

Date : 2024-09-24

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24I10-PTH03

Customer Identification : Lavandin - Spain - L20111R

Type : Essential Oil

Source : *Lavandula x hybrida* [syn. *Lavandula angustifolia* x *latifolia*]

Customer : Plant Therapy

Checked and approved by:

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

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

Date : 2024-09-24

PHYSICOCHEMICAL DATA

Refractive index : 1.4608 ± 0.0003 (20 °C)

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

Analyst : Cindy Caron B. Sc.

Date : 2024-09-17

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
Isobutyral	tr	Aliphatic aldehyde
Methacrolein	tr	Aliphatic aldehyde
3-Buten-2-one	tr	Aliphatic ketone
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	tr	Simple phenolic
Prenal	tr	Aliphatic aldehyde
Hexanal	tr	Aliphatic aldehyde
Methyl hexyl ether	0.03	Aliphatic ether
(2E)-Hexenal	0.01	Aliphatic aldehyde
(3Z)-Hexenol	0.05	Aliphatic alcohol
Hexanol	0.13	Aliphatic alcohol
Tricyclene	0.01	Monoterpene
α -Thujene	0.08	Monoterpene
α -Pinene	0.45	Monoterpene
Camphene	0.27	Monoterpene
α -Fenchene	tr	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Butyl isobutyrate	0.01	Aliphatic ester
β -Pinene	0.36	Monoterpene
Sabinene	0.11	Monoterpene
Octen-3-ol	0.19	Aliphatic alcohol
Octan-3-one	0.05	Aliphatic ketone
Myrcene	0.48	Monoterpene
Butyl butyrate	0.03	Aliphatic ester
Octan-3-ol	0.01	Aliphatic alcohol
α -Phellandrene	0.05	Monoterpene
<i>cis</i> -Dehydroxylinalool oxide	0.01	Monoterpenic ether
Δ^3 -Carene	0.06	Monoterpene
(3Z)-Hexenyl acetate	0.01	Aliphatic ester
α -Terpinene	0.04	Monoterpene
Hexyl acetate	0.11	Aliphatic ester
<i>meta</i> -Cymene	0.02	Monoterpene
<i>para</i> -Cymene	0.21	Monoterpene
Limonene	0.88	Monoterpene
1,8-Cineole	6.99	Monoterpenic ether
Lavender lactone	0.02	Aliphatic lactone

(Z)- β -Ocimene	0.63	Monoterpene
(E)- β -Ocimene	0.25	Monoterpene
γ -Terpinene	0.16	Monoterpene
cis-Sabinene hydrate	0.15	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.12	Monoterpenic alcohol
Octanol	0.08	Aliphatic alcohol
trans-Linalool oxide (fur.)	0.11	Monoterpenic alcohol
Terpinolene	0.21	Monoterpene
trans-Sabinene hydrate	0.02	Monoterpenic alcohol
Rosefuran	0.05	Monoterpenic ether
Linalool	31.71	Monoterpenic alcohol
(Z)-6-Methyl-3,5-heptadien-2-one	0.04	Aliphatic ketone
Octen-3-yl acetate	0.21	Aliphatic ester
Unknown	0.02	Unknown
α -Campholenal	0.03	Monoterpenic aldehyde
Octan-3-yl acetate	0.04	Aliphatic ester
Camphor	7.14	Monoterpenic ketone
Camphene hydrate	0.06	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Hexyl isobutyrate	0.15	Aliphatic ester
Nerol oxide	0.01	Aliphatic ether
Borneol	2.60	Monoterpenic alcohol
δ -Terpineol	0.10	Monoterpenic alcohol
Lavandulol	0.75	Monoterpenic alcohol
Terpinen-4-ol	3.31	Monoterpenic alcohol
(3E,5Z)-Undeca-1,3,5-triene	0.01	Alkene
meta-Cymen-8-ol	0.02	Monoterpenic alcohol
para-Cymen-8-ol	0.06	Monoterpenic alcohol
α -Terpineol	0.84	Monoterpenic alcohol
Hexyl butyrate	0.37	Aliphatic ester
Verbenone	0.03	Monoterpenic ketone
(3Z,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol?	0.03	Monoterpenic alcohol
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.01	Monoterpenic alcohol
Octyl acetate	0.03	Aliphatic ester
Bornyl formate	0.04	Monoterpenic ester
Nerol	0.11	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.01	Aliphatic ester
Hexyl isovalerate	0.15	Aliphatic ester
Geraniol	0.32	Monoterpenic alcohol
Linalyl acetate	29.37	Monoterpenic ester
Geranial	0.01	Monoterpenic aldehyde
Bornyl acetate	0.03	Monoterpenic ester
Lavandulyl acetate	2.22	Monoterpenic ester
Hexyl tiglate	0.17	Aliphatic ester
Hodiendiol derivative	0.03	Oxygenated monoterpene

