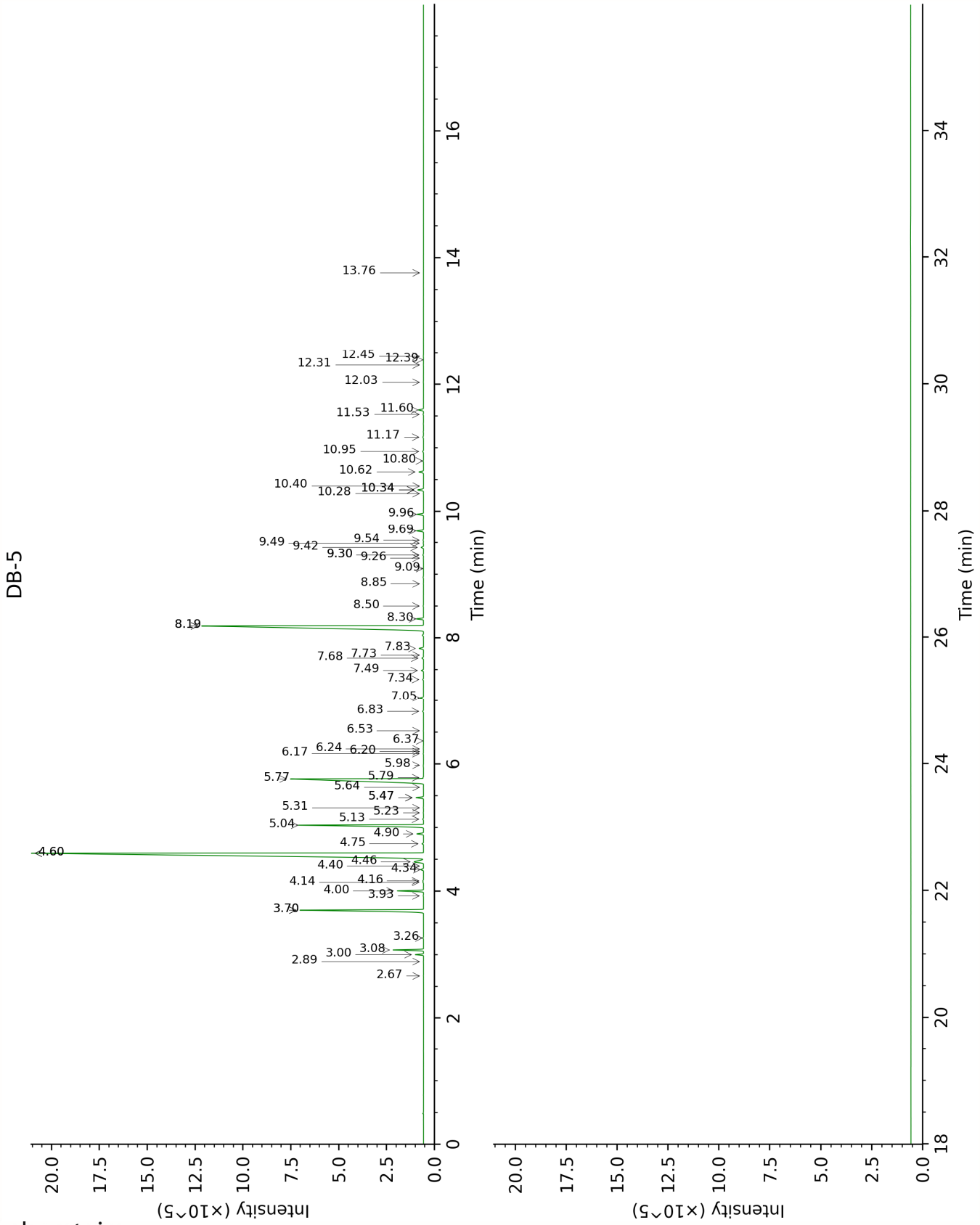

DB-WAX
15.49
13.83
13.00
12.81
11.70
11.14
11.23
10.77
10.80
10.62
10.20
10.25
10.17
10.06
9.85
9.76
9.82
9.54
9.59
9.33
9.02
8.90
8.65
8.49
8.31
8.25
8.25
8.18
8.03
7.28
7.36
7.14
7.07
6.97
6.79
6.66
6.60
6.50
5.93
5.14
4.49
4.35
4.17
4.05
3.89
3.32
3.36
2.94
3.02
2.83
2.33
2.16
1.74
1.40
1.46
1.27
0.79
Time (min)
Intensity (×10^5)
Time (min)
Intensity (×10^5)


DB-5
Time (min)
Intensity (×10^5)
13.76
12.31
12.45
12.39
12.03
11.53
11.60
11.17
10.95
10.80
10.62
10.40
10.28
10.34
9.96
9.69
9.49
9.42
9.54
9.30
9.26
9.09
8.85
8.50
8.30
8.19
7.83
7.68
7.73
7.49
7.34
7.05
6.83
6.53
6.37
6.17
6.24
6.20
5.98
5.77
5.79
5.64
5.47
5.31
5.23
5.13
5.04
4.90
4.75
4.60
4.40
4.46
4.34
4.14
4.16
4.00
3.93
3.70
3.26
3.00
3.08
2.89
2.67

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Nonane	0.79	891.4	tr	2.67	903.7	tr
Tricyclene	1.27	971.4	tr	2.89	918.8	tr
α-Thujene	1.46	998.8	0.31	3.00	926.1	0.31
α-Pinene	1.40	992.0	1.17	3.08	931.0	1.17
Camphene	1.74	1026.6	0.03	3.26	943.6	0.04
β-Pinene	2.16	1068.0	5.94	3.70*	973.0	[7.01]
Sabinene	2.34	1085.3	1.07	3.70*	973.0	[7.01]
6-Methyl-5-hepten-2-one	5.14	1300.1	0.02	3.93	988.1	0.02
Myrcene	2.94	1134.3	1.10	4.00	993.4	1.10
α-Phellandrene	2.84	1126.4	0.03	4.14	1002.4	0.03
