Date : 2024-03-12

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24B27-PTH15
Customer Identification : Lavandin - France - L20110R
Type : Essential Oil
Source : *Lavandula x intermedia*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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 : Alexis St-Gelais, Ph. D., Chimiste 2013-174
Date : 2024-03-12

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 : 2024-02-28

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
Isobutyral	tr	Aliphatic aldehyde
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Hexanal	tr	Aliphatic aldehyde
Methyl hexyl ether	0.03	Aliphatic ether
(3*Z*)-Hexenol	0.05	Aliphatic alcohol
Hexanol	0.14	Aliphatic alcohol
Tricyclene	0.02	Monoterpene
α-Thujene	0.08	Monoterpene
α-Pinene	0.47	Monoterpene
Camphene	0.27	Monoterpene
α-Fenchene	tr	Monoterpene
Butyl isobutyrate	0.01	Aliphatic ester
Sabinene	0.12	Monoterpene
β-Pinene	0.36	Monoterpene
Octen-3-ol	0.19	Aliphatic alcohol
Octan-3-one	0.05	Aliphatic ketone
Myrcene	0.48	Monoterpene
Butyl butyrate	0.02	Aliphatic ester
α-Phellandrene	0.04	Monoterpene
cis-Dehydroxylinalool oxide	0.02	Monoterpenic ether
Δ3-Carene	0.06	Monoterpene
(3*Z*)-Hexenyl acetate	0.01	Aliphatic ester
α-Terpinene	0.04	Monoterpene
Hexyl acetate	0.11	Aliphatic ester
meta-Cymene	0.02	Monoterpene
para-Cymene	0.21	Monoterpene
1,8-Cineole	7.02	Monoterpenic ether
Limonene	0.88	Monoterpene
Lavender lactone	0.01	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	0.06	Aliphatic alcohol
trans-Linalool oxide (fur.)	0.11	Monoterpenic alcohol
Terpinolene	0.22	Monoterpene
trans-Sabinene hydrate	0.02	Monoterpenic alcohol
Linalool	31.73	Monoterpenic alcohol

(*Z*)-6-Methyl-3,5-heptadien-2-one	0.04	Aliphatic ketone
Octen-3-yl acetate	0.21	Aliphatic ester
α-Campholenal	0.02	Monoterpenic aldehyde
Octan-3-yl acetate	0.03	Aliphatic ester
Camphor	7.19	Monoterpenic ketone
Camphene hydrate	0.06	Monoterpenic alcohol
Hexyl isobutyrate	0.14	Aliphatic ester
Nerol oxide	0.01	Aliphatic ether
Borneol	2.61	Monoterpenic alcohol
δ-Terpineol	0.08	Monoterpenic alcohol
Lavandulol	0.74	Monoterpenic alcohol
Terpinen-4-ol	3.31	Monoterpenic alcohol
(3*E*,5*Z*)-Undeca-1,3,5-triene	0.01	Alkene
Cryptone	0.02	Normonoterpenic ketone
meta-Cymen-8-ol	0.03	Monoterpenic alcohol
para-Cymen-8-ol	0.06	Monoterpenic alcohol
α-Terpineol	0.84	Monoterpenic alcohol
Hexyl butyrate	0.37	Aliphatic ester
Verbenone	0.02	Monoterpenic ketone
Unknown	0.03	Unknown
(3*E*,5*E*)-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	0.12	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.02	Aliphatic ester
Carvone	0.05	Monoterpenic ketone
Neral	0.03	Monoterpenic aldehyde
Hexyl isovalerate	0.15	Aliphatic ester
Geraniol	0.32	Monoterpenic alcohol
Linalyl acetate	29.38	Monoterpenic ester
Geranial	0.01	Monoterpenic aldehyde
Bornyl acetate	0.04	Monoterpenic ester
Lavandulyl acetate	2.21	Monoterpenic ester
Car-3-en-5-one	0.01	Monoterpenic ketone
Hexyl tiglate	0.16	Aliphatic ester
Hodiendiol derivative	0.03	Oxygenated monoterpene
Unknown	0.03	Oxygenated monoterpene
Neryl acetate	0.19	Monoterpenic ester
α-Copaene	0.01	Sesquiterpene
β-Bourbonene	0.07	Sesquiterpene
Geranyl acetate	0.37	Monoterpenic ester
Hexyl hexanoate	0.02	Aliphatic ester
7-epi-Sesquithujene	0.09	Sesquiterpene
α-Funebrene	0.01	Sesquiterpene
Sesquithujene	0.13	Sesquiterpene

