

Date : 2024-02-27

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24B09-NPA02

Customer Identification : Lavender - Bulgaria - NPS00130 - Lot# NP0358

Type : Essential Oil

Source : *Lavandula angustifolia*

Customer : Nature Packaged

Checked and approved by:



Sylvain Mercier, M. Sc., Chimiste 2014-005

Notes: 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.

This report is an update from the first version issued on 2024-02-23 to format it for online publication.

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 : Benoit Roger, Ph. D.

Date : 2024-02-23

PHYSICOCHEMICAL DATA

Refractive index : 1.4621 ± 0.0003 (20 °C)

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

Analyst : Cindy Caron B. Sc.

Date : 2024-02-12

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
3-Buten-2-one	0.01	Aliphatic ketone
2-Methyl-3-buten-2-ol	0.02	Aliphatic alcohol
Isovaleral	0.02	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
Isoamyl alcohol	0.01	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	0.01	Simple phenolic
Butyl acetate	0.02	Aliphatic ester
Methyl hexyl ether	0.08	Aliphatic ether
(3Z)-Hexenol	0.02	Aliphatic alcohol
Hexanol	0.10	Aliphatic alcohol
Tricyclene	0.01	Monoterpene
α -Thujene	0.09	Monoterpene
α -Pinene	0.17	Monoterpene
Camphene	0.11	Monoterpene
α -Fenchene	0.01	Monoterpene
Butyl isobutyrate	0.01	Aliphatic ester
Sabinene	0.04	Monoterpene
β -Pinene	0.03	Monoterpene
Octen-3-ol	0.25	Aliphatic alcohol
6-Methyl-5-hepten-2-one	tr	Aliphatic ketone
Octan-3-one	1.32	Aliphatic ketone
Myrcene	0.54	Monoterpene
Butyl butyrate	0.06	Aliphatic ester
Octan-3-ol	0.23	Aliphatic alcohol
α -Phellandrene	0.03	Monoterpene
Δ^3 -Carene	0.07	Monoterpene
α -Terpinene	0.03	Monoterpene
Hexyl acetate	0.49	Aliphatic ester
<i>meta</i> -Cymene	0.03	Monoterpene
<i>para</i> -Cymene	0.15	Monoterpene
1,8-Cineole	0.57	Monoterpenic ether
Limonene	0.31	Monoterpene
β -Phellandrene	0.25	Monoterpene
(Z)- β -Ocimene	5.01	Monoterpene
(E)- β -Ocimene	2.46	Monoterpene
γ -Terpinene	0.11	Monoterpene
<i>cis</i> -Sabinene hydrate	0.05	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.11	Monoterpenic alcohol
Octanol	tr	Aliphatic alcohol

α -Pinene oxide analog	0.03	Monoterpenic ether
Terpinolene	0.15	Monoterpene
Rosefuran	0.05	Monoterpenic ether
(Z)-6-Methyl-3,5-heptadien-2-one	0.16	Aliphatic ketone
Linalool	31.22	Monoterpenic alcohol
β -Thujone	0.03	Monoterpenic ketone
Octen-3-yl acetate	0.77	Aliphatic ester
Unknown	0.02	Unknown
Octan-3-yl acetate	0.10	Aliphatic ester
allo-Ocimene	0.06	Monoterpene
(Z)-Myroxide	0.03	Monoterpenic ether
Camphor	0.17	Monoterpenic ketone
(E)-Myroxide	0.03	Monoterpenic ether
Hexyl isobutyrate	0.06	Aliphatic ester
Nerol oxide	0.01	Aliphatic ether
Borneol	0.41	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.02	Monoterpenic alcohol
Lavandulol	0.95	Monoterpenic alcohol
Terpinen-4-ol	4.03	Monoterpenic alcohol
Cryptone	0.22	Normoterpenic ketone
meta-Cymen-8-ol	0.04	Monoterpenic alcohol
para-Cymen-8-ol	0.05	Monoterpenic alcohol
α -Terpineol	0.98	Monoterpenic alcohol
Hodiendiol (2,6-dimethylocta-3,7-diene-2,6-diol)	tr	Monoterpenic alcohol
Hexyl butyrate	0.30	Aliphatic ester
Verbenone	0.01	Monoterpenic ketone
Unknown	0.02	Unknown
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.02	Monoterpenic alcohol
trans-Carveol	0.01	Monoterpenic alcohol
Bornyl formate	0.03	Monoterpenic ester
Nerol	0.16	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.03	Aliphatic ester
Cuminal	0.04	Monoterpenic aldehyde
Carvone	0.04	Monoterpenic ketone
Neral	0.02	Monoterpenic aldehyde
Hexyl isovalerate	0.01	Aliphatic ester
Geraniol	0.42	Monoterpenic alcohol
Linalyl acetate	32.20	Monoterpenic ester
Geranial	0.02	Monoterpenic aldehyde
2,6-Dimethyl-1,7-octadiene-3,6-diol	tr	Monoterpenic alcohol
Bornyl acetate	0.08	Monoterpenic ester
Lavandulyl acetate	2.81	Monoterpenic ester
Hexyl tiglate	0.04	Aliphatic ester
Hodiendiol derivative	0.01	Oxygenated monoterpene

