

Date : 2024-01-30

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24A23-PTH04

Customer Identification : Rosemary - Croatia - R40112R

Type : Essential Oil

Source : *Rosmarinus officinalis* ct. 1,8-Cineole

Customer : Plant Therapy

Checked and 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

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 : 2024-01-26

PHYSICOCHEMICAL DATA

Refractive index : 1.4657 ± 0.0003 (20 °C)

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

Analyst : Cindy Caron B. Sc.

Date : 2024-01-24

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
Ethanol	tr	Aliphatic alcohol
Isobutyral	tr	Aliphatic aldehyde
2-Methyl-3-buten-2-ol	tr	Aliphatic alcohol
Isovaleral	0.15	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	0.02	Aliphatic alcohol
Toluene	tr	Simple phenolic
Hexanal	tr	Aliphatic aldehyde
Hexanol	0.01	Aliphatic alcohol
Isoamyl acetate	0.02	Aliphatic ester
Bornylene	0.01	Monoterpene
Hashishene	0.02	Monoterpene
Tricyclene	0.26	Monoterpene
α -Thujene	0.05	Monoterpene
α -Pinene	12.80	Monoterpene
Camphene	4.50	Monoterpene
α -Fenchene	0.11	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
Sabinene	0.06	Monoterpene
β -Pinene	7.01	Monoterpene
Unknown	0.03	Monoterpene
Octan-3-one	0.04	Aliphatic ketone
Myrcene	1.30	Monoterpene
2-Carene	0.01	Monoterpene
α -Phellandrene	0.28	Monoterpene
Pseudolimonene	0.06	Monoterpene
Δ^3 -Carene	0.02	Monoterpene
α -Terpinene	0.22	Monoterpene
<i>para</i> -Cymene	1.56	Monoterpene
1,8-Cineole	45.92	Monoterpenic ether
Limonene	3.85	Monoterpene
(Z)- β -Ocimene	0.05	Monoterpene
(E)- β -Ocimene	0.03	Monoterpene
γ -Terpinene	1.56	Monoterpene
Unknown	0.01	Oxygenated monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.01	Monoterpenic alcohol
<i>trans</i> -Linalool oxide (fur.)	0.02	Monoterpenic alcohol
<i>para</i> -Cymenene	0.03	Monoterpene
Terpinolene	0.07	Monoterpene
Linalool	0.47	Monoterpenic alcohol

endo-Fenchol	0.03	Monoterpenic alcohol
<i>cis-para</i> -Menth-2-en-1-ol	0.01	Monoterpenic alcohol
α -Campholenal	0.01	Monoterpenic aldehyde
<i>trans</i> -Pinocarveol	0.08	Monoterpenic alcohol
Camphor	9.90	Monoterpenic ketone
Camphene hydrate	0.04	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Isoborneol	0.07	Monoterpenic alcohol
Pinocarvone	0.03	Monoterpenic ketone
δ -Terpineol	0.11	Monoterpenic alcohol
Borneol	3.33	Monoterpenic alcohol
Terpinen-4-ol	0.31	Monoterpenic alcohol
<i>para</i> -Cymen-8-ol	0.01	Monoterpenic alcohol
Myrtenal	0.03	Monoterpenic aldehyde
α -Terpineol	2.08	Monoterpenic alcohol
Myrtenol	0.02	Monoterpenic alcohol
Verbenone	0.03	Monoterpenic ketone
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
Bornyl formate	0.01	Monoterpenic ester
<i>cis</i> -Carveol	0.01	Monoterpenic alcohol
Citronellol	0.01	Monoterpenic alcohol
Carvone	0.02	Monoterpenic ketone
Geraniol	0.05	Monoterpenic alcohol
Bornyl acetate	0.97	Monoterpenic ester
Unknown	0.01	Oxygenated monoterpene
Unknown	0.01	Unknown
Limonene hydroperoxide I	0.01	Monoterpenic peroxide
α -Cubebene	0.02	Sesquiterpene
α -Ylangene	0.01	Sesquiterpene
α -Copaene	0.03	Sesquiterpene
Geranyl acetate	0.01	Monoterpenic ester
Isocaryophyllene	0.01	Sesquiterpene
α -Gurjunene	0.04	Sesquiterpene
β -Caryophyllene	0.55	Sesquiterpene
β -Copaene	0.01	Sesquiterpene
β -Gurjunene	0.02	Sesquiterpene
Aromadendrene	0.19	Sesquiterpene
α -Humulene	0.07	Sesquiterpene
allo-Aromadendrene	0.06	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.01	Sesquiterpene
γ -Muurolene	0.03	Sesquiterpene
β -Selinene	0.02	Sesquiterpene
α -Selinene	0.02	Sesquiterpene
Unknown	tr	Unknown
Viridiflorene	0.02	Sesquiterpene