β-Caryophyllene	1.44	Sesquiterpene
cis-α-Bergamotene	0.08	Sesquiterpene
α-Santalene	0.18	Sesquiterpene
Lavandulyl isobutyrate	0.01	Monoterpenic ester
Coumarin	0.15	Coumarin
trans-α-Bergamotene	0.14	Sesquiterpene
Sesquisabinene A	0.09	Sesquiterpene
epi-β-Santalene	0.01	Sesquiterpene
α-Humulene	0.07	Sesquiterpene
Lavandulyl butyrate?	0.08	Monoterpenic ester
β-Santalene	0.02	Sesquiterpene
(*E*)-β-Farnesene	1.08	Sesquiterpene
trans-Cadina-1(6),4-diene	0.10	Sesquiterpene
Germacrene D	0.59	Sesquiterpene
trans-β-Bergamotene	0.04	Sesquiterpene
Isodaucene	0.08	Sesquiterpene
Hodiendiol derivative II	0.05	Oxygenated monoterpene
β-Bisabolene	0.12	Sesquiterpene
Cubebol	0.01	Sesquiterpenic alcohol
γ-Cadinene	0.24	Sesquiterpene
Lavandulyl isovalerate	0.28	Monoterpenic ester
δ-Cadinene	0.02	Sesquiterpene
trans-Calamenene	0.02	Sesquiterpene
β-Sesquiphellandrene	0.12	Sesquiterpene
(*E*)-α-Bisabolene	0.02	Sesquiterpene
Isocaryophyllene epoxide B	0.01	Sesquiterpenic ether
cis-Sesquisabinene hydrate	0.01	Sesquiterpenic alcohol
(*E*)-Nerolidol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.11	Sesquiterpenic ether
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Ledol?	0.01	Oxygenated sesquiterpene
Neryl valerate?	0.02	Aliphatic ester
τ-Cadinol	0.15	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.01	Sesquiterpenic alcohol
α-Bisabolol	0.35	Sesquiterpenic alcohol
Consolidated total	**99.26**	