Octanal	4.49	1252.6	0.03	4.16	1003.9	0.04
α-Terpinene	3.02	1140.6	0.15	4.34	1015.2	0.15
meta-Cymene	4.17*	1228.9	[0.82]	4.40	1018.7	0.01
para-Cymene	4.17*	1228.9	[0.82]	4.46	1023.0	0.83
β-Phellandrene	3.36	1167.6	0.22	4.60*	1031.5	[42.55]
Limonene	3.32	1164.2	42.33	4.60*	1031.5	[42.55]
(*Z*)-β-Ocimene	3.89*	1208.7	[6.96]	4.75	1040.9	0.07
(*E*)-β-Ocimene	4.05	1219.9	0.31	4.90	1050.8	0.31
γ-Terpinene	3.89*	1208.7	[6.96]	5.04	1059.6	6.90
cis-Sabinene hydrate	6.97*	1430.8	[0.04]	5.13	1065.5	0.04
cis-Linalool oxide (fur.)	6.60	1404.2	0.01	5.23	1071.9	0.01
Octanol	8.25*†	1526.5	[21.00]	5.31	1076.9	0.02
Terpinolene	4.35	1241.9	0.33	5.47*	1087.0	[0.34]
trans-Linalool oxide (fur.)	6.97*	1430.8	[0.04]	5.47*	1087.0	[0.34]
trans-Sabinene hydrate	8.03	1509.8	0.01	5.64	1097.4	0.01
Linalool	8.18*†	1521.2	[14.76]	5.77	1105.8	13.30
Nonanal	5.94	1356.5	0.02	5.79	1107.1	0.02
trans-para-Mentha-2,8-dien-1-ol	9.02	1585.6	0.01	5.98	1119.9	0.01
cis-Limonene oxide	6.50	1396.3	0.02	6.17	1131.7	0.02
trans-Limonene oxide	6.66	1408.5	0.01	6.20	1133.8	0.01
Camphor	7.28	1453.8	0.01	6.24	1136.5	0.01
Epoxyterpinolene	6.79	1418.1	0.01	6.37	1144.7	0.01
Citronellal	7.07	1438.4	0.01	6.53	1155.1	0.01
Terpinen-4-ol	8.65	1556.7	0.04	6.83	1175.0	0.04