α -Muurolene	0.01	Sesquiterpene
β -Bisabolene	0.02	Sesquiterpene
γ -Cadinene	0.03	Sesquiterpene
δ -Cadinene	0.05	Sesquiterpene
<i>trans</i> -Calamenene	0.01	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.01	Sesquiterpene
α -Calacorene	0.01	Sesquiterpene
Caryophyllene oxide	0.03	Sesquiterpenic ether
Globulol	0.05	Sesquiterpenic alcohol
Viridiflorol	0.01	Sesquiterpenic alcohol
Ledol	0.01	Sesquiterpenic alcohol
Humulene epoxide II	0.01	Sesquiterpenic ether
Unknown	0.01	Oxygenated sesquiterpene
γ -Eudesmol	0.02	Sesquiterpenic alcohol
Caryophylladienol II	0.01	Sesquiterpenic alcohol
β -Eudesmol	0.05	Sesquiterpenic alcohol
α -Eudesmol	0.04	Sesquiterpenic alcohol
14-Hydroxy-(<i>Z</i>)-caryophyllene	0.02	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.01	Sesquiterpenic alcohol
<i>meta</i> -Camphorene	0.03	Diterpene
<i>para</i> -Camphorene	0.01	Diterpene
Consolidated total	99.37	

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

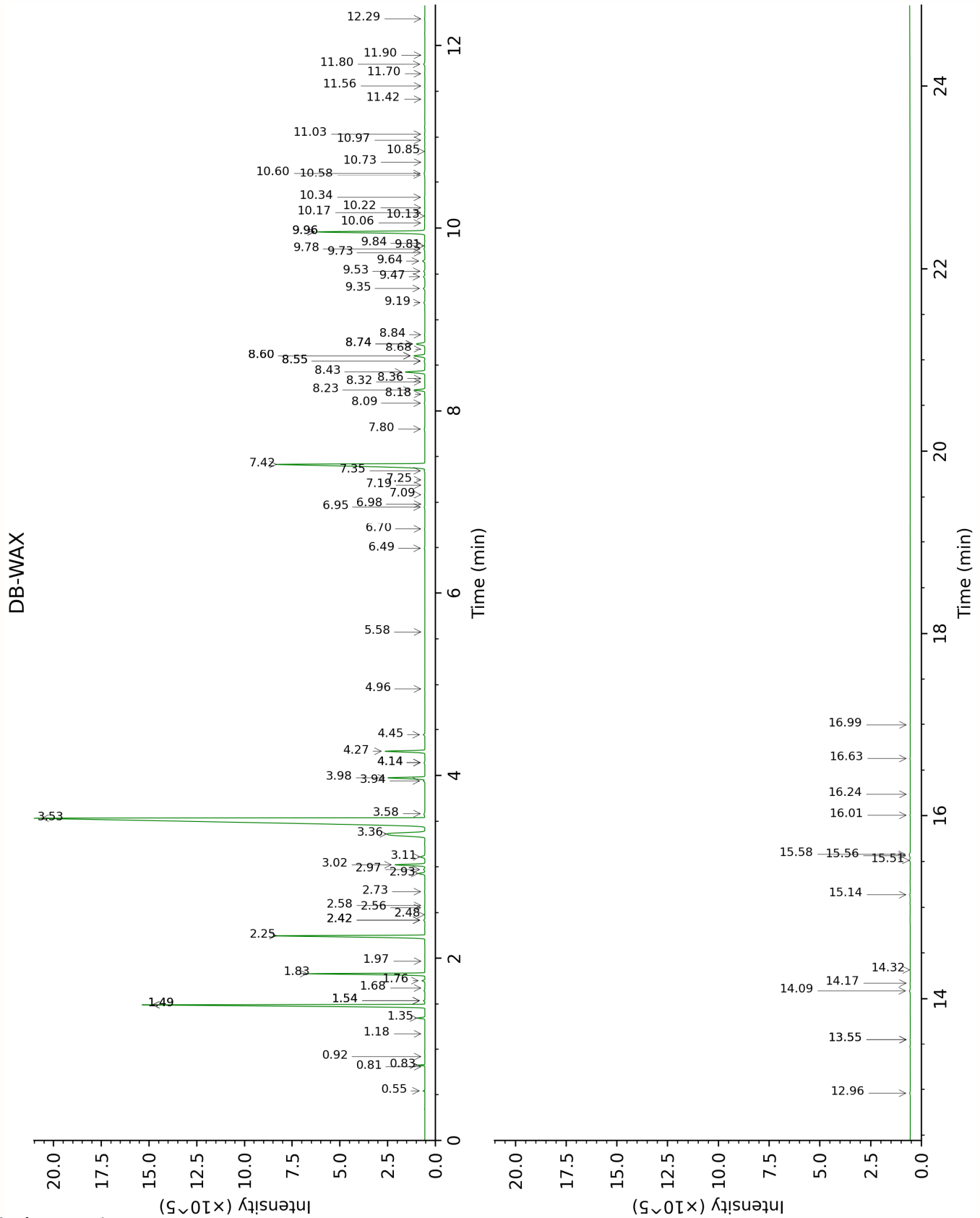
Note: no correction factor was applied

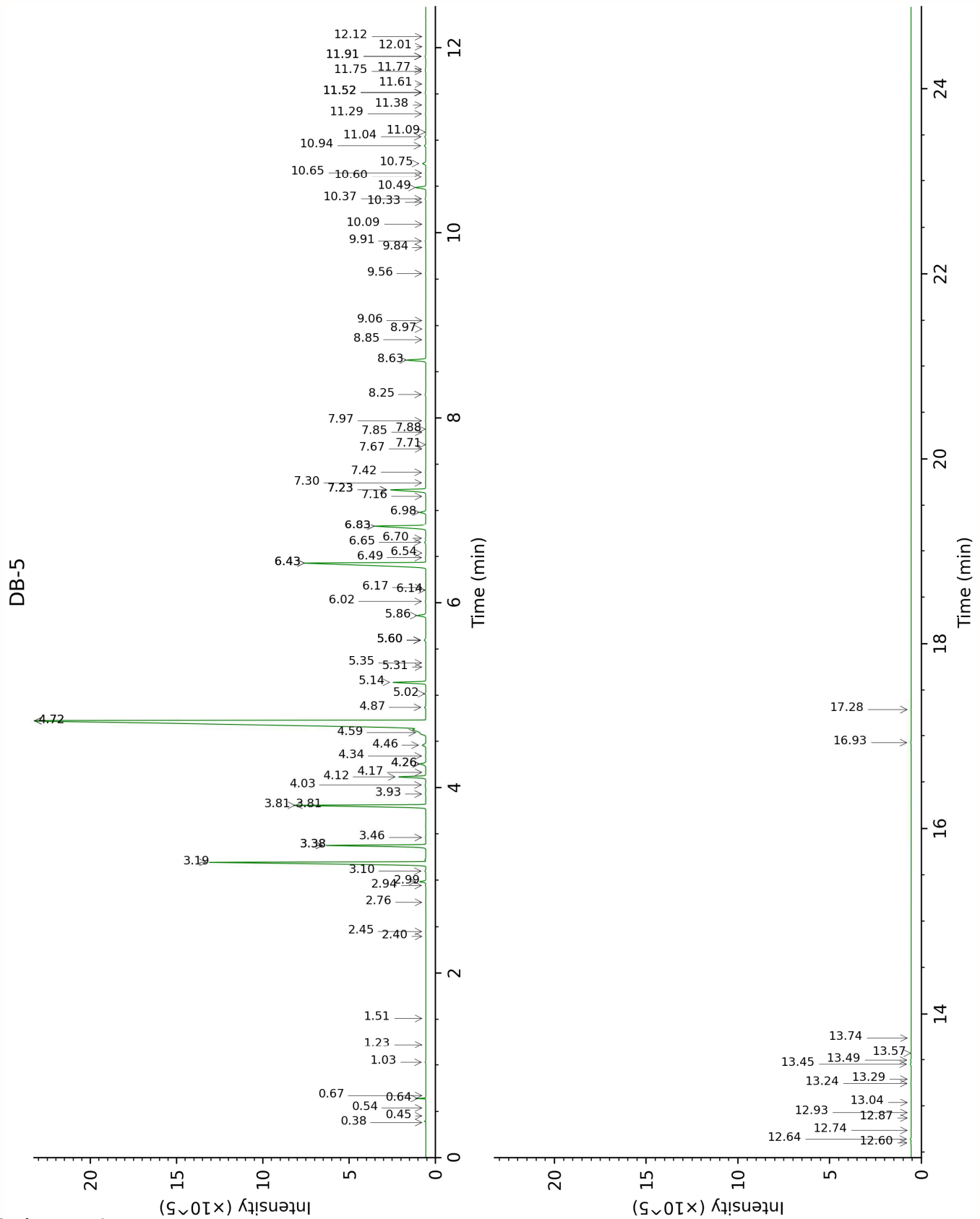
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