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

Note: no correction factor was applied

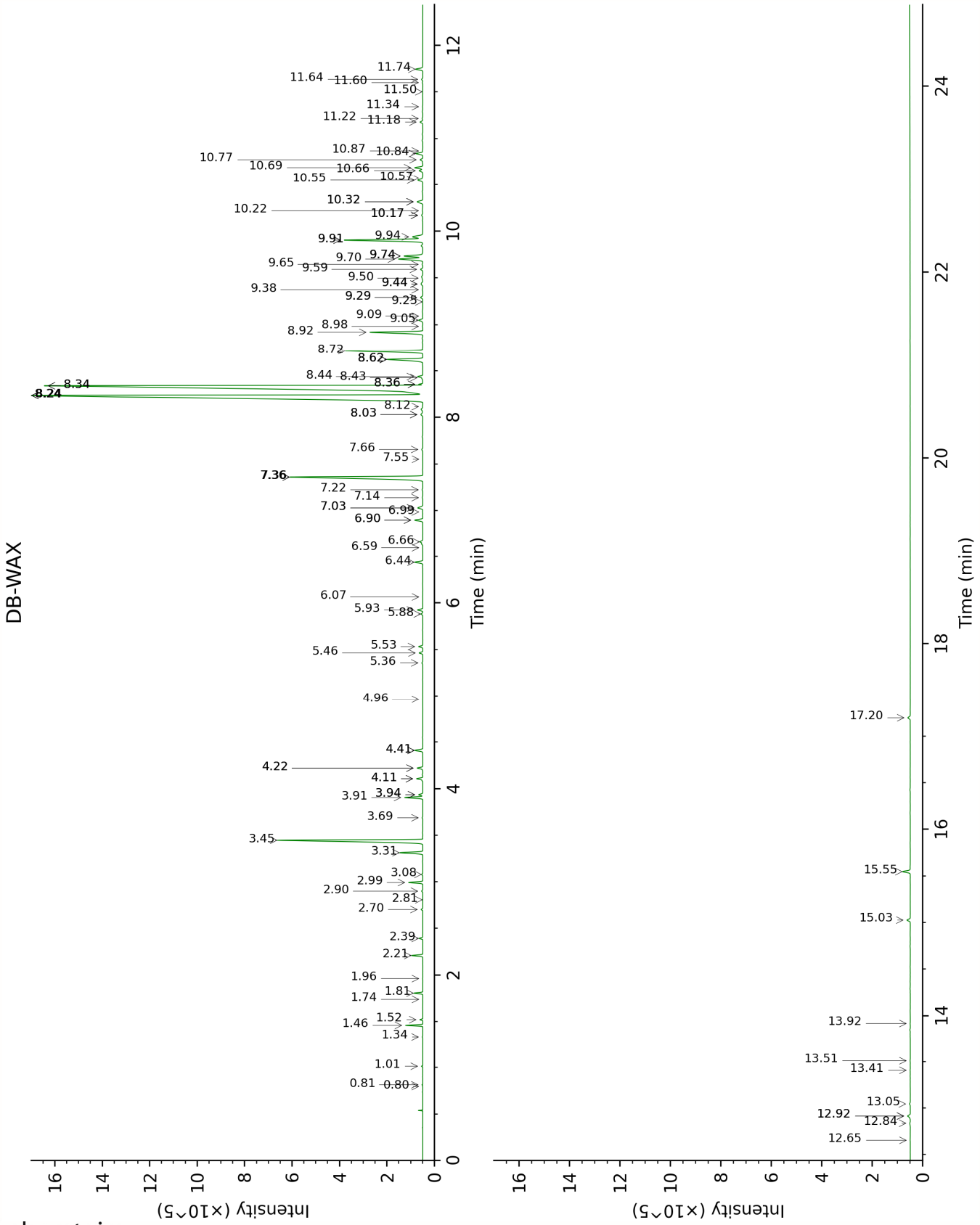
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