Unknown	0.03	Oxygenated monoterpene
Unknown	0.03	Oxygenated monoterpene
Neryl acetate	0.20	Monoterpenic ester
α -Copaene	0.01	Sesquiterpene
Daucene	0.07	Sesquiterpene
β -Bourbonene	0.06	Sesquiterpene
Geranyl acetate	0.36	Monoterpenic ester
7-epi-Sesquithujene	0.12	Sesquiterpene
α -Funebrene	0.02	Sesquiterpene
Sesquithujene	0.12	Sesquiterpene
β -Caryophyllene	1.51	Sesquiterpene
α -Santalene	0.18	Sesquiterpene
Coumarin	0.12	Coumarin
Lavandulyl isobutyrate	0.09	Monoterpenic ester
<i>trans</i> - α -Bergamotene	0.14	Sesquiterpene
Sesquisabinene A	0.04	Sesquiterpene
<i>cis</i> - β -Bergamotene?	0.05	Sesquiterpene
α -Humulene	0.06	Sesquiterpene
Lavandulyl butyrate?	0.07	Monoterpenic ester
(<i>E</i>)- β -Farnesene	1.12	Sesquiterpene
Dauca-5,8-diene?	0.06	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.09	Sesquiterpene
Germacrene D	0.59	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.04	Sesquiterpene
Isodaucene	0.08	Sesquiterpene
α -Muurolene	0.05	Sesquiterpene
β -Bisabolene	0.09	Sesquiterpene
Lavandulyl isovalerate	0.33	Monoterpenic ester
γ -Cadinene	0.25	Sesquiterpene
Cubebol	tr	Sesquiterpenic alcohol
<i>trans</i> -Calamenene	0.02	Sesquiterpene
β -Sesquiphellandrene	0.12	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.02	Sesquiterpene
Isocaryophyllene epoxide B	0.01	Sesquiterpenic ether
<i>cis</i> -Sesquisabinene hydrate	0.01	Sesquiterpenic alcohol
(<i>E</i>)-Nerolidol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.13	Sesquiterpenic ether
Caryophyllene oxide isomer	0.04	Sesquiterpenic ether
τ -Cadinol	0.15	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.01	Sesquiterpenic alcohol
α -Bisabolol	0.36	Sesquiterpenic alcohol
Consolidated total	99.40	