Ethanol	Column DB-WAX			Column DB-5		
	0.92	907.0	tr	0.38	500.3	tr
Isobutyral	0.54	774.7	0.03	0.45	536.3	tr
2-Methyl-3-buten-2-ol	1.68	1013.1	0.01	0.54	606.0	tr
Isovaleral	0.83	883.2	0.16	0.64	640.5	0.15
2-Methylbutyral	0.81	877.7	tr	0.67	650.8	tr
Isoamyl alcohol	3.58	1174.6	0.02	1.03	732.4	0.02
Toluene	1.54*	1000.1	[0.04]	1.23	759.1	tr
Hexanal	1.97	1040.8	0.01	1.51	798.4	tr
Hexanol	5.58	1319.5	0.01	2.40	873.7	0.01
Isoamyl acetate	2.48	1088.8	0.01	2.45	878.0	0.02
Bornylene	1.18	945.7	0.01	2.76	903.7	0.01
Hashishene	1.49*	993.5	[12.81]	2.94	915.9	0.02
Tricyclene	1.35	971.8	0.26	2.99	918.7	0.26
α -Thujene	1.54*	1000.1	[0.04]	3.10	926.1	0.05
α -Pinene	1.49*	993.5	[12.81]	3.20	932.4	12.80
Camphene	1.84	1028.0	4.50	3.38*	944.4	[4.62]
α -Fenchene	1.76	1020.8	0.11	3.38*	944.4	[4.62]
Thuja-2,4(10)-diene	2.42*	1083.1	[0.06]	3.46	950.0	0.02
Sabinene	2.42*	1083.1	[0.06]	3.81*	972.9	[7.07]
β -Pinene	2.25	1067.1	7.01	3.81*	972.9	[7.07]
Unknown ORVU I [m/z 93, 79 (73), 67 (49), 95 (42), 91 (41), 121 (38)...]	2.56	1096.0	0.01	3.93	980.8	0.03
Octan-3-one	4.14*	1215.8	[0.04]	4.03	987.3	0.04
Myrcene	3.02	1132.2	1.28	4.12	993.0	1.30
2-Carene	2.58	1098.3	0.01	4.16	996.2	0.01
α -Phellandrene	2.93	1125.0	0.28	4.26*	1002.2	[0.35]
Pseudolimonene	2.97	1128.2	0.06	4.26*	1002.2	[0.35]
Δ^3 -Carene	2.73	1109.9	0.02	4.34	1007.7	0.02
α -Terpinene	3.11	1138.8	0.23	4.46	1015.0	0.22
<i>para</i> -Cymene	4.27	1224.6	1.72	4.59†	1023.5	0.39
1,8-Cineole	3.53	1170.8	45.92	4.72*	1031.4	[49.98]
Limonene	3.36	1157.7	3.85	4.72*	1031.4	[49.98]
(<i>Z</i>)- β -Ocimene	3.94	1201.5	0.05	4.87	1040.4	0.05
(<i>E</i>)- β -Ocimene	4.14*	1215.8	[0.04]	5.02	1050.1	0.03
γ -Terpinene	3.98	1204.0	1.59	5.14	1057.8	1.56
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26),	4.96	1273.6	0.01	5.31	1068.1	0.01