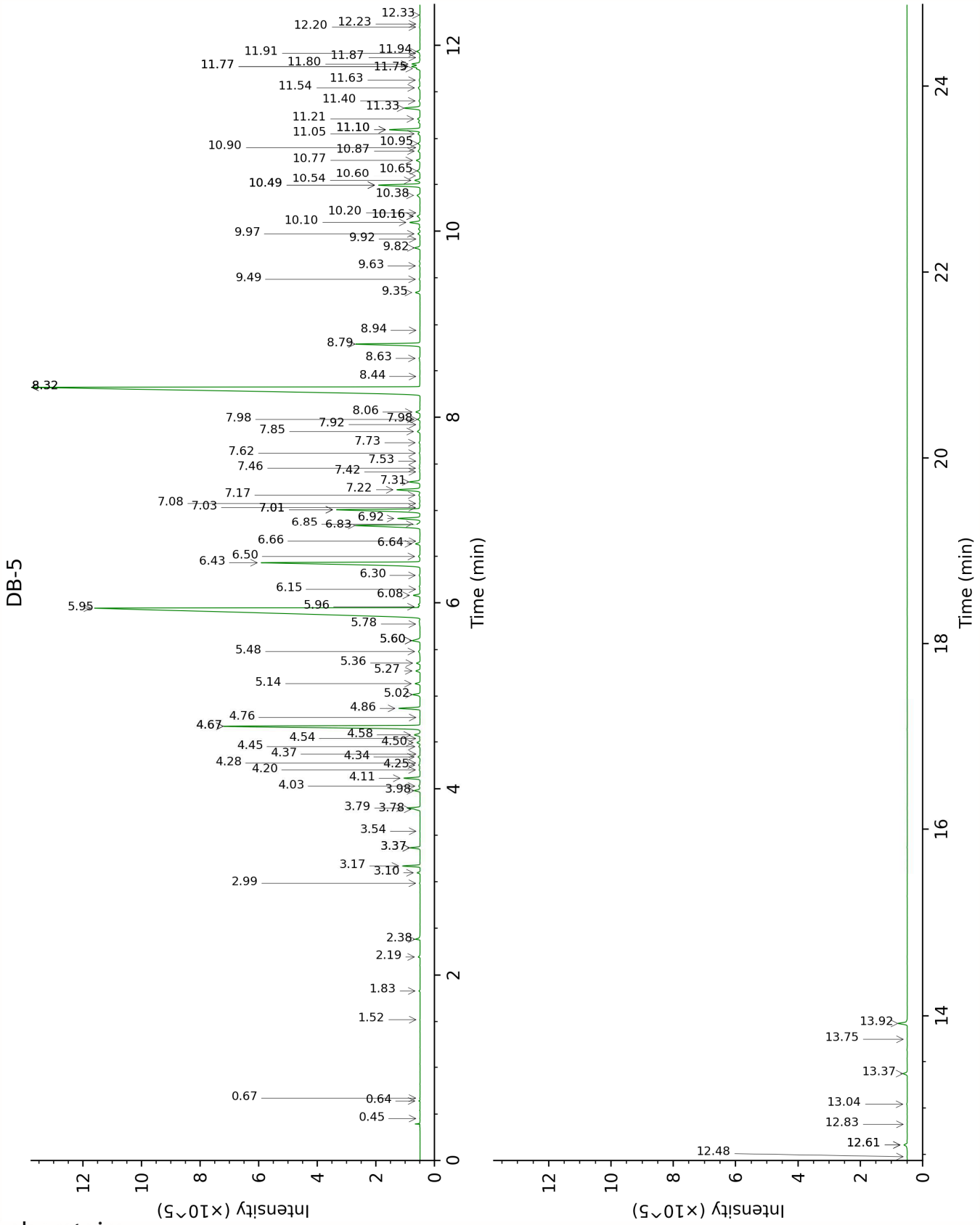
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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.

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


DB-WAX
Time (min)
Intensity (×10^5)
11.74
11.64
11.60
11.50
11.34
11.22
11.18
10.87
10.84
10.77
10.69
10.66
10.55
10.57
10.32
10.22
10.17
9.91
9.94
9.70
9.74
9.65
9.59
9.50
9.44
9.38
9.29
9.25
9.09
9.05
8.92
8.98
8.72
8.62
8.44
8.43
8.36
8.34
8.24
8.12
8.03
7.66
7.55
7.36
7.22
7.14
7.03
6.99
6.90
6.59
6.66
6.44
6.07
5.93
5.88
5.46
5.53
5.36
4.96
4.41
4.22
4.11
3.91
3.94
3.69
3.45
3.31
3.08
2.99
2.90
2.81
2.70
2.39
2.21
1.96
1.74
1.81
1.46
1.52
1.34
1.01
0.81
0.80
17.20
15.55
15.03
13.92
13.51
13.41
13.05
12.92
12.84
12.65


