Date : 2024-04-16

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24D02-PTH01
Customer Identification : Organic Lemon - Argentina - L70114R
Type : Essential Oil
Source : *Citrus x limon*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

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

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 : 2024-04-10

Physicochemical data

Refractive index : 1.4744 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2024-04-04

Conclusion

No adulterant, contaminant or diluent has been detected using this method.

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

Analysis Summary - Consolidated Contents

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Heptane	tr	Alkane
Hexanal	tr	Aliphatic aldehyde
Octane	tr	Alkane
Heptanal	tr	Aliphatic aldehyde
Tricyclene	0.01	Monoterpene
α-Thujene	0.36	Monoterpene
α-Pinene	1.70	Monoterpene
α-Fenchene	tr	Monoterpene
Camphene	0.05	Monoterpene
β-Pinene	9.68	Monoterpene
Sabinene	1.77	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	1.59	Monoterpene
α-Phellandrene	0.04	Monoterpene
Pseudolimonene	0.01	Monoterpene
Δ3-Carene	0.01	Monoterpene
Octanal	0.08	Aliphatic aldehyde
α-Terpinene	0.15	Monoterpene
para-Cymene	0.10	Monoterpene
Limonene	70.11	Monoterpene
1,8-Cineole	0.02	Monoterpenic ether
β-Phellandrene	0.30	Monoterpene
(*Z*)-β-Ocimene	0.04	Monoterpene
(*E*)-β-Ocimene	0.08	Monoterpene
γ-Terpinene	7.36	Monoterpene
cis-Sabinene hydrate	0.05	Monoterpenic alcohol
Terpinolene	0.32	Monoterpene
trans-Sabinene hydrate	0.04	Monoterpenic alcohol
Linalool	0.08	Monoterpenic alcohol
Nonanal	0.11	Aliphatic aldehyde
cis-Limonene oxide	0.01	Monoterpenic ether
Camphor	0.01	Monoterpenic ketone
trans-Limonene oxide	0.01	Monoterpenic ether
Citronellal	0.07	Monoterpenic aldehyde
Borneol	0.01	Monoterpenic alcohol
Isoneral	0.01	Monoterpenic aldehyde
Terpinen-4-ol	0.04	Monoterpenic alcohol
Isogeranial	0.02	Monoterpenic aldehyde
α-Terpineol	0.19	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene

Decanal	0.04	Aliphatic aldehyde
2,3-Epoxyneral?	0.01	Monoterpenic aldehyde
Nerol	0.04	Monoterpenic alcohol
2,3-Epoxygeranial?	0.02	Monoterpenic aldehyde
Neral	0.73	Monoterpenic aldehyde
Geraniol	0.02	Monoterpenic alcohol
Geranial	1.19	Monoterpenic aldehyde
Undecanal	0.03	Aliphatic aldehyde
Citronellyl acetate	0.02	Monoterpenic ester
Neryl acetate	0.38	Monoterpenic ester
α-Copaene	0.01	Sesquiterpene
Geranyl acetate	0.19	Monoterpenic ester
Dodecanal	0.01	Aliphatic aldehyde
cis-α-Bergamotene	0.05	Sesquiterpene
β-Caryophyllene	0.16	Sesquiterpene
α-Santalene	0.01	Sesquiterpene
trans-α-Bergamotene	0.34	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
β-Santalene	0.01	Sesquiterpene
(*E*)-β-Farnesene	0.04	Sesquiterpene
Geranyl propionate	0.01	Monoterpenic ester
trans-β-Bergamotene	0.02	Sesquiterpene
Valencene	0.01	Sesquiterpene
Bicyclogermacrene	0.04	Sesquiterpene
(*Z*)-α-Bisabolene	0.05	Sesquiterpene
β-Bisabolene	0.50	Sesquiterpene
(*E*)-α-Bisabolene	0.02	Sesquiterpene
Spathulenol	0.02	Sesquiterpenic alcohol
Globulol	0.01	Sesquiterpenic alcohol
Viridiflorol	0.01	Sesquiterpenic alcohol
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
epi-α-Bisabolol	0.03	Sesquiterpenic alcohol
Citropten	0.05	Furanocoumarin
Palmitic acid	0.01	Aliphatic acid
Stearic acid	0.02	Aliphatic acid
Byakangelicol	0.01	Furanocoumarin
Consolidated total	**98.67**	