Unknown	0.02	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Neryl acetate	0.28	Monoterpenic ester
β -Bourbonene	0.03	Sesquiterpene
Geranyl acetate	0.45	Monoterpenic ester
7-epi-Sesquithujene	0.09	Sesquiterpene
Hexyl hexanoate	0.09	Aliphatic ester
β -Caryophyllene	3.78	Sesquiterpene
<i>cis</i> - α -Bergamotene	0.04	Sesquiterpene
α -Santalene	0.44	Sesquiterpene
Coumarin	0.01	Coumarin
<i>trans</i> - α -Bergamotene	0.14	Sesquiterpene
<i>cis</i> - β -Bergamotene?	0.05	Sesquiterpene
Sesquisabinene A	0.01	Sesquiterpene
α -Humulene	0.12	Sesquiterpene
Lavandulyl butyrate?	0.12	Monoterpenic ester
(<i>E</i>)- β -Farnesene	3.66	Sesquiterpene
Dauca-5,8-diene?	0.02	Sesquiterpene
Germacrene D	0.47	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.06	Sesquiterpene
Isodaucene	0.02	Sesquiterpene
β -Bisabolene	0.01	Sesquiterpene
γ -Cadinene	0.15	Sesquiterpene
Isocaryophyllene epoxide B	0.02	Sesquiterpenic ether
(<i>E</i>)-Nerolidol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.04	Sesquiterpenic ether
Caryophyllene oxide	0.22	Sesquiterpenic ether
Dendrolasin	0.02	Sesquiterpenic ether
τ -Cadinol	0.08	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.01	Sesquiterpenic alcohol
Consolidated total	99.19	