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

Note: no correction factor was applied

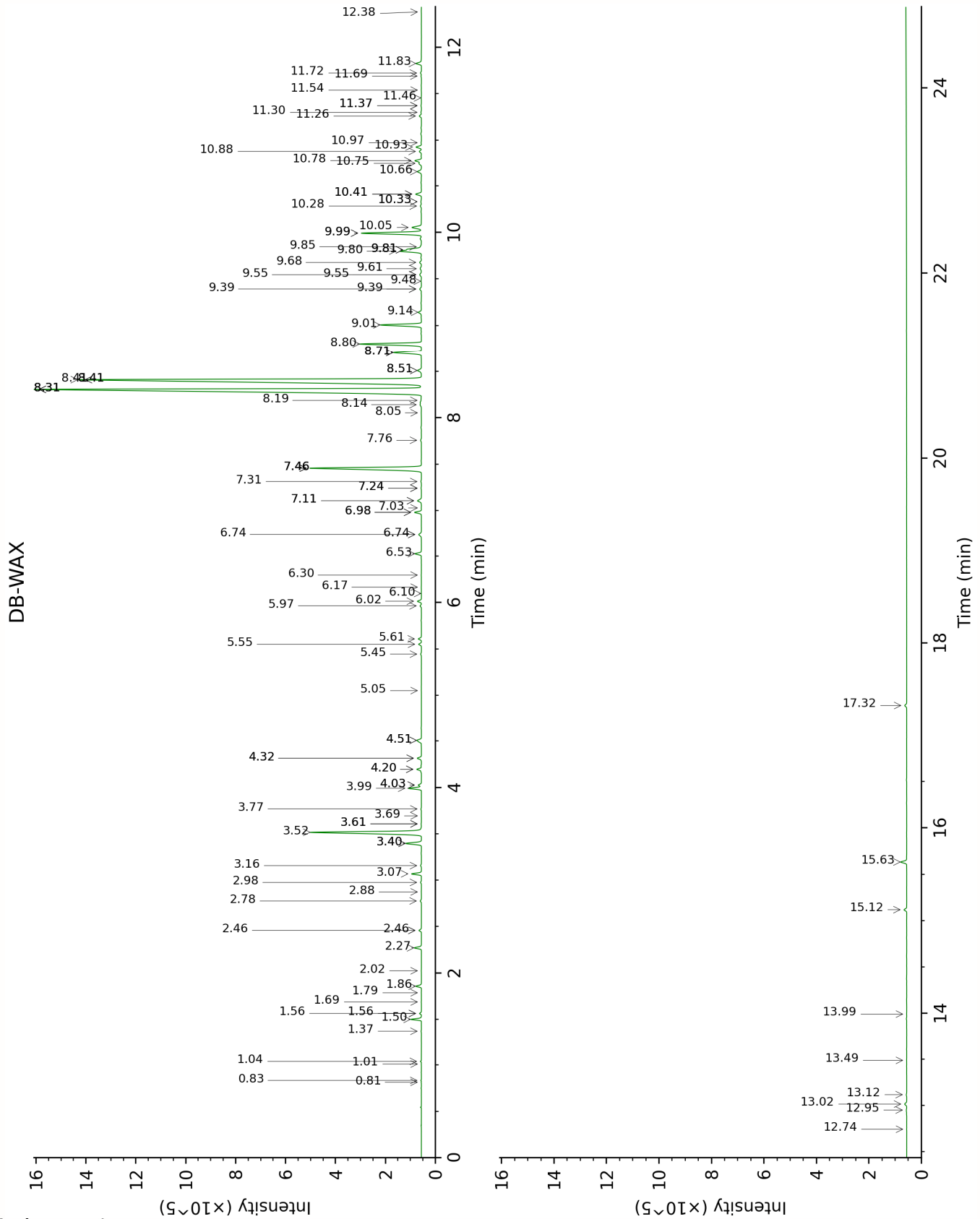
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies

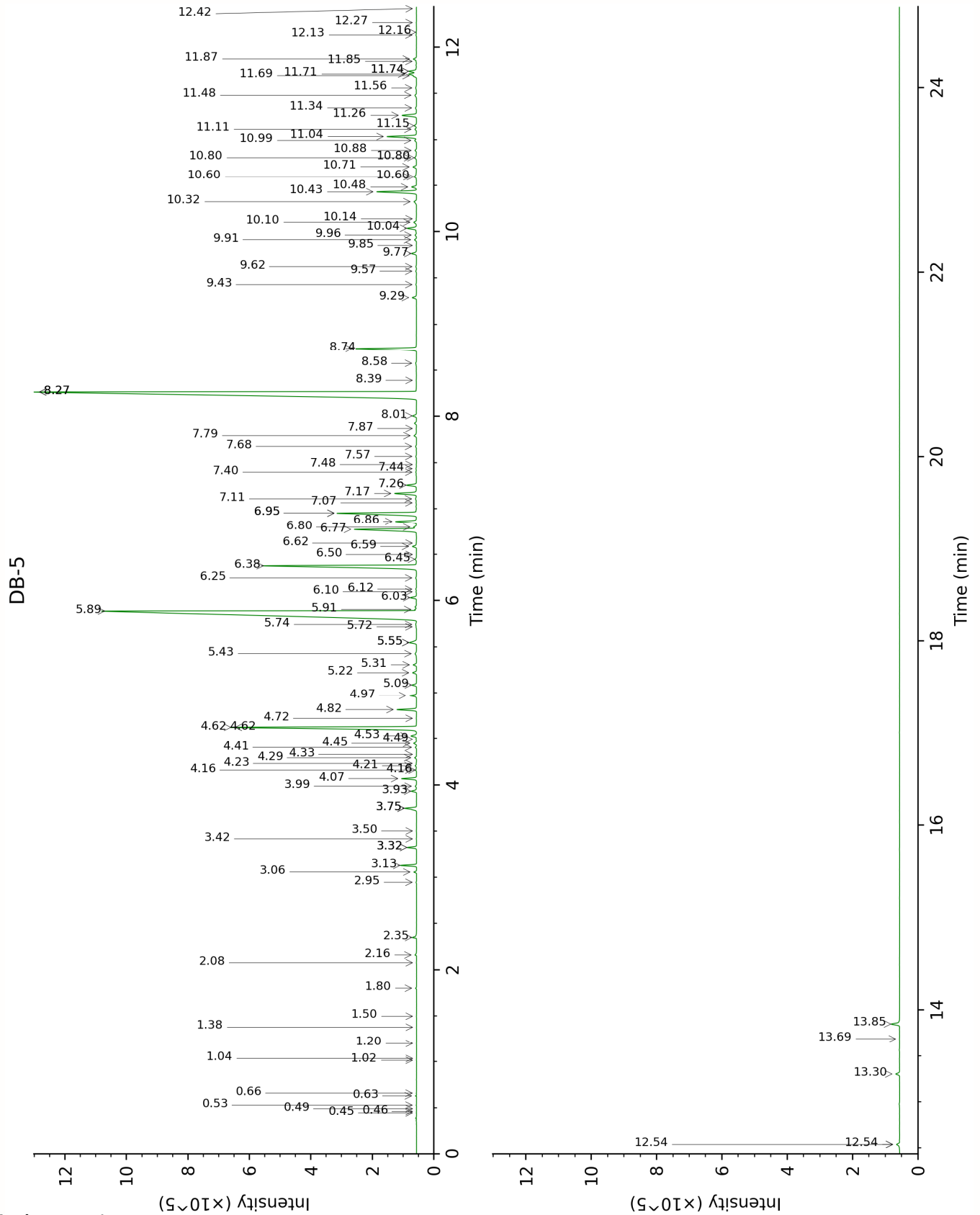
between columns, the algorithm is set to prioritize data from the most standard DB-5 column, and smallest values so as to avoid overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report 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

