

Date : 2024-06-07

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24E28-PTH01

Customer Identification : Rhododendron - Nepal - RJ0108R

Type : Essential Oil

Source : *Rhododendron anthopogon*

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

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

Date : 2024-06-07

PHYSICOCHEMICAL DATA

Refractive index : 1.4794 ± 0.0003 (20 °C)

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

Analyst : Cindy Caron B. Sc.

Date : 2024-05-28

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
Toluene	0.01	Simple phenolic
5-Methyl-3-hexanone	0.02	Aliphatic ketone
4-Methyl-3-hexanone	0.02	Aliphatic ketone
Ethyl 2-methylbutyrate	tr	Aliphatic ester
Bornylene	tr	Monoterpene
Hashishene	0.02	Monoterpene
Tricyclene	0.06	Monoterpene
α -Thujene	0.22	Monoterpene
α -Pinene	36.61	Monoterpene
5-Methyl-3-heptanone	0.02	Aliphatic ketone
Camphene	0.27	Monoterpene
α -Fenchene	0.06	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
β -Pinene	15.96	Monoterpene
Sabinene	0.17	Monoterpene
Octen-3-ol	0.01	Aliphatic alcohol
Myrcene	1.02	Monoterpene
α -Phellandrene	0.03	Monoterpene
Pseudolimonene	0.02	Monoterpene
Δ^3 -Carene	0.08	Monoterpene
α -Terpinene	0.07	Monoterpene
<i>para</i> -Cymene	0.99	Monoterpene
β -Phellandrene	[0.13]	Monoterpene
Limonene	12.91	Monoterpene
1,8-Cineole	[0.13]	Monoterpenic ether
(<i>Z</i>)- β -Ocimene	2.78	Monoterpene
2-Heptyl acetate	0.03	Aliphatic ester
(<i>E</i>)- β -Ocimene	1.47	Monoterpene
γ -Terpinene	2.75	Monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
<i>para</i> -Cymenene	0.01	Monoterpene
Terpinolene	0.20	Monoterpene
α -Pinene oxide	0.05	Monoterpenic ether
<i>trans</i> -Sabinene hydrate	0.02	Monoterpenic alcohol
Linalool	0.19	Monoterpenic alcohol
Verbenol analog?	0.03	Monoterpenic alcohol
allo-Ocimene	0.11	Monoterpene
<i>trans</i> -Pinocarveol	0.09	Monoterpenic alcohol
Camphene hydrate	0.09	Monoterpenic alcohol

Borneol	0.04	Monoterpenic alcohol
Terpinen-4-ol	0.14	Monoterpenic alcohol
<i>para</i> -Cymen-8-ol	0.01	Monoterpenic alcohol
α -Terpineol	0.26	Monoterpenic alcohol
Myrtenol	0.04	Monoterpenic alcohol
(3Z,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol?	0.01	Monoterpenic alcohol
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.03	Monoterpenic alcohol
<i>trans</i> -Carveol	0.02	Monoterpenic alcohol
<i>cis</i> -Carveol	0.01	Monoterpenic alcohol
Citronellol	0.03	Monoterpenic alcohol
2-Nonyl acetate	0.02	Aliphatic ester
Unknown	0.03	Unknown
Geraniol	0.02	Monoterpenic alcohol
Bornyl acetate	0.10	Monoterpenic ester
α -Cubebene	0.21	Sesquiterpene
Citronellyl acetate	0.14	Monoterpenic ester
Cyclosativene II	0.01	Sesquiterpene
α -Ylangene	0.08	Sesquiterpene
α -Copaene	0.51	Sesquiterpene
β -Bourbonene	0.17	Sesquiterpene
β -Cubebene	0.03	Sesquiterpene
β -Elemene	0.12	Sesquiterpene
7- <i>epi</i> -Sesquithujene	0.03	Sesquiterpene
α -Funebrene	0.06	Sesquiterpene
4-Phenyl-2-butyl acetate	0.02	Phenylbutanoid ester
α -Gurjunene	0.16	Sesquiterpene
α -Cedrene	0.04	Sesquiterpene
β -Caryophyllene	1.66	Sesquiterpene
β -Copaene	0.02	Sesquiterpene
β -Gurjunene	0.15	Sesquiterpene
α -Maaliene	0.04	Sesquiterpene
Aromadendrene	0.32	Sesquiterpene
Selina-5,11-diene	0.04	Sesquiterpene
<i>cis</i> -Muurolo-3,5-diene	0.03	Sesquiterpene
Unknown	0.15	Sesquiterpene
α -Humulene	0.28	Sesquiterpene
allo-Aromadendrene	0.35	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.15	Sesquiterpene
(E)- β -Farnesene	0.45	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.36	Sesquiterpene
γ -Muurolole	1.19	Sesquiterpene
α -Amorphene	0.13	Sesquiterpene
β -Selinene	0.74	Sesquiterpene
<i>ar</i> -Curcumene	0.07	Sesquiterpene
γ -Amorphene	0.11	Sesquiterpene