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

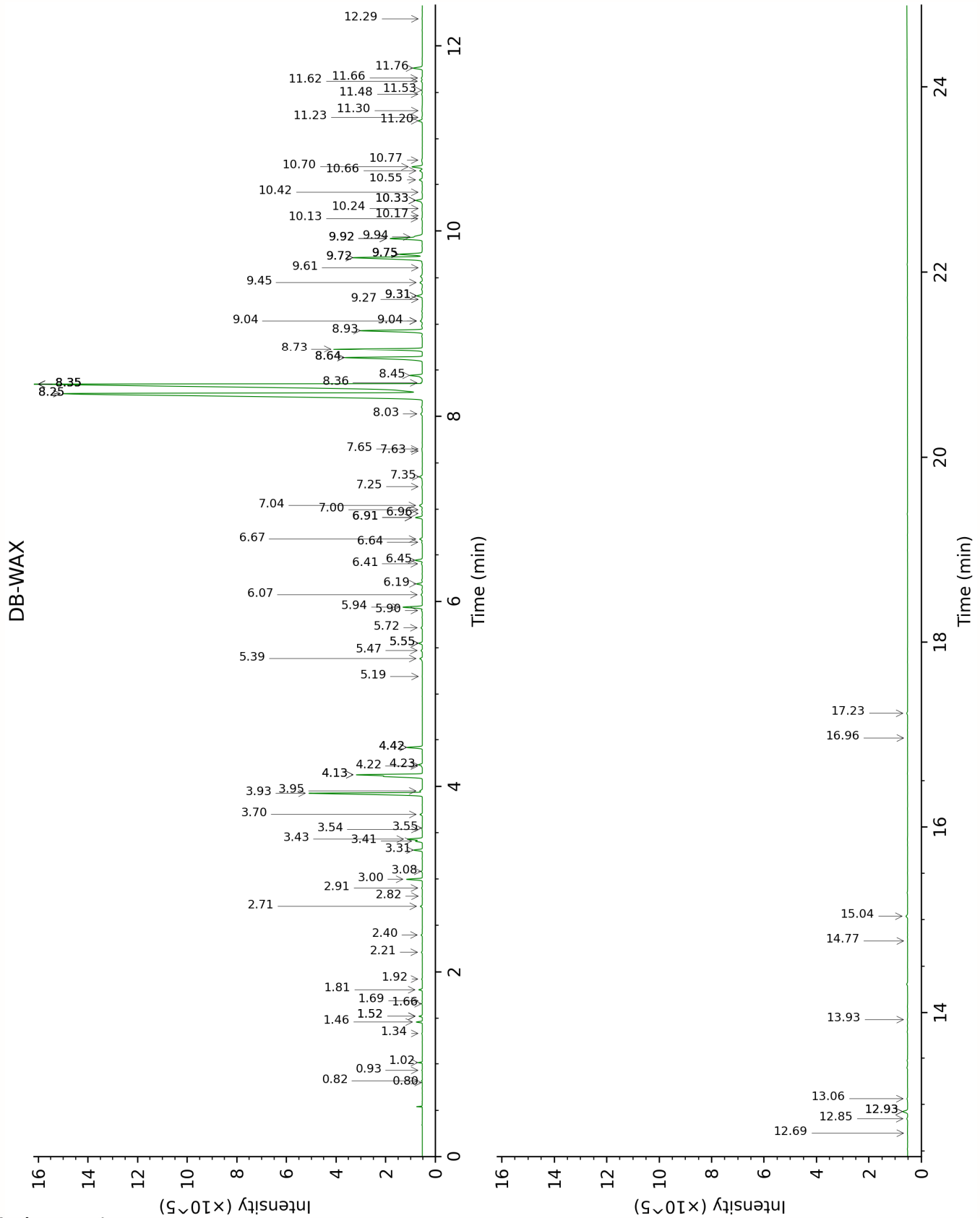
Note: no correction factor was applied

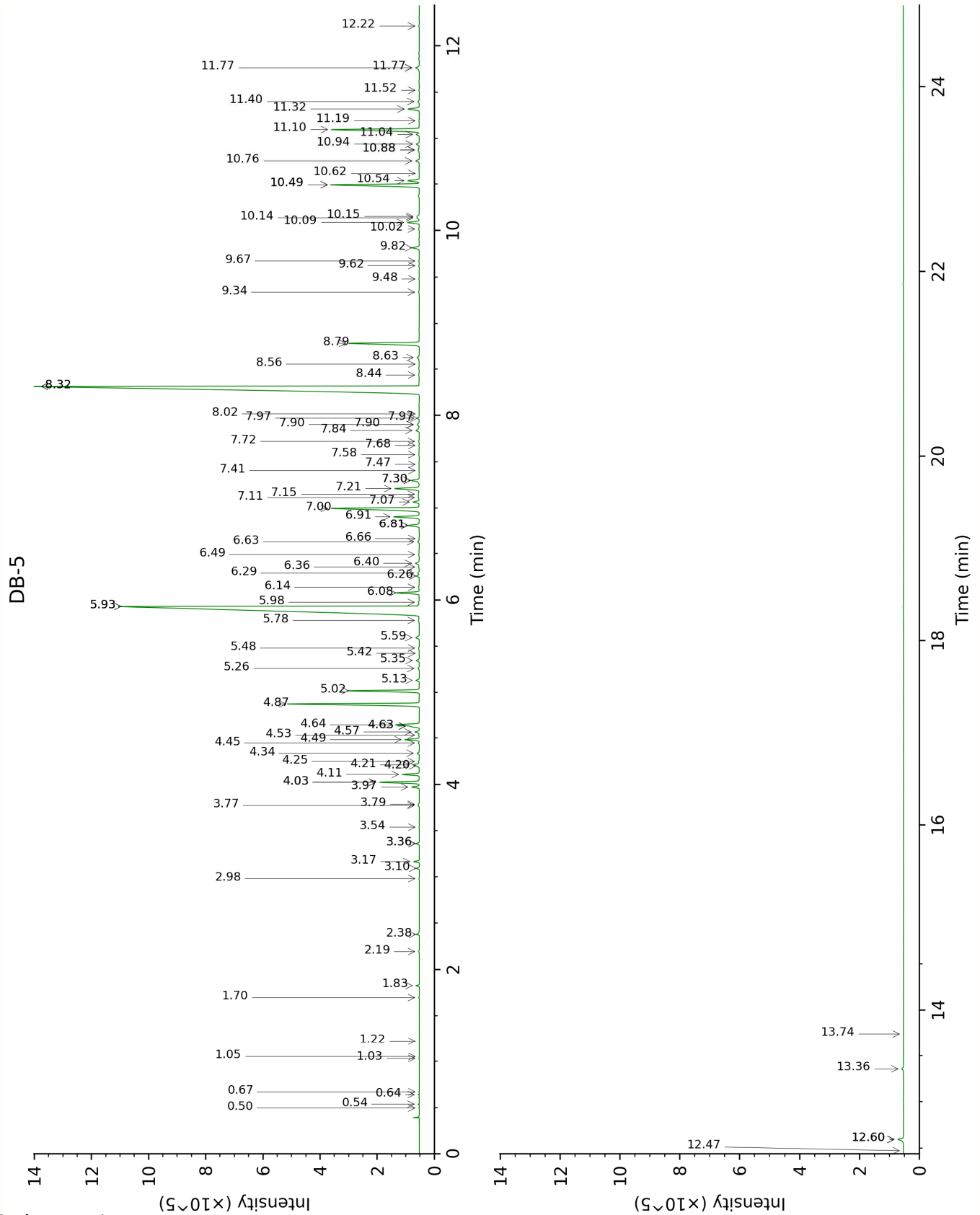
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