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

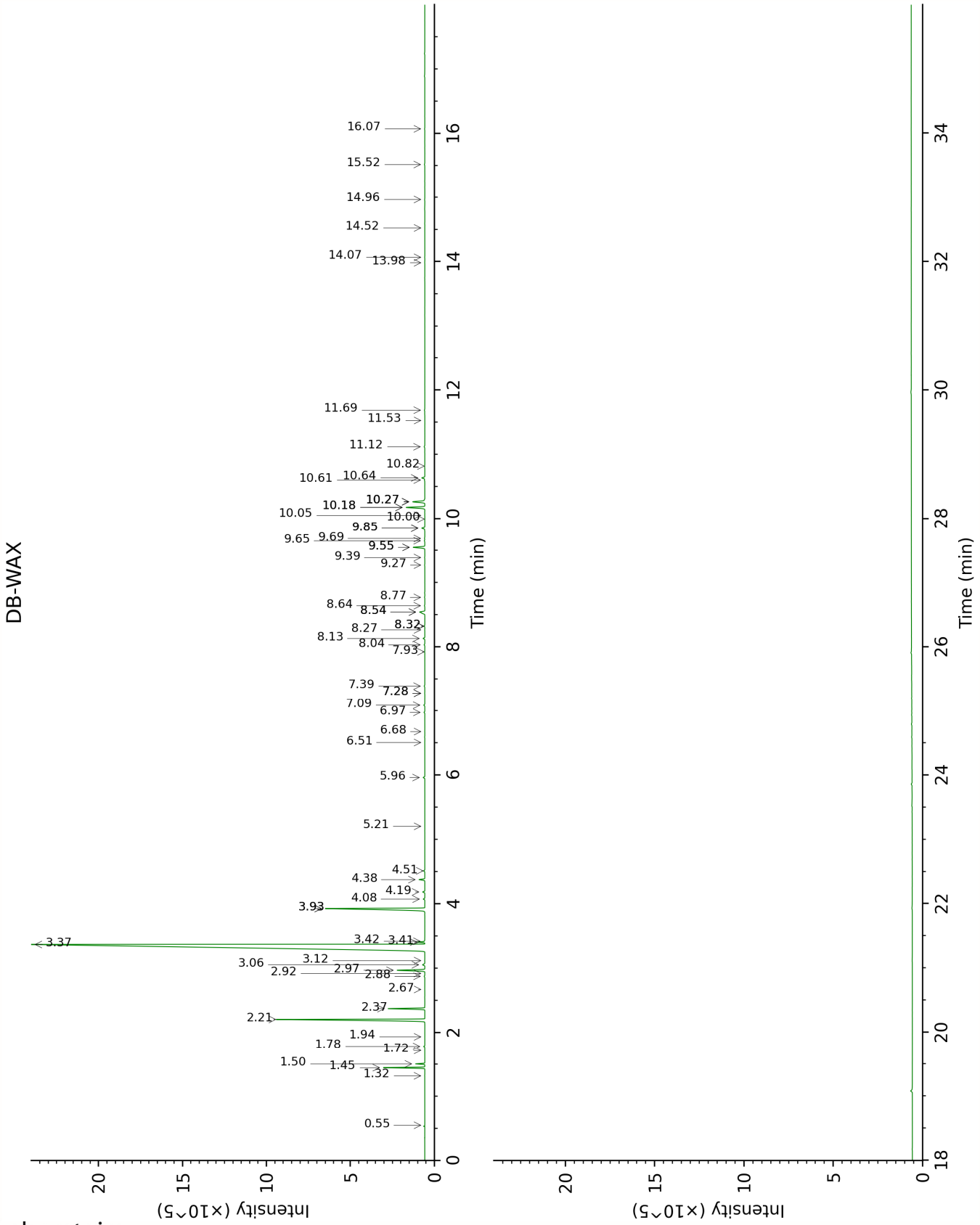
628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