α-Selinene	0.88	Sesquiterpene
Unknown	0.15	Sesquiterpene
α-Muurolene	1.63	Sesquiterpene
(3E,6E)-α-Farnesene	0.20	Sesquiterpene
β-Curcumene	0.30	Sesquiterpene
γ-Cadinene	1.88	Sesquiterpene
trans-Calamenene	0.17	Sesquiterpene
Zonarene	0.65	Sesquiterpene
δ-Cadinene	4.39	Sesquiterpene
trans-Cadina-1,4-diene	0.21	Sesquiterpene
α-Cadinene	0.36	Sesquiterpene
α-Calacorene	0.09	Sesquiterpene
Isocaryophyllene epoxide B	0.04	Sesquiterpenic ether
Palustrol	0.03	Sesquiterpenic alcohol
(E)-Nerolidol	0.08	Sesquiterpenic alcohol
Germacrene D-4-ol	0.14	Sesquiterpenic alcohol
Caryophyllene oxide	0.23	Sesquiterpenic ether
Caryophyllene oxide isomer	0.07	Sesquiterpenic ether
Unknown	0.04	Oxygenated sesquiterpene
Viridiflorol	0.03	Sesquiterpenic alcohol
Unknown	0.02	Oxygenated sesquiterpene
1,10-diepi-Cubenol	0.02	Sesquiterpenic alcohol
1-epi-Cubenol	0.16	Sesquiterpenic alcohol
γ-Eudesmol	0.05	Sesquiterpenic alcohol
τ-Muurolol	0.33	Sesquiterpenic alcohol
τ-Cadinol	0.32	Sesquiterpenic alcohol
α-Muurolol	0.21	Sesquiterpenic alcohol
α-Cadinol	0.41	Sesquiterpenic alcohol
cis-Calamenen-10-ol	0.03	Sesquiterpenic alcohol
trans-Calamenen-10-ol	0.02	Sesquiterpenic alcohol
Cadalene	0.03	Sesquiterpene
Shyobunol	0.01	Sesquiterpenic alcohol
α-Bisabolol	0.06	Sesquiterpenic alcohol
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
Consolidated total	98.51	