DB-5
Time (min)
Intensity (×10^5)
12.33
12.20
12.23
11.91
11.94
11.87
11.77
11.80
11.75
11.54
11.63
11.40
11.33
11.21
11.05
11.10
10.90
10.95
10.87
10.77
10.65
10.60
10.49
10.54
10.38
10.20
10.16
10.10
9.97
9.92
9.82
9.63
9.49
9.35
8.94
8.79
8.63
8.44
8.32
8.06
7.98
7.92
7.98
7.85
7.73
7.62
7.53
7.46
7.42
7.31
7.17
7.22
7.08
7.03
7.01
6.92
6.85
6.83
6.66
6.64
6.43
6.50
6.30
6.15
6.08
5.95
5.96
5.78
5.60
5.48
5.36
5.27
5.14
5.02
4.86
4.76
4.67
4.58
4.54
4.50
4.45
4.37
4.34
4.28
4.25
4.20
4.11
4.03
3.98
3.79
3.78
3.54
3.37
3.17
3.10
2.99
2.38
2.19
1.83
1.52
0.67
0.64
0.45
13.92
13.75
13.37
13.04
12.83
12.61
12.48

FULL ANALYSIS DATA

Isobutyral	Column DB-WAX			Column DB-5		
				0.45	536.7	tr
Isovaleral	0.82	883.7	0.02	0.64	640.9	0.01
2-Methylbutyral	0.80	877.6	0.01	0.67	651.3	tr
Hexanal	1.96	1043.4	0.01	1.52	800.3	tr
Methyl hexyl ether	1.01	924.9	0.03	1.83	827.7	0.03
(3*Z*)-Hexenol	5.88	1343.7	0.07	2.20	857.7	0.05
Hexanol	5.53	1318.4	0.16	2.38	873.3	0.14
Tricyclene	1.34	973.1	0.01	2.99	919.2	0.02
α-Thujene	1.52	1001.0	0.08	3.10	926.6	0.08
α-Pinene	1.46	991.9	0.46	3.17	931.4	0.47
Camphene	1.81	1028.7	0.27	3.37*	944.2	[0.28]
α-Fenchene	1.74	1022.4	tr	3.37*	944.2	[0.28]
Butyl isobutyrate	2.81	1119.2	0.01	3.54	955.9	0.01
Sabinene	2.39	1084.1	0.12	3.78*†	971.4	[0.09]
β-Pinene	2.21	1066.8	0.36	3.79*†	972.3	[0.39]
Octen-3-ol	6.90*	1417.4	[0.35]	3.98	984.6	0.19
Octan-3-one	4.11*	1217.4	[0.23]	4.03	987.8	0.05
Myrcene	2.99	1133.4	0.47	4.11	993.4	0.48
Butyl butyrate	3.69	1186.4	0.03	4.20	999.3	0.02
α-Phellandrene	2.90	1126.3	0.04	4.25	1002.6	0.04
cis-Dehydroxylinalool oxide	3.94*	1205.1	[0.16]	4.28	1004.1	0.02
Δ3-Carene	2.70	1111.3	0.06	4.34	1008.3	0.06
(3*Z*)-Hexenyl acetate	4.96	1279.1	0.01	4.37	1010.2	0.01
α-Terpinene	3.08	1140.0	0.04	4.45	1015.2	0.04
Hexyl acetate	4.41*	1239.3	[0.33]	4.50	1017.9	0.11
meta-Cymene	4.22*	1225.6	[0.23]	4.54	1020.6	0.02
para-Cymene	4.22*	1225.6	[0.23]	4.58	1023.0	0.21
1,8-Cineole	3.45	1168.0	7.02	4.67*	1028.8	[7.94]
Limonene	3.31	1157.7	0.88	4.67*	1028.8	[7.94]
Lavender lactone	9.38	1606.6	0.03	4.76	1034.7	0.01
(*Z*)-β-Ocimene	3.91	1203.0	0.64	4.86	1040.8	0.63
(*E*)-β-Ocimene	4.11*	1217.4	[0.23]	5.02	1050.6	0.25
γ-Terpinene	3.94*	1205.1	[0.16]	5.14	1057.9	0.16
cis-Sabinene hydrate	7.03*	1427.2	[0.25]	5.27	1066.5	0.15
cis-Linalool oxide (fur.)	6.66	1399.6	0.13	5.36	1071.7	0.12
Octanol	8.36*	1527.1	[0.08]	5.48	1079.5	0.06
trans-Linalool oxide (fur.)	7.03*	1427.2	[0.25]	5.60*	1086.8	[0.32]