3-Buten-2-one	Column DB-WAX			Column DB-5		
	0.93	912.7	0.01	0.50	573.2	0.01
2-Methyl-3-buten-2-ol	1.66	1014.7	0.01	0.54	606.5	0.02
Isovaleral	0.82	885.3	0.02	0.64	641.2	0.02
2-Methylbutyral	0.80	879.0	0.01	0.67	651.3	0.01
Isoamyl alcohol	3.54	1174.8	0.01	1.03	733.1	0.01
2-Methylbutanol	3.55	1175.9	0.01	1.05	736.0	tr
Toluene	1.52*	1001.4	[0.09]	1.22	759.4	0.01
Butyl acetate	1.92	1039.7	0.02	1.70	816.9	0.02
Methyl hexyl ether	1.02	925.3	0.09	1.83	827.5	0.08
(3Z)-Hexenol	5.90	1345.1	0.03	2.20	857.7	0.02
Hexanol	5.55*	1319.7	[0.14]	2.38	872.9	0.10
Tricyclene	1.34	973.5	0.01	2.98	919.0	0.01
α -Thujene	1.52*	1001.4	[0.09]	3.10	926.4	0.09
α -Pinene	1.46	992.0	0.17	3.17	931.1	0.17
Camphene	1.81	1028.9	0.11	3.36*	943.9	[0.11]
α -Fenchene	1.69	1017.7	0.01	3.36*	943.9	[0.11]
Butyl isobutyrate	2.82	1119.9	0.01	3.54	955.6	0.01
Sabinene	2.40	1084.6	0.04	3.77	971.0	0.04
β -Pinene	2.21	1067.0	0.03	3.79	971.9	0.03
Octen-3-ol	6.91*	1418.5	[0.27]	3.97	984.1	0.25
6-Methyl-5-hepten-2-one	5.19	1295.5	tr	4.02*	987.6	[1.32]
Octan-3-one	4.13*	1218.8	[3.82]	4.02*	987.6	[1.32]
Myrcene	3.00	1133.8	0.54	4.11	993.1	0.54
Butyl butyrate	3.70	1187.1	0.09	4.20	999.1	0.06
Octan-3-ol	6.19	1365.9	0.23	4.21	999.9	0.23
α -Phellandrene	2.91	1126.7	0.03	4.25	1002.3	0.03
Δ^3 -Carene	2.71	1111.6	0.07	4.34	1008.0	0.07
α -Terpinene	3.08	1140.3	0.03	4.45	1014.9	0.03
Hexyl acetate	4.42*	1239.9	[0.57]	4.48	1017.2	0.49
<i>meta</i> -Cymene	4.22	1225.4	0.02	4.53	1020.2	0.03
<i>para</i> -Cymene	4.23	1226.5	0.15	4.57	1022.4	0.15
1,8-Cineole	3.43	1166.8	0.57	4.63*†	1026.3	[0.23]
Limonene	3.31	1157.8	0.31	4.63*†	1026.3	[0.23]
β -Phellandrene	3.41	1165.2	0.25	4.64*†	1027.2	[0.91]
(Z)- β -Ocimene	3.93	1204.5	5.03	4.87	1041.3	5.01
(E)- β -Ocimene	4.13*	1218.8	[3.82]	5.02	1050.7	2.46
γ -Terpinene	3.95	1206.3	0.11	5.13	1057.7	0.11
<i>cis</i> -Sabinene hydrate	7.04	1428.2	0.14	5.26	1065.8	0.05
<i>cis</i> -Linalool	6.67	1400.7	0.11	5.35	1071.1	0.11