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

Note: no correction factor was applied

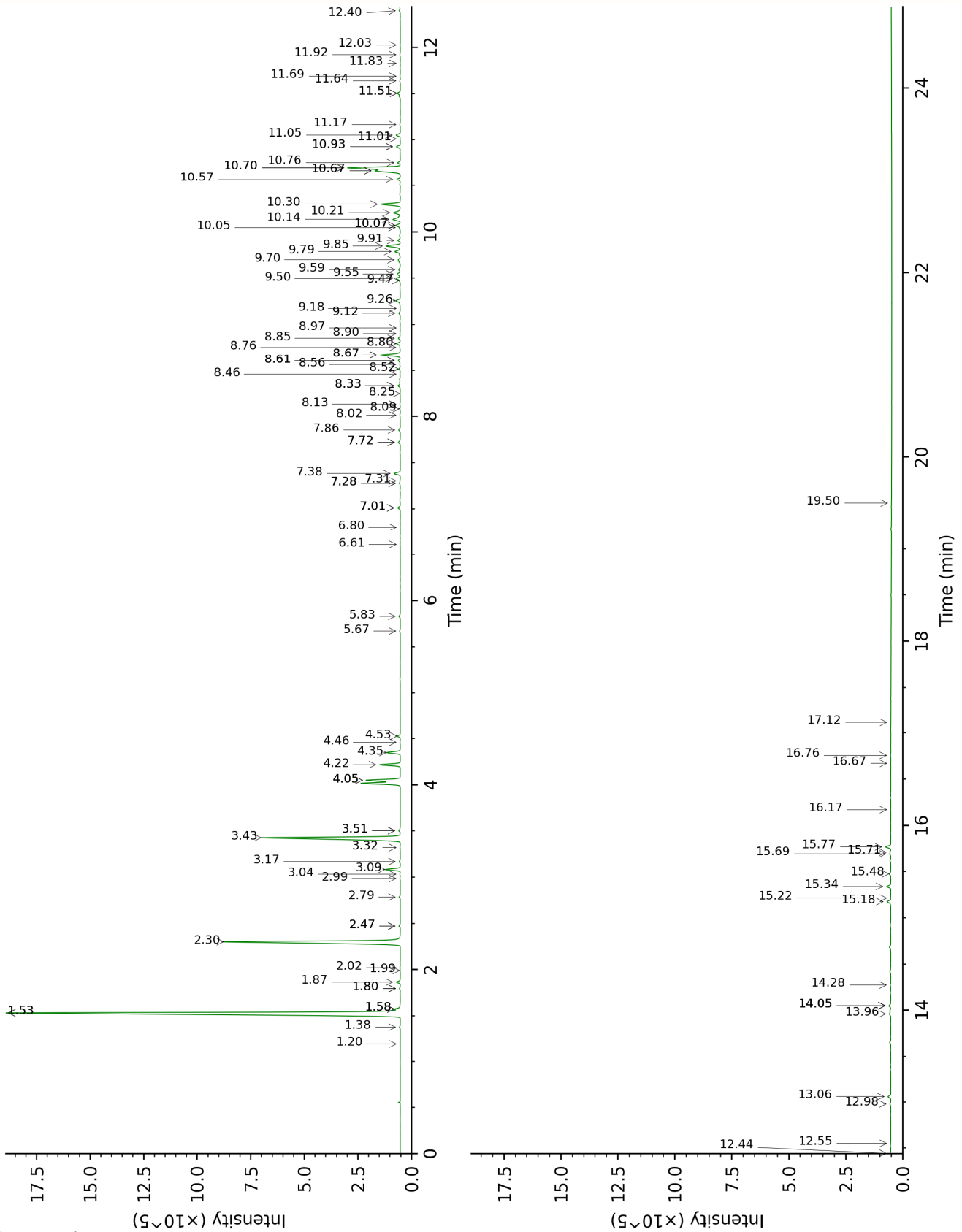
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