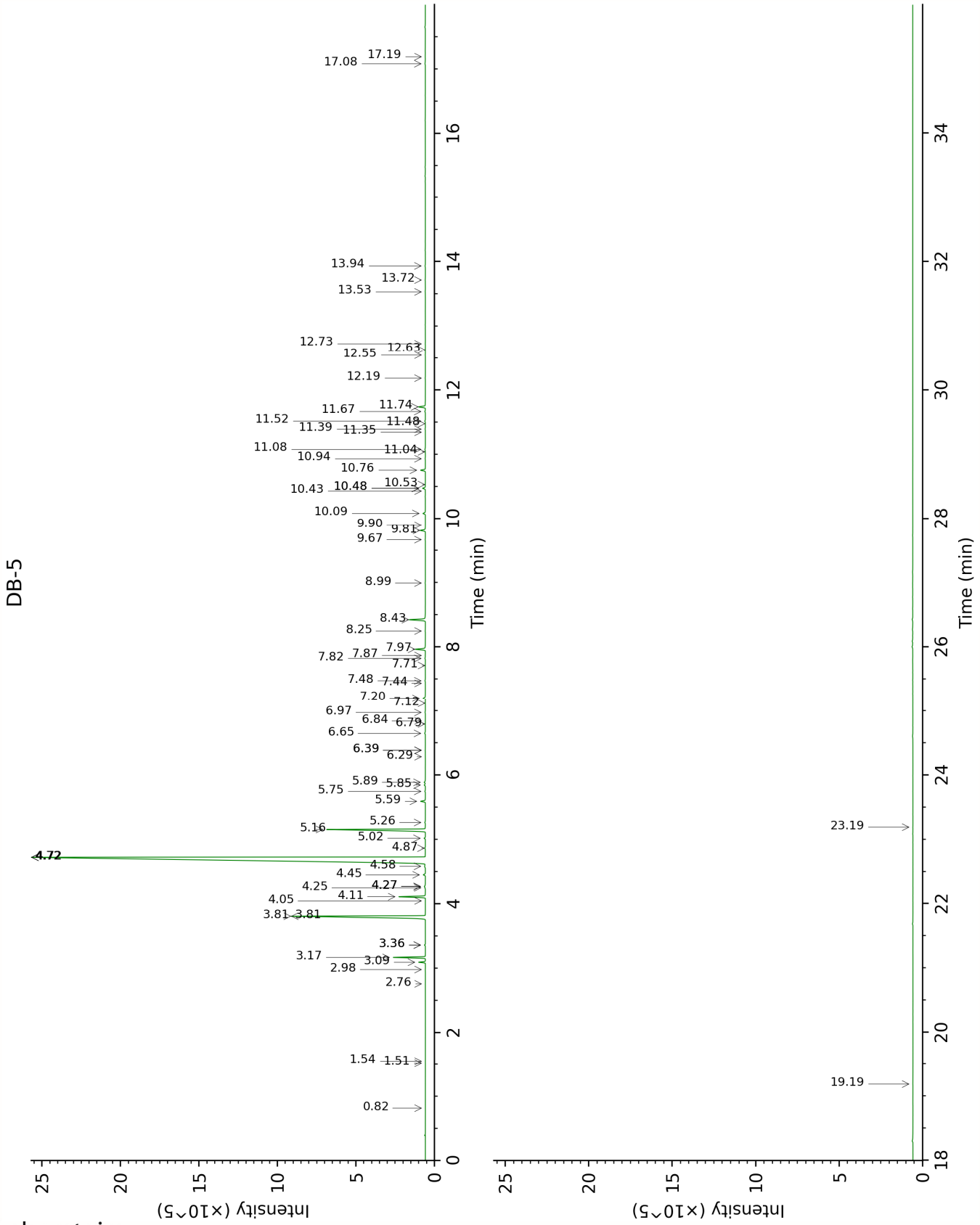
to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.
Bracketed value ([xx]): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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