α-Terpineol	9.85	1651.8	0.17	7.05	1189.1	0.17
Decanal	7.36	1459.5	0.03	7.34	1208.3	0.04
Octyl acetate	7.14	1443.7	0.10	7.49	1218.0	0.10
Nerol	11.14	1758.1	0.10	7.68	1231.3	0.09
Citronellol	10.80	1729.9	0.01	7.73	1234.5	0.01
Neral	9.54	1627.0	0.22	7.83	1241.7	0.23
Linalyl acetate	8.25*†	1526.5	[21.00]	8.19*	1265.9	[22.50]
Geraniol	11.70	1806.5	0.04	8.19*	1265.9	[22.50]
Geranial	10.17	1677.5	0.31	8.30	1273.5	0.32
Bornyl acetate	8.31	1531.2	0.04	8.50	1287.4	0.02
cis-para-Mentha-2,8-diene-1-hydroperoxide				8.85	1307.6	0.01
trans-para-Mentha-2,8-diene-1-hydroperoxide				9.09	1324.7	0.01
para-Mentha-1,8-diene-4-hydroperoxide				9.26	1336.4	0.01
Linalyl propionate	8.90	1576.2	0.03	9.30*	1339.9	[0.04]
Hodiendiol derivative	13.00	1922.0	0.01	9.30*	1339.9	[0.04]
α-Terpinyl acetate	9.76	1644.7	0.13	9.42	1348.5	0.12
Unknown MISC VII [m/z 43, 121 (52), 93 (48), 79 (33), 41 (30), 136 (26), 81 (25)...]				9.49	1353.2	0.02
Unknown SASC III [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	11.23	1766.2	0.02	9.54	1356.6	0.03
Neryl acetate	10.25*	1683.9	[0.36]	9.69	1367.1	0.34
Geranyl acetate	10.62	1714.5	0.32	9.96	1386.4	0.32
Dodecanal	10.06	1668.8	0.02	10.28	1410.0	0.01
cis-α-Bergamotene	8.25*†	1526.5	[21.00]	10.34*	1414.3	[0.30]
β-Caryophyllene	8.49*	1544.9	[0.52]	10.34*	1414.3	[0.30]
α-Santalene	8.25*†	1526.5	[21.00]	10.40	1418.8	0.01
trans-α-Bergamotene	8.49*	1544.9	[0.52]	10.62	1435.5	0.24

α-Humulene	9.33	1609.8	0.02	10.80	1448.5	0.02
(*E*)-β-Farnesene	9.59	1630.9	0.04	10.95	1459.7	0.05
Germacrene D	9.82	1649.4	0.03	11.17	1476.6	0.04
(*Z*)-α-Bisabolene	10.25*	1683.9	[0.36]	11.53	1503.4	0.03
β-Bisabolene	10.20	1679.9	0.25	11.60	1509.0	0.26
(*E*)-α-Bisabolene	10.77	1727.0	0.01	12.03	1543.3	0.01
(*E*)-Nerolidol	13.83	1999.0	0.01	12.31	1565.0	0.01
Spathulenol				12.39	1571.4	0.01
Caryophyllene oxide	12.81	1904.9	0.01	12.44	1575.8	0.01
α-Bisabolol	15.49	2160.9	0.01	13.76	1683.8	tr
Total reported		99.63%			99.76%	

*: 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