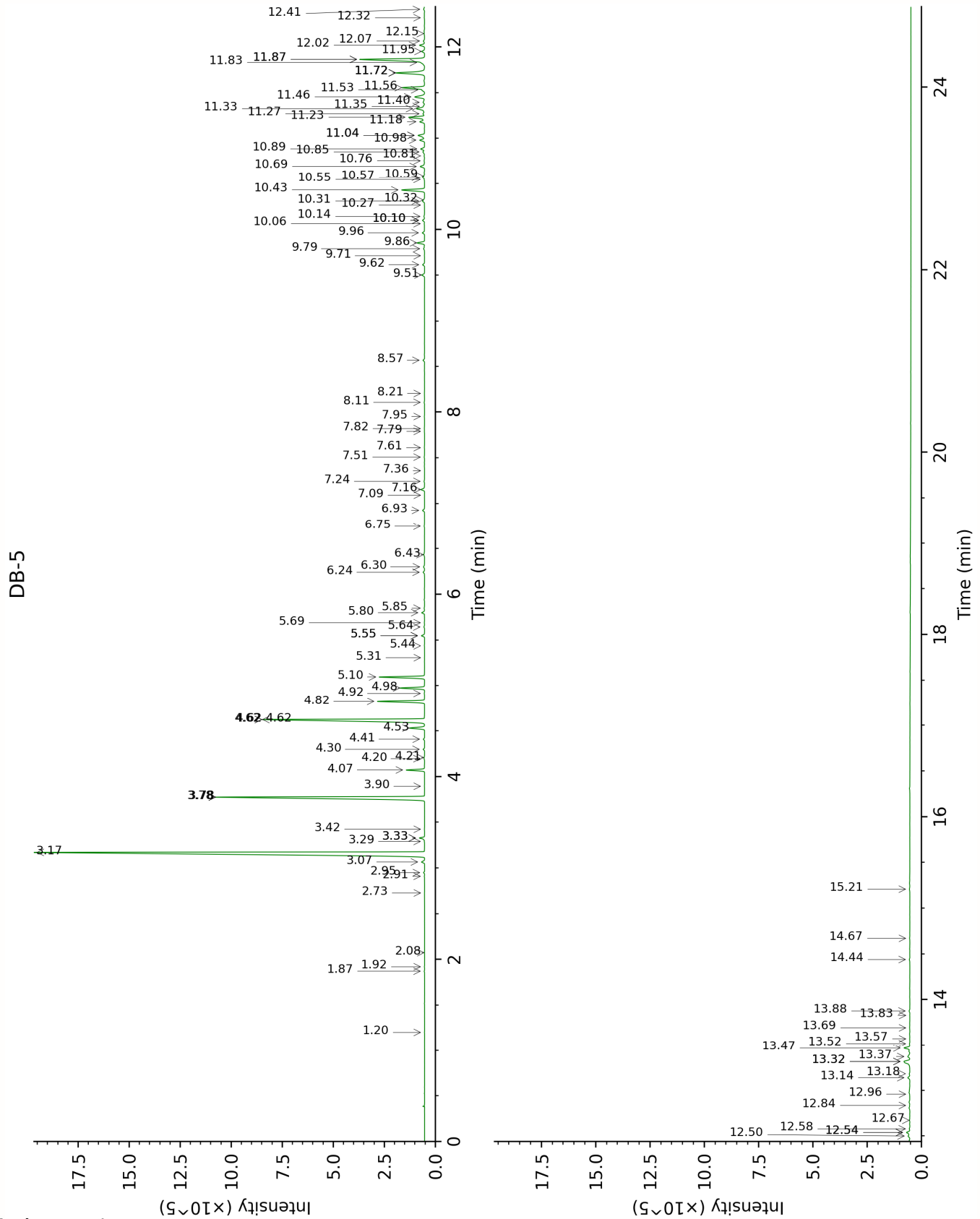
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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.