oxide (fur.)						
Octanol	8.35*	1526.7	[31.91]	5.42	1076.0	tr
α -Pinene oxide analog	5.55*	1319.7	[0.14]	5.48	1079.5	0.03
Terpinolene	4.42*	1239.9	[0.57]	5.60	1086.6	0.15
Rosefuran	6.07	1357.4	0.07	5.78	1098.2	0.05
(Z)-6-Methyl-3,5-heptadien-2-one	8.35*	1526.7	[31.91]	5.93*	1107.7	[31.38]
Linalool	8.25*	1518.8	[31.25]	5.93*	1107.7	[31.38]
β -Thujone	6.41	1381.4	0.04	5.98	1110.5	0.03
Octen-3-yl acetate	5.94	1347.8	0.77	6.08	1117.1	0.77
Unknown LAAN I [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	9.75*	1637.3	[1.01]	6.14	1120.8	0.02
Octan-3-yl acetate	5.39	1307.8	0.11	6.26	1128.7	0.10
allo-Ocimene	5.72	1331.7	0.05	6.29	1130.7	0.06
(Z)-Myroxide	7.00	1424.7	0.02	6.36	1134.8	0.03
Camphor	7.35	1451.3	0.16	6.40	1137.4	0.17
(E)-Myroxide	7.25	1443.3	0.03	6.49	1143.4	0.03
Hexyl isobutyrate	5.47	1314.0	0.05	6.63	1152.3	0.06
Nerol oxide	6.96	1421.8	0.02	6.66	1154.4	0.01
Borneol	9.92*	1651.1	[1.56]	6.81*	1163.5	[0.43]
cis-Linalool oxide (pyr.)	10.42	1691.4	0.02	6.81*	1163.5	[0.43]
Lavandulol	9.75*	1637.3	[1.01]	6.91	1170.0	0.95
Terpinen-4-ol	8.73	1556.5	3.95	7.00	1175.8	4.03
Cryptone	9.31*	1601.1	[0.26]	7.07	1180.1	0.22
meta-Cymen-8-ol	11.62	1793.2	0.05	7.11	1183.1	0.04
para-Cymen-8-ol	11.66	1796.1	0.04	7.15	1185.5	0.05
α -Terpineol	9.92*	1651.1	[1.56]	7.21	1189.4	0.98
Hodiendiol (2,6-dimethylocta-3,7-diene-2,6-diol)	12.93*	1908.8	[0.24]	7.30*	1195.0	[0.30]
Hexyl butyrate	6.45	1384.2	0.30	7.30*	1195.0	[0.30]
Verbenone	9.75*	1637.3	[1.01]	7.41	1201.8	0.01
Unknown SASC VII [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.63	1471.9	0.01	7.47	1206.1	0.02