Terpinolene	4.41*	1239.3	[0.33]	5.60*	1086.8	[0.32]
trans-Sabinene hydrate	8.12	1508.5	0.02	5.78	1097.9	0.02
Linalool	8.24*†	1517.8	[31.69]	5.95	1108.6	31.73
(*Z*)-6-Methyl-3,5-heptadien-2-one	8.36*	1527.1	[0.08]	5.96	1109.6	0.04
Octen-3-yl acetate	5.93	1346.8	0.21	6.08	1117.4	0.21
α-Campholenal	7.14	1435.4	0.03	6.15	1121.5	0.02
Octan-3-yl acetate	5.36	1305.8	0.04	6.30	1131.0	0.03
Camphor	7.36*	1451.8	[7.16]	6.43	1139.7	7.19
Camphene hydrate	8.62*	1547.9	[1.64]	6.50	1144.0	0.06
Hexyl isobutyrate	5.46	1313.5	0.14	6.64	1152.6	0.14
Nerol oxide	6.99	1423.9	0.02	6.66	1154.4	0.01
Borneol	9.91*	1649.7	[3.40]	6.83	1165.2	2.61
δ-Terpineol	9.59	1624.3	0.10	6.85	1166.6	0.08
Lavandulol	9.74*	1635.9	[0.80]	6.92	1170.5	0.74
Terpinen-4-ol	8.72	1555.2	3.31	7.01*	1176.5	[3.33]
(3*E*,5*Z*)-Undeca-1,3,5-triene	6.07	1356.8	0.01	7.01*	1176.5	[3.33]
Cryptone	9.25	1596.3	0.01	7.03	1177.9	0.02
meta-Cymen-8-ol	11.60	1791.4	0.02	7.08	1180.7	0.03
para-Cymen-8-ol	11.64	1794.3	0.05	7.17	1186.5	0.06
α-Terpineol	9.91*	1649.7	[3.40]	7.22	1190.2	0.84
Hexyl butyrate	6.44	1383.8	0.34	7.31	1195.5	0.37
Verbenone	9.74*	1635.9	[0.80]	7.42	1202.4	0.02
Unknown SASC VII [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.55	1466.1	0.01	7.46	1204.9	0.03
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	11.50	1783.1	0.01	7.53	1209.9	0.01
Octyl acetate	7.22	1441.6	0.03	7.62	1215.7	0.03
Bornyl formate	8.24*†	1517.8	[31.69]	7.73	1223.2	0.04
Nerol	11.18	1755.4	0.12	7.85	1231.2	0.12
Hexyl 2-methylbutyrate	6.59	1394.9	0.01	7.92	1236.2	0.02
Carvone	10.17*	1671.3	[0.06]	7.98*	1239.9	[0.08]
Neral	9.65	1628.6	0.03	7.98*	1239.9	[0.08]
Hexyl isovalerate	6.90*	1417.4	[0.35]	8.06	1245.2	0.15
Geraniol	11.74	1803.7	0.32	8.32*	1262.9	[29.70]
Linalyl acetate	8.34*†	1525.9	[29.42]	8.32*	1262.9	[29.70]
Geranial	10.22	1675.3	0.02	8.44	1270.7	0.01
Bornyl acetate	8.43	1532.7	0.05	8.63	1283.7	0.04
Lavandulyl acetate	8.92	1571.0	2.24	8.80	1294.4	2.21