DB-WAX





FULL ANALYSIS DATA

Toluene	Column DB-WAX			Column DB-5		
	1.58*†	998.5	[0.38]	1.20	759.4	0.01
5-Methyl-3-hexanone	2.02	1041.4	0.02	1.87	833.4	0.02
4-Methyl-3-hexanone	1.99	1038.5	0.02	1.92	837.5	0.02
Ethyl 2-methylbutyrate	1.80*	1019.9	[0.06]	2.08	850.3	tr
Bornylene	1.20	943.2	tr	2.73	904.4	tr
Hashishene	1.53*†	994.5	[36.27]	2.91	916.5	0.02
Tricyclene	1.38	971.3	0.06	2.95	919.2	0.06
α-Thujene	1.58*†	998.5	[0.38]	3.07	926.9	0.22
α-Pinene	1.53*†	994.5	[36.27]	3.17	933.8	36.61
5-Methyl-3-heptanone	3.32	1150.5	0.02	3.29	941.7	0.02
Camphene	1.87	1026.5	0.27	3.33*	944.3	[0.33]
α-Fenchene	1.80*	1019.9	[0.06]	3.33*	944.3	[0.33]
Thuja-2,4(10)-diene	2.47*	1084.3	[0.10]	3.42	950.6	0.01
β-Pinene	2.30	1068.2	15.96	3.78*	973.8	[16.13]
Sabinene	2.47*	1084.3	[0.10]	3.78*	973.8	[16.13]
Octen-3-ol	7.01*	1417.9	[0.19]	3.90	981.7	0.01
Myrcene	3.09	1132.6	1.04	4.07	993.5	1.02
α-Phellandrene	2.99	1125.3	0.03	4.20	1001.6	0.03
Pseudolimonene	3.04	1128.8	0.03	4.21	1002.5	0.02
Δ ³ -Carene	2.79	1110.0	0.08	4.30	1008.2	0.08
α-Terpinene	3.17	1139.1	0.08	4.41	1015.2	0.07
para-Cymene	4.35	1225.4	1.00	4.53	1022.8	0.99
β-Phellandrene	3.51*	1164.3	[0.13]	4.62*	1028.7	[13.08]
Limonene	3.43	1158.6	12.91	4.62*	1028.7	[13.08]
1,8-Cineole	3.51*	1164.3	[0.13]	4.62*	1028.7	[13.08]
(Z)-β-Ocimene	4.05*	1204.4	[2.69]	4.82	1041.2	2.78
2-Heptyl acetate	4.46	1233.1	0.02	4.92	1047.0	0.03
(E)-β-Ocimene	4.22	1216.2	1.46	4.98	1050.8	1.47
γ-Terpinene	4.05*	1204.4	[2.69]	5.10	1058.3	2.75
cis-Linalool oxide (fur.)	6.80	1402.3	0.01	5.31	1071.5	0.01
Octanol	8.46	1526.1	0.03	5.44	1079.7	0.02
para-Cymenene	6.61	1388.2	0.01	5.55*	1086.7	[0.21]
Terpinolene	4.53	1237.7	0.20	5.55*	1086.7	[0.21]
α-Pinene oxide	5.67	1321.2	0.06	5.64	1092.6	0.05
trans-Sabinene hydrate	8.25	1509.9	0.02	5.69	1095.5	0.02
Linalool	8.33*	1516.5	[0.17]	5.80	1102.4	0.19