Isobutyral	Column DB-WAX			Column DB-5		
				0.44	536.6	tr
Methacrolein				0.46	550.1	tr
3-Buten-2-one	1.01	918.1	tr	0.49	574.8	tr
2-Methyl-3-buten-2-ol	1.69	1012.8	tr	0.53	605.6	0.01
Isovaleral	0.84	884.5	0.01	0.63	640.3	0.01
2-Methylbutyral	0.82	877.6	tr	0.66	650.7	tr
Isoamyl alcohol	3.70	1181.7	0.01	1.02	732.3	tr
2-Methylbutanol	3.61*	1175.2	[0.02]	1.04	735.1	tr
Toluene	1.56*	1001.0	[0.08]	1.20	758.3	tr
Prenal	3.40*	1159.4	[0.89]	1.38	783.3	tr
Hexanal	2.02	1044.9	tr	1.50	800.0	tr
Methyl hexyl ether	1.04	922.6	0.03	1.80	826.7	0.03
(2E)-Hexenal	3.61*	1175.2	[0.02]	2.08	849.5	0.01
(3Z)-Hexenol	5.97	1345.0	0.07	2.16	856.5	0.05
Hexanol	5.61	1319.5	0.16	2.35	872.2	0.13
Tricyclene	1.37	974.0	0.02	2.95	918.0	0.01
α -Thujene	1.56*	1001.0	[0.08]	3.06	925.4	0.08
α -Pinene	1.50	993.8	0.46	3.13	930.2	0.45
Camphene	1.86	1029.1	0.27	3.32*	942.9	[0.28]
α -Fenchene	1.79	1022.3	tr	3.32*	942.9	[0.28]
Thuja-2,4(10)-diene	2.46*	1086.2	[0.12]	3.42	949.1	0.01
Butyl isobutyrate	2.88	1119.8	0.01	3.50	954.7	0.01
β -Pinene	2.27	1068.4	0.36	3.75*	971.0	[0.47]
Sabinene	2.46*	1086.2	[0.12]	3.75*	971.0	[0.47]
Octen-3-ol	6.98*	1418.5	[0.35]	3.93	983.2	0.19
Octan-3-one	4.20*	1217.8	[0.23]	3.99	986.8	0.05
Myrcene	3.07	1134.6	0.48	4.07	992.2	0.48
Butyl butyrate	3.77	1187.3	0.03	4.16*	998.3	[0.04]
Octan-3-ol	6.30	1368.8	0.01	4.16*	998.3	[0.04]
α -Phellandrene	2.98	1127.6	0.04	4.21	1001.4	0.05
<i>cis</i> -Dehydroxylinalool oxide	4.03*	1205.9	[0.16]	4.23	1003.1	0.01
Δ^3 -Carene	2.78	1112.4	0.06	4.30	1007.0	0.06
(3Z)-Hexenyl acetate	5.05	1277.6	0.01	4.33	1009.2	0.01
α -Terpinene	3.16	1141.2	0.05	4.41	1014.0	0.04
Hexyl acetate	4.51*	1239.6	[0.33]	4.45	1016.8	0.11
<i>meta</i> -Cymene	4.32*	1226.2	[0.23]	4.49	1019.4	0.02
<i>para</i> -Cymene	4.32*	1226.2	[0.23]	4.53	1021.7	0.21
Limonene	3.40*	1159.4	[0.89]	4.62*	1027.5	[7.87]
1,8-Cineole	3.52	1168.3	6.99	4.62*	1027.5	[7.87]