Laboratoire
PhytoChemia

Plus que des analyses... des conseils

91 (20), 152 (18)]						
<i>cis</i> -Linalool oxide (fur.)	6.70	1400.0	0.01	5.35	1070.9	0.01
<i>trans</i> -Linalool oxide (fur.)	7.09	1428.2	0.02	5.60*	1086.2	[0.10]
<i>para</i> -Cymenene	6.49	1384.8	0.03	5.60*	1086.2	[0.10]
Terpinolene	4.45	1237.4	0.07	5.60*	1086.2	[0.10]
Linalool	8.23	1513.4	0.47	5.86	1102.8	0.47
endo-Fenchol	8.55*	1537.8	[0.04]	6.02	1112.5	0.03
<i>cis-para</i> -Menth-2-en-1-ol	8.32	1520.2	0.02	6.14	1120.2	0.01
α -Campholenal	7.19	1435.9	0.01	6.16	1122.0	0.01
<i>trans</i> -Pinocarveol	9.34	1599.4	0.08	6.43*	1138.8	[9.99]
Camphor	7.42	1452.7	9.90	6.43*	1138.8	[9.99]
Camphene hydrate	8.68	1548.3	0.01	6.49	1142.5	0.04
Unknown CICA III [m/z 109, 41 (49), 124 (41), 43 (31), 95 (28), 84 (22)... 152 (7)]	6.98	1420.6	0.01	6.54	1145.7	0.01
Isoborneol	9.53	1614.6	0.05	6.65	1153.1	0.07
Pinocarvone	8.09	1502.3	0.03	6.70	1155.9	0.03
δ -Terpineol	9.64	1623.5	0.11	6.83*	1164.2	[3.44]
Borneol	9.96*	1649.2	[5.43]	6.83*	1164.2	[3.44]
Terpinen-4-ol	8.74*	1552.8	[0.48]	6.98	1174.2	0.31
<i>para</i> -Cymen-8-ol	11.70	1793.3	0.02	7.16	1185.2	0.01
Myrtenal	8.84	1560.5	0.03	7.23*	1189.7	[2.11]
α -Terpineol	9.96*	1649.2	[5.43]	7.23*	1189.7	[2.11]
Myrtenol	11.03	1737.5	0.02	7.30	1194.5	0.02
Verbenone	9.81	1636.9	0.02	7.42	1201.7	0.03
<i>trans</i> -Carveol	11.56	1782.0	0.01	7.67	1218.5	0.01
Bornyl formate	8.18	1509.8	0.01	7.71	1221.4	0.01
<i>cis</i> -Carveol	11.90	1811.0	tr	7.85	1230.4	0.01
Citronellol	10.97	1731.9	0.02	7.88	1232.7	0.01
Carvone	10.17	1666.0	0.02	7.97	1238.7	0.02
Geraniol	11.80	1802.3	0.07	8.25	1257.6	0.05
Bornyl acetate	8.43	1528.6	0.97	8.63	1282.4	0.97
Unknown MISC IX [m/z 43, 93 (66), 91 (44), 41 (38), 69 (35)... 152? (1)]				8.85	1297.6	0.01
Unknown MISC X [m/z 69, 41 (79), 91 (56), 92 (54), 79				8.97	1305.3	0.01