Verbenol analog?	8.56	1534.2	0.05	5.85	1105.6	0.03
allo-Ocimene	5.83	1332.6	0.10	6.24	1130.7	0.11
<i>trans</i> -Pinocarveol	9.48	1604.8	0.04	6.30	1134.4	0.09
Camphene hydrate	8.76	1548.8	0.05	6.44	1143.0	0.09
Borneol	10.05	1650.8	0.06	6.75	1163.0	0.04
Terpinen-4-ol	8.85	1556.5	0.16	6.93	1174.4	0.14
<i>para</i> -Cymen-8-ol	11.83	1799.1	0.01	7.09	1185.0	0.01
α -Terpineol	10.07*	1652.7	[0.42]	7.16	1189.0	0.26
Myrtenol	11.17	1743.1	0.04	7.24	1194.7	0.04
(3Z,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol?	11.51*	1771.5	[0.26]	7.36	1202.2	0.01
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	11.64	1782.8	0.04	7.51	1212.0	0.03
<i>trans</i> -Carveol	11.69	1787.0	0.03	7.61	1218.9	0.02
<i>cis</i> -Carveol	12.03	1816.5	0.02	7.79	1230.9	0.01
Citronellol	11.01	1730.1	0.02	7.82	1232.9	0.03
2-Nonyl acetate	7.31	1439.5	0.02	7.95	1241.8	0.02
Unknown RHAN I [m/z 68, 43 (71), 82 (59), 67 (52), 95 (24), 81 (24)...]	7.72*	1470.2	[0.16]	8.11	1252.1	0.03
Geraniol	11.92	1807.3	0.04	8.20	1258.6	0.02
Bornyl acetate	8.52	1530.4	0.11	8.57	1282.9	0.10
α -Cubebene	7.01*	1417.9	[0.19]	9.50	1347.9	0.21
Citronellyl acetate	9.70	1623.0	0.26	9.62	1355.8	0.14
Cyclosativene II	7.28*	1437.5	[0.07]	9.72	1362.8	0.01
α -Ylangene	7.28*	1437.5	[0.07]	9.79	1368.1	0.08
α -Copaene	7.38	1445.4	0.52	9.86	1372.6	0.51
β -Bourbonene	7.72*	1470.2	[0.16]	9.96	1380.4	0.17
β -Cubebene	8.02	1491.9	0.04	10.06	1387.4	0.03
β -Elemene	8.67*	1542.4	[1.76]	10.10*	1389.9	[0.15]
7-epi-Sesquithujene	8.08	1497.3	0.03	10.10*	1389.9	[0.15]
α -Funebrene	8.14	1501.1	0.04	10.14	1392.9	0.06
4-Phenyl-2-butyl acetate				10.27	1401.7	0.02
α -Gurjunene	7.86	1480.1	0.13	10.31	1404.9	0.16
α -Cedrene	8.33*	1516.5	[0.17]	10.32	1405.8	0.04
β -Caryophyllene	8.67*	1542.4	[1.76]	10.43	1413.9	1.66

β-Copaene	8.61*	1537.5	[0.18]	10.55	1422.5	0.02
β-Gurjunene	8.61*	1537.5	[0.18]	10.57	1424.3	0.15
α-Maaliene	8.90	1560.3	0.04	10.59	1425.5	0.04
Aromadendrene	8.80	1552.1	0.31	10.69	1433.4	0.32
Selina-5,11-diene	8.97	1565.1	0.02	10.76	1438.0	0.04
cis-Muuroala-3,5-diene	9.18	1581.2	0.02	10.81	1442.1	0.03
Unknown BOCA IV [m/z 91, 161 (92), 105 (85), 119 (63), 133 (53), 79 (49), 204 (46)]	9.12	1577.3	0.12	10.85	1445.3	0.15
α-Humulene	9.55	1610.5	0.28	10.89	1447.8	0.28
allo-Aromadendrene	9.26	1587.6	0.44	10.98	1455.0	0.35
cis-Muuroala-4(15),5-diene	9.59	1614.4	0.15	11.04*	1458.8	[0.57]
(E)-β-Farnesene	9.79	1630.1	0.45	11.04*	1458.8	[0.57]
trans-Cadina-1(6),4-diene	9.50	1606.8	0.36	11.18	1469.9	0.36
γ-Muurolole	9.85	1634.9	1.22	11.23	1473.6	1.19
α-Amorphene	9.91	1639.8	0.20	11.27	1476.4	0.13
β-Selinene	10.14	1657.9	0.78	11.33	1480.6	0.74
ar-Curcumene	10.93*	1723.0	[0.31]	11.35	1482.4	0.07
γ-Amorphene	10.07*	1652.7	[0.42]	11.40	1485.7	0.11
α-Selinene	10.21	1663.8	0.66	11.46	1490.2	0.88
Unknown SWGL III [m/z 161, 105 (77), 204 (73), 119 (65), 189 (57), 91 (53)]	10.70*	1703.9	[4.54]	11.53	1496.0	0.15
α-Muurolole	10.30	1671.1	1.55	11.56	1497.7	1.63
(3E,6E)-α-Farnesene	10.76	1708.5	0.20	11.72*	1510.0	[2.37]
β-Curcumene	10.57	1693.1	0.30	11.72*	1510.0	[2.37]
γ-Cadinene	10.67*	1701.1	[2.16]	11.72*	1510.0	[2.37]
trans-Calamenene	11.51*	1771.5	[0.26]	11.83	1518.9	0.17
Zonarene	10.67*	1701.1	[2.16]	11.87*	1521.6	[5.04]
δ-Cadinene	10.70*	1703.9	[4.54]	11.87*	1521.6	[5.04]
trans-Cadina-1,4-diene	10.93*	1723.0	[0.31]	11.95	1528.4	0.21
α-Cadinene	11.05	1733.6	0.34	12.02	1533.8	0.36