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

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


DB-WAX
Intensity (×10^5)
Time (min)
16.07
15.52
14.96
14.52
14.07
13.98
11.69
11.53
11.12
10.82
10.61
10.64
10.27
10.18
10.05
10.00
9.85
9.65
9.69
9.55
9.39
9.27
8.77
8.64
8.54
8.32
8.27
8.13
8.04
7.93
7.39
7.28
7.09
6.97
6.68
6.51
5.96
5.21
4.51
4.38
4.19
4.08
3.93
3.42
3.41
3.37
3.12
3.06
2.97
2.92
2.88
2.67
2.37
2.21
1.94
1.78
1.72
1.50
1.45
1.32
0.55


DB-5
17.08
17.19
13.94
13.72
13.53
12.73
12.55
12.63
12.19
11.67
11.74
11.52
11.48
11.39
11.35
11.08
11.04
10.94
10.76
10.43
10.48
10.53
10.09
9.90
9.81
9.67
8.99
8.43
8.25
7.97
7.82
7.87
7.71
7.48
7.44
7.20
7.12
6.97
6.84
6.79
6.65
6.39
6.29
5.89
5.85
5.75
5.59
5.26
5.16
5.02
4.87
4.72
4.58
4.45
4.27
4.25
4.11
4.05
3.81
3.81
3.36
3.17
3.09
2.98
2.76
1.54
1.51
0.82
23.19
19.19
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Heptane				0.82	699.6	tr
Hexanal	1.94	1044.0	tr	1.52	799.3	tr
Octane	0.55	786.9	tr	1.54	803.5	tr
Heptanal	3.12	1145.8	0.01	2.76	903.8	tr
Tricyclene	1.32	974.0	0.01	2.98	918.8	0.01
α-Thujene	1.50	1001.9	0.36	3.09	926.2	0.36
α-Pinene	1.45	993.0	1.71	3.17	931.2	1.70
α-Fenchene	1.72	1023.5	tr	3.36*	943.8	[0.06]
Camphene	1.78	1029.9	0.05	3.36*	943.8	[0.06]
β-Pinene	2.21	1069.5	9.68	3.81*	973.3	[11.46]
Sabinene	2.37	1085.3	1.77	3.81*	973.3	[11.46]
6-Methyl-5-hepten-2-one	5.20	1298.0	0.01	4.05	989.0	0.01
Myrcene	2.97	1134.4	1.60	4.11	993.2	1.59
α-Phellandrene	2.88	1127.3	0.04	4.25*†	1002.4	[0.04]
Pseudolimonene	2.92	1130.7	0.01	4.27*†	1003.7	[0.09]
Δ3-Carene	2.67	1111.8	0.01	4.27*†	1003.7	[0.09]
Octanal	4.51	1248.6	0.08	4.27*†	1003.7	[0.09]
α-Terpinene	3.06	1140.8	0.16	4.45	1015.1	0.15
para-Cymene	4.19	1225.3	0.12	4.58	1023.4	0.10
Limonene	3.37	1164.7	70.11	4.72*	1032.1	[70.46]
1,8-Cineole	3.42	1168.5	0.02	4.72*	1032.1	[70.46]
β-Phellandrene	3.41	1167.5	0.30	4.72*	1032.1	[70.46]
(*Z*)-β-Ocimene	3.93*	1206.9	[7.43]	4.87	1041.0	0.04
(*E*)-β-Ocimene	4.08	1217.4	0.09	5.02	1050.6	0.08
γ-Terpinene	3.93*	1206.9	[7.43]	5.16	1059.1	7.36
cis-Sabinene hydrate	6.98	1426.4	0.05	5.26	1065.9	0.05
Terpinolene	4.38	1239.0	0.33	5.59	1086.5	0.32
trans-Sabinene hydrate	8.04	1506.0	0.05	5.75	1096.1	0.04
Linalool	8.13	1513.7	0.10	5.85	1102.3	0.08
Nonanal	5.96	1352.5	0.10	5.89	1104.9	0.11
cis-Limonene oxide	6.51	1391.8	0.01	6.29	1130.3	0.01
Camphor	7.28*	1449.4	[0.02]	6.39*	1136.6	[0.02]
trans-Limonene oxide	6.68	1404.1	0.01	6.39*	1136.6	[0.02]
Citronellal	7.09	1434.8	0.07	6.65	1153.4	0.07
Borneol	9.85*	1650.6	[0.19]	6.80	1162.7	0.01
Isoneral	7.93	1497.8	0.02	6.84	1165.8	0.01
Terpinen-4-ol	8.64	1553.7	0.03	6.97	1174.2	0.04
Isogeranial	8.27	1524.2	0.01	7.12	1183.4	0.02