(50), 77 (35)...						
Limonene hydroperoxide I				9.06	1311.7	0.01
α -Cubebene	6.95	1418.2	0.03	9.56	1347.3	0.02
α -Ylangene	7.25	1440.2	0.01	9.84	1367.0	0.01
α -Copaene	7.35	1447.5	0.03	9.91	1371.8	0.03
Geranyl acetate	10.73	1711.6	0.01	10.09	1384.6	0.01
Isocaryophyllene	8.36	1523.1	0.01	10.33	1401.1	0.01
α -Gurjunene	7.80	1481.2	0.04	10.37	1403.8	0.04
β -Caryophyllene	8.60*	1542.2	[0.56]	10.49	1412.8	0.55
β -Copaene	8.60*	1542.2	[0.56]	10.60	1421.6	0.01
β -Gurjunene	8.55*	1537.8	[0.04]	10.65	1424.9	0.02
Aromadendrene	8.74*	1552.8	[0.48]	10.75	1432.5	0.19
α -Humulene	9.47	1609.7	0.07	10.94	1446.8	0.07
allo-Aromadendrene	9.19	1587.5	0.06	11.04	1454.0	0.06
(E)- β -Farnesene	9.73	1630.8	0.01	11.09	1457.7	0.01
γ -Murolene	9.78	1634.2	0.05	11.29	1472.3	0.03
β -Selinene	10.06	1656.9	0.03	11.38	1479.4	0.02
α -Selinene	10.13	1663.1	0.02	11.52*	1489.4	[0.04]
Unknown MISC CCII [m/z 59, 94 (67), 95 (50), 79 (44), 43 (41), 73 (16)...				11.52*	1489.4	[0.04]
Viridiflorene	9.84	1639.1	0.02	11.52*	1489.4	[0.04]
α -Murolene	10.22	1670.4	0.01	11.61	1496.2	0.01
β -Bisabolene	10.34	1679.5	0.03	11.75	1506.5	0.02
γ -Cadinene	10.58	1699.3	0.02	11.77	1508.3	0.03
δ -Cadinene	10.60	1701.3	0.05	11.91*	1519.2	[0.06]
<i>trans</i> -Calamenene	11.42	1769.7	0.01	11.91*	1519.2	[0.06]
<i>trans</i> -Cadina-1,4- diene	10.84	1721.6	0.01	12.01	1527.3	0.01
α -Calacorene	12.29	1846.1	0.02	12.12	1535.8	0.01
Caryophyllene oxide	12.96	1905.1	0.03	12.60	1573.6	0.03
Globulol	14.09	2009.5	0.05	12.64	1576.8	0.05
Viridiflorol	14.17	2017.5	0.01	12.74	1584.2	0.01
Ledol	13.55*	1959.8	[0.01]	12.87	1594.7	0.01
Humulene epoxide II	13.55*	1959.8	[0.01]	12.93	1599.2	0.01
Unknown EUGL VIII [m/z 94, 91 (83), 105 (78), 79 (75), 107 (62), 120	14.32	2031.4	0.01	13.04	1607.9	0.01

(58)... 218 (11)]						
γ-Eudesmol	15.14	2110.8	0.02	13.24	1624.9	0.02
Caryophylladienol II	16.24	2221.6	0.01	13.29	1628.7	0.01
β-Eudesmol	15.58	2155.0	0.05	13.45	1642.1	0.05
α-Eudesmol	15.51	2148.4	0.04	13.50	1645.6	0.04
14-Hydroxy-(Z)- caryophyllene	16.63	2262.1	0.02	13.57	1651.8	0.02
(3Z)-Caryophylla- 3,8(13)-dien-5β-ol	16.99	2300.5	0.01	13.74	1665.9	0.01
<i>meta</i> - Camphorene	15.56	2153.5	0.02	16.93	1948.5	0.03
<i>para</i> - Camphorene	16.01	2197.7	0.01	17.28	1982.4	0.01
Total reported		99.45%			99.60%	

*: 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