α -Calacorene	12.40	1849.1	0.09	12.07	1537.4	0.09
Isocaryophyllene epoxide B	12.44	1852.7	0.06	12.15	1543.8	0.04
Palustrol	12.55	1862.4	0.02	12.32	1557.4	0.03
(E)-Nerolidol	14.05*	1998.5	[0.15]	12.42	1564.8	0.08
Germacrene D-4-ol	13.96	1990.0	0.12	12.50	1571.5	0.14
Caryophyllene oxide	13.06	1907.6	0.23	12.54*	1574.6	[0.28]
Caryophyllene oxide isomer	12.98	1900.2	0.07	12.54*	1574.6	[0.28]
Unknown HEBR VI [m/z 109, 43 (95), 81 (81), 93 (76), 69 (75), 95 (74), 107 (71)... 204 (22), 220 (6)]				12.58	1577.7	0.04
Viridiflorol	14.28	2019.7	0.05	12.67	1585.1	0.03
Unknown RHAN III [m/z 149, 43 (95), 93 (84), 177 (66), 109 (62), 67 (60)...220 (11)]				12.84	1597.8	0.02
1,10-diepi-Cubenol	14.05*	1998.5	[0.15]	12.96	1607.7	0.02
1-epi-Cubenol	14.05*	1998.5	[0.15]	13.14	1622.6	0.16
γ -Eudesmol	15.22	2109.9	0.02	13.18	1626.2	0.05
τ -Muurolol	15.34	2122.1	0.33	13.32*	1637.3	[0.72]
τ -Cadinol	15.18	2106.1	0.32	13.32*	1637.3	[0.72]
α -Muurolol	15.48	2135.6	0.12	13.37	1641.8	0.21
α -Cadinol	15.77	2164.3	0.39	13.47	1649.7	0.41
<i>cis</i> -Calamenen-10-ol	16.76	2264.7	0.03	13.52	1653.9	0.03
<i>trans</i> -Calamenen-10-ol	17.12	2302.0	0.01	13.57	1658.3	0.02
Cadalene	15.71	2158.6	0.06	13.69	1668.3	0.03
Shyobunol	16.67	2255.8	0.01	13.83	1679.6	0.01
α -Bisabolol	15.69	2156.9	0.07	13.88	1683.6	0.06
Unknown RHAN IV [m/z 91, 175 (93), 105 (76), 79 (73), 133 (69), 107 (60)...218 (33)]	16.17	2204.7	0.02	14.44	1731.4	0.04

Unknown RHAN V [m/z 91, 177 (75), 79 (68), 105 (65), 93 (62), 159 (60)...220 (16)]				14.67	1751.5	0.03
Unknown SCMO VIII [m/z 43, 41 (72), 95 (69), 81 (66), 67 (55), 55 (52), 79 (52), 69 (50)... 238 (1)]	19.50	2563.5	0.01	15.21	1798.2	0.05
Total reported	94.65%			98.57%		

*: 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