Lavender lactone	9.48	1608.6	0.03	4.72	1033.7	0.02
(Z)- β -Ocimene	3.99	1203.5	0.63	4.82	1039.6	0.63
(E)- β -Ocimene	4.20*	1217.8	[0.23]	4.97	1049.3	0.25
γ -Terpinene	4.03*	1205.9	[0.16]	5.09	1056.6	0.16
cis-Sabinene hydrate	7.11*	1427.8	[0.26]	5.22	1065.0	0.15
cis-Linalool oxide (fur.)	6.74*	1400.2	[0.19]	5.31	1070.4	0.12
Octanol	8.41*†	1525.6	[29.53]	5.43	1078.0	0.08
trans-Linalool oxide (fur.)	7.11*	1427.8	[0.26]	5.55*	1085.5	[0.33]
Terpinolene	4.51*	1239.6	[0.33]	5.55*	1085.5	[0.33]
trans-Sabinene hydrate	8.19	1508.4	0.02	5.72	1096.1	0.02
Rosefuran	6.17	1359.4	0.01	5.74	1097.8	0.05
Linalool	8.31*†	1517.5	[31.73]	5.89	1106.9	31.71
(Z)-6-Methyl-3,5-heptadien-2-one	8.41*†	1525.6	[29.53]	5.90	1108.0	0.04
Octen-3-yl acetate	6.02	1348.6	0.21	6.03	1116.2	0.21
Unknown LAAN I [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	9.85	1638.5	0.05	6.10	1120.2	0.02
α -Campholenal	7.24*	1437.7	[0.02]	6.12	1122.0	0.03
Octan-3-yl acetate	5.45	1307.8	0.04	6.25	1129.8	0.04
Camphor	7.46*	1453.7	[7.15]	6.38	1138.2	7.14
Camphene hydrate	8.71*	1548.4	[1.63]	6.45	1142.7	0.06
Unknown CALU I [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	7.24*	1437.7	[0.02]	6.50	1146.0	0.01
Hexyl isobutyrate	5.55	1315.4	0.14	6.59	1151.6	0.15
Nerol oxide	7.03	1422.0	0.01	6.62	1153.9	0.01
Borneol	9.99*	1650.3	[3.36]	6.77	1163.5	2.60
δ -Terpineol	9.68	1624.9	0.10	6.80	1165.0	0.10
Lavandulol	9.80*†	1634.8	[1.24]	6.86	1169.1	0.75
Terpinen-4-ol	8.80	1555.9	3.31	6.95*	1175.0	[3.33]
(3E,5Z)-Undeca-1,3,5-triene	6.10	1354.6	0.01	6.95*	1175.0	[3.33]
meta-Cymen-8-ol	11.69	1791.9	0.02	7.07	1182.1	0.02
para-Cymen-8-ol	11.72	1794.7	0.05	7.11	1184.9	0.06
α -Terpineol	9.99*	1650.3	[3.36]	7.17	1188.6	0.84
Hexyl butyrate	6.53	1385.3	0.34	7.26	1194.4	0.37
Verbenone	9.81*†	1635.8	[0.62]	7.40	1203.3	0.03
(3Z,5E)-2,6-	11.37*	1764.9	[0.03]	7.44	1205.9	0.03