α-Terpineol	9.85*	1650.6	[0.19]	7.20	1188.7	0.19
Unknown CYFL VI [m/z 84, 41 (83), 83 (79), 91 (76), 93 (67), 119 (64), 137 (63), 109 (54), 108 (54)... 152 (4)]	10.27*	1685.3	[0.89]	7.44	1203.6	0.01
Decanal	7.39	1457.8	0.05	7.48	1206.2	0.04
2,3-Epoxyneral?				7.71	1222.1	0.01
Nerol	11.12	1758.4	0.05	7.82	1229.4	0.04
2,3-Epoxygeranial?				7.87	1232.5	0.02
Neral	9.55*	1625.9	[0.75]	7.97	1239.0	0.73
Geraniol	11.69	1797.9	0.03	8.25	1257.9	0.02
Geranial	10.18*	1678.1	[1.23]	8.42	1269.6	1.19
Undecanal	8.77	1563.8	0.02	8.99	1307.8	0.03
Citronellyl acetate	9.55*	1625.9	[0.75]	9.67	1355.4	0.02
Neryl acetate	10.27*	1685.3	[0.89]	9.81	1365.5	0.38
α-Copaene	7.28*	1449.4	[0.02]	9.90	1371.6	0.01
Geranyl acetate	10.64	1716.4	0.20	10.09	1384.8	0.19
Dodecanal	10.06	1667.7	0.01	10.43	1409.5	0.01
cis-α-Bergamotene	8.32*	1528.7	[0.04]	10.48*	1412.7	[0.21]
β-Caryophyllene	8.54*	1545.9	[0.50]	10.48*	1412.7	[0.21]
α-Santalene	8.32*	1528.7	[0.04]	10.53	1417.0	0.01
trans-α-Bergamotene	8.54*	1545.9	[0.50]	10.76	1433.6	0.34
α-Humulene	9.39	1612.8	0.02	10.94	1446.9	0.02
β-Santalene	9.27	1603.3	0.02	11.04	1454.9	0.01
(*E*)-β-Farnesene	9.65	1634.4	0.04	11.08	1457.7	0.04
Geranyl propionate	11.53	1783.9	0.01	11.35	1477.5	0.01
trans-β-Bergamotene	9.69	1637.3	0.03	11.40	1481.0	0.02
Valencene	10.00	1663.1	0.01	11.48	1487.3	0.01
Bicyclogermacrene	10.18*	1678.1	[1.23]	11.52	1490.3	0.04
(*Z*)-α-Bisabolene	10.60	1713.5	0.03	11.67	1501.4	0.05
β-Bisabolene	10.27*	1685.3	[0.89]	11.74	1506.9	0.50
(*E*)-α-Bisabolene	10.82	1732.3	0.01	12.19	1541.8	0.02
Spathulenol	14.52	2063.9	0.01	12.55	1570.1	0.02
Globulol	13.98	2011.1	0.01	12.63	1576.9	0.01
Viridiflorol	14.07	2019.3	0.01	12.73	1584.3	0.01
Unknown CILI I [m/z 94, 43 (89), 41 (67), 122 (46), 69 (41)...222]	14.96	2107.1	0.01	13.53	1649.7	0.02
Unknown CILI II	16.07	2220.1	0.02	13.72	1664.8	0.02

[m/z 69, 95 (100), 41 (89), 109 (68), 67 (61)...222]						
epi-α-Bisabolol	15.52	2163.3	0.03	13.94	1682.8	0.03
Citropten				17.08	1964.1	0.05
Palmitic acid				17.19	1974.5	0.01
Stearic acid				19.19	2174.1	0.02
Byakangelicol				23.19	2629.7	0.01
Total reported		98.57%			98.69%	

*: 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

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