(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	11.48	1781.3	0.03	7.58	1213.1	0.02
<i>trans</i> -Carveol	11.53	1785.0	0.02	7.68	1219.8	0.01
Bornyl formate	8.25*	1518.8	[31.25]	7.72	1222.7	0.03
Nerol	11.20	1757.0	0.17	7.84	1230.6	0.16
Hexyl 2-methylbutyrate	6.64	1398.2	0.03	7.90*	1234.8	[0.10]
Cuminal	10.77	1720.9	0.04	7.90*	1234.8	[0.10]
Carvone	10.14	1668.3	0.04	7.97*	1239.4	[0.07]
Neral	9.61	1625.5	0.02	7.97*	1239.4	[0.07]
Hexyl isovalerate	6.91*	1418.5	[0.27]	8.02	1242.6	0.01
Geraniol	11.76	1805.4	0.42	8.32*	1262.4	[32.62]
Linalyl acetate	8.35*	1526.7	[31.91]	8.32*	1262.4	[32.62]
Geranial	10.24	1677.2	0.02	8.44	1270.6	0.02
2,6-Dimethyl-1,7-octadiene-3,6-diol	14.77	2082.7	0.01	8.56	1278.5	tr
Bornyl acetate	8.35*	1526.7	[31.91]	8.63	1283.2	0.08
Lavandulyl acetate	8.93	1572.1	2.79	8.79	1294.0	2.81
Hexyl tiglate	9.04*	1580.1	[0.11]	9.34	1332.2	0.04
Hodiendiol derivative	13.06	1921.6	0.02	9.48	1342.2	0.01
Unknown SASC II [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	11.23	1760.1	0.02	9.62	1352.3	0.02
Unknown SASC III [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	11.30	1766.2	0.02	9.67	1355.8	0.02
Neryl acetate	10.33*	1684.3	[0.32]	9.82	1365.8	0.28
β -Bourbonene	7.65	1473.6	0.03	10.02	1380.0	0.03
Geranyl acetate	10.70	1714.9	0.45	10.09	1385.0	0.45
7-epi-Sesquithujene	8.03	1501.8	0.08	10.14	1388.5	0.09
Hexyl hexanoate	9.04*	1580.1	[0.11]	10.15	1389.6	0.09
β -Caryophyllene	8.64*	1548.9	[3.86]	10.49*	1414.0	[3.81]
<i>cis</i> - α -Bergamotene	8.36	1527.8	0.04	10.49*	1414.0	[3.81]
α -Santalene	8.44	1534.0	0.50	10.54	1417.3	0.44
Coumarin	17.23	2333.8	0.05	10.62	1423.7	0.01

<i>trans</i> - α -Bergamotene	8.64*	1548.9	[3.86]	10.76	1433.7	0.14
<i>cis</i> - β -Bergamotene?				10.88*	1442.5	[0.06]
Sesquisabinene A	9.27	1598.1	0.01	10.88*	1442.5	[0.06]
α -Humulene	9.45	1612.6	0.11	10.94	1447.3	0.12
Lavandulyl butyrate?	10.66	1711.2	0.12	11.04	1455.0	0.12
(<i>E</i>)- β -Farnesene	9.72*	1634.4	[3.67]	11.10	1458.9	3.66
Dauca-5,8-diene?	9.31*	1601.1	[0.26]	11.19	1466.0	0.02
Germacrene D	9.94	1652.4	0.33	11.32	1475.5	0.47
<i>trans</i> - β -Bergamotene	9.72*	1634.4	[3.67]	11.40	1481.4	0.06
Isodaucene	10.17	1671.0	0.01	11.52	1490.5	0.02
β -Bisabolene	10.33*	1684.3	[0.32]	11.76*	1508.7	[0.16]
γ -Cadinene	10.55	1702.2	0.15	11.76*	1508.7	[0.16]
Isocaryophyllene epoxide B	12.29	1852.4	0.02	12.22	1544.1	0.02
(<i>E</i>)-Nerolidol	13.93	2001.2	0.01	12.47	1564.2	0.02
Caryophyllene oxide isomer	12.85	1901.6	0.04	12.60*	1573.9	[0.28]
Caryophyllene oxide	12.93*	1908.8	[0.24]	12.60*	1573.9	[0.28]
Dendrolasin	12.69	1887.7	0.02	12.60*	1573.9	[0.28]
τ -Cadinol	15.04	2108.7	0.08	13.36	1635.1	0.08
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	16.96	2305.0	0.01	13.74	1666.8	0.01
Total reported		98.77%			99.23%	

*: 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