Dimethylocta-3,5,7-trien-2-ol? (3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	11.54	1779.0	0.01	7.48	1208.9	0.01
Octyl acetate	7.31	1443.0	0.03	7.57	1214.8	0.03
Bornyl formate	8.31*†	1517.5	[31.73]	7.68	1222.0	0.04
Nerol	11.26	1755.4	0.12	7.79	1229.8	0.11
Hexyl 2-methylbutyrate	6.74*	1400.2	[0.19]	7.87	1235.0	0.01
Hexyl isovalerate	6.98*	1418.5	[0.35]	8.01	1244.1	0.15
Geraniol	11.83	1803.8	0.32	8.26*	1261.4	[29.69]
Linalyl acetate	8.41*†	1525.6	[29.53]	8.26*	1261.4	[29.69]
Geranial	10.33*	1677.6	[0.04]	8.39	1269.8	0.01
Bornyl acetate	8.51*	1533.3	[0.25]	8.58	1282.2	0.03
Lavandulyl acetate	9.01	1571.7	2.24	8.74	1293.1	2.22
Hexyl tiglate	9.14	1582.2	0.19	9.29	1331.5	0.17
Hodiendiol derivative	13.12	1918.9	0.03	9.43	1341.4	0.03
Unknown SASC II [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	11.30	1758.8	0.03	9.58	1351.6	0.03
Unknown SASC III [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	11.37*	1764.9	[0.03]	9.62	1355.0	0.03
Neryl acetate	10.41*	1684.2	[0.32]	9.77	1365.0	0.20
α-Copaene	7.46*	1453.7	[7.15]	9.85	1371.1	0.01
Daucene	7.46*	1453.7	[7.15]	9.91	1375.5	0.07
β-Bourbonene	7.76	1476.0	0.05	9.96	1379.0	0.06
Geranyl acetate	10.78	1714.8	0.37	10.04	1384.2	0.36
7-epi-Sesquithujene	8.14	1504.8	0.09	10.10	1388.8	0.12
α-Funebrene	8.05	1498.0	0.01	10.14	1391.4	0.02
Sesquithujene	8.31*†	1517.5	[31.73]	10.32	1404.5	0.12
β-Caryophyllene	8.71*	1548.4	[1.63]	10.43	1412.4	1.51
α-Santalene	8.51*	1533.3	[0.25]	10.48	1416.3	0.18
Coumarin	17.32	2335.3	0.12	10.60*	1424.7	[0.14]
Lavandulyl isobutyrate	9.61	1619.5	0.09	10.60*	1424.7	[0.14]
trans-α-Bergamotene	8.71*	1548.4	[1.63]	10.71	1432.9	0.14
Sesquisabinene A	9.39*	1601.8	[0.11]	10.80*	1440.3	[0.09]
cis-β-Bergamotene?				10.80*	1440.3	[0.09]

α -Humulene	9.55*	1614.3	[0.12]	10.88	1446.2	0.06
Lavandulyl butyrate?	10.75	1712.3	0.15	10.99	1454.2	0.07
(E)- β -Farnesene	9.81*†	1635.8	[0.62]	11.04	1457.4	1.12
Dauca-5,8-diene?	9.39*	1601.8	[0.11]	11.11	1463.2	0.06
trans-Cadina-1(6),4-diene	9.55*	1614.3	[0.12]	11.15	1466.1	0.09
Germacrene D	10.05	1655.2	0.62	11.26	1474.5	0.59
trans- β -Bergamotene	9.81*†	1635.8	[0.62]	11.34	1480.4	0.04
Isodaucene	10.28	1673.8	0.06	11.48	1490.7	0.08
α -Muurolene	10.33*	1677.6	[0.04]	11.56	1496.5	0.05
β -Bisabolene	10.41*	1684.2	[0.32]	11.69	1506.6	0.09
Lavandulyl isovalerate	10.93	1727.2	0.29	11.71	1507.9	0.33
γ -Cadinene	10.66	1704.8	0.25	11.74*	1510.3	[0.29]
Cubebol	12.74	1884.8	tr	11.74*	1510.3	[0.29]
trans-Calamenene	11.46	1771.9	0.02	11.85	1518.7	0.02
β -Sesquiphellandrene	10.88	1723.2	0.12	11.87	1520.7	0.12
(E)- α -Bisabolene	10.97	1731.1	0.02	12.13	1541.1	0.02
Isocaryophyllene epoxide B	12.38	1853.0	0.01	12.16	1543.4	0.01
cis-Sesquisabinene hydrate	13.49	1953.0	0.01	12.27	1551.6	0.01
(E)-Nerolidol	14.00	2000.0	0.01	12.42	1563.6	0.01
Caryophyllene oxide	13.02	1909.5	0.13	12.54*	1573.1	[0.15]
Caryophyllene oxide isomer	12.95	1903.5	0.04	12.54*	1573.1	[0.15]
τ -Cadinol	15.12	2108.7	0.15	13.30	1634.6	0.15
(3Z)-Caryophylla-3,8(13)-dien-5 β -ol				13.69	1666.4	0.01
α -Bisabolol	15.63	2159.9	0.33	13.85	1679.8	0.36
Total reported		98.99%			99.37%	

*: 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