Car-3-en-5-one				8.94	1304.2	0.01
Hexyl tiglate	9.05	1581.1	0.19	9.35	1332.6	0.16
Hodiendiol derivative	13.05	1919.8	0.04	9.49	1342.6	0.03
Unknown SASC II [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	11.22	1758.7	0.03	9.63	1352.7	0.03
Neryl acetate	10.32*	1683.1	[0.31]	9.82	1366.3	0.19
α-Copaene	7.36*	1451.8	[7.16]	9.92	1372.9	0.01
β-Bourbonene	7.66	1474.0	0.05	9.97	1376.9	0.07
Geranyl acetate	10.69	1713.8	0.34	10.10	1385.4	0.37
Hexyl hexanoate	8.98	1576.0	0.02	10.16*	1390.1	[0.11]
7-epi-Sesquithujene	8.03*	1501.8	[0.12]	10.16*	1390.1	[0.11]
α-Funebrene	8.03*	1501.8	[0.12]	10.20	1392.7	0.01
Sesquithujene	8.24*†	1517.8	[31.69]	10.38	1405.9	0.13
β-Caryophyllene	8.62*	1547.9	[1.64]	10.49*	1414.0	[1.52]
cis-α-Bergamotene	8.34*†	1525.9	[29.42]	10.49*	1414.0	[1.52]
α-Santalene	8.44	1533.6	0.19	10.54	1417.8	0.18
Lavandulyl isobutyrate	9.50	1616.7	0.03	10.60	1421.7	0.01
Coumarin	17.20	2330.9	0.12	10.65	1425.9	0.15
trans-α-Bergamotene	8.62*	1547.9	[1.64]	10.77	1434.3	0.14
Sesquisabinene A	9.29*	1600.0	[0.11]	10.87	1441.7	0.09
epi-β-Santalene	9.09	1584.4	0.02	10.90	1444.5	0.01
α-Humulene	9.44*	1611.5	[0.11]	10.95	1447.8	0.07
Lavandulyl butyrate?	10.66	1711.1	0.17	11.05	1455.5	0.08
β-Santalene	9.29*	1600.0	[0.11]	11.10*	1458.8	[1.09]
(*E*)-β-Farnesene	9.70	1633.2	1.08	11.10*	1458.8	[1.09]
trans-Cadina-1(6),4-diene	9.44*	1611.5	[0.11]	11.21	1467.4	0.10
Germacrene D	9.94	1652.6	0.58	11.33	1476.0	0.59
trans-β-Bergamotene	9.74*	1635.9	[0.80]	11.40	1481.8	0.04
Isodaucene	10.17*	1671.3	[0.06]	11.54	1492.2	0.08
Hodiendiol derivative II	12.92*	1907.7	[0.14]	11.63	1498.3	0.05
β-Bisabolene	10.32*	1683.1	[0.31]	11.75*†	1507.7	[0.11]
Cubebol	12.66	1884.4	0.01	11.77*†	1509.4	[0.32]
γ-Cadinene	10.55	1702.0	0.24	11.77*†	1509.4	[0.32]
Lavandulyl isovalerate	10.84	1726.7	0.29	11.80	1511.5	0.28

δ-Cadinene	10.57	1703.8	0.01	11.87	1517.0	0.02
trans-Calamenene	11.34	1769.4	0.02	11.92	1520.5	0.02
β-Sesquiphellandrene	10.77	1721.1	0.12	11.94	1522.1	0.12
(*E*)-α-Bisabolene	10.87	1729.1	0.02	12.20	1542.6	0.02
Isocaryophyllene epoxide B				12.23	1545.2	0.01
cis-Sesquisabinene hydrate	13.41	1953.2	0.01	12.33	1552.8	0.01
(*E*)-Nerolidol	13.92	2000.4	0.01	12.48	1564.7	0.01
Caryophyllene oxide	12.92*	1907.7	[0.14]	12.60*	1574.6	[0.15]
Caryophyllene oxide isomer	12.84	1900.6	0.03	12.60*	1574.6	[0.15]
Ledol?	13.51	1962.7	0.01	12.83	1592.0	0.01
Neryl valerate?				13.04	1609.1	0.02
τ-Cadinol	15.03	2107.4	0.15	13.37	1636.2	0.15
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol				13.75	1667.3	0.01
α-Bisabolol	15.55	2159.6	0.33	13.92	1681.4	0.35
Total reported		98.77%			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