Date : 2024-08-12

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24G29-PTH02
Customer Identification : Neroli - Egypt - N10112R
Type : Essential Oil
Source : *Citrus aurantium subsp. amara*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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 : Sylvain Mercier, M. Sc., Chimiste 2014-005
Date : 2024-08-06

Physicochemical data

Refractive index : 1.4672 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2024-07-31

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
Ethanol	0.02	Aliphatic alcohol
Methacrolein	tr	Aliphatic aldehyde
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	tr	Simple phenolic
Octane	tr	Alkane
(3*Z*)-Hexenol	0.01	Aliphatic alcohol
(2*E*)-Hexenol	0.01	Aliphatic alcohol
Hexanol	0.03	Aliphatic alcohol
α-Thujene	0.02	Monoterpene
α-Pinene	0.34	Monoterpene
Camphene	0.03	Monoterpene
Benzaldehyde	0.01	Simple phenolic
Sabinene	0.49	Monoterpene
β-Pinene	4.61	Monoterpene
6-Methyl-5-hepten-2-one	0.03	Aliphatic ketone
Myrcene	1.96	Monoterpene
α-Phellandrene	0.02	Monoterpene
cis-Dehydroxylinalool oxide	0.02	Monoterpenic ether
Δ3-Carene	0.02	Monoterpene
(3*Z*)-Hexenyl acetate	0.01	Aliphatic ester
α-Terpinene	0.06	Monoterpene
(2*E*)-Hexenyl acetate	0.01	Aliphatic ester
para-Cymene	0.04	Monoterpene
β-Phellandrene	0.10	Monoterpene
Limonene	8.74	Monoterpene
(*Z*)-β-Ocimene	0.85	Monoterpene
(*E*)-β-Ocimene	4.71	Monoterpene
γ-Terpinene	0.11	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.15	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
trans-Linalool oxide (fur.)	0.08	Monoterpenic alcohol
Terpinolene	0.42	Monoterpene
α-Pinene oxide	0.01	Monoterpenic ether
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Rosefuran	0.01	Monoterpenic ether
Linalool	45.57	Monoterpenic alcohol
Hotrienol	0.02	Monoterpenic alcohol

Nonanal	0.01	Aliphatic aldehyde
(*Z*)-6-Methyl-3,5-heptadien-2-one	0.05	Aliphatic ketone
Phenylethyl alcohol	0.03	Simple phenolic
(*E*)-4,8-Dimethylnona-1,3,7-triene	0.01	Terpene derivative
(*E*)-4,8-Dimethyl-1,3,7-nonatriene	0.05	Monoterpene
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
all*o*-Ocimene	0.02	Monoterpene
Benzeneacetonitrile	0.16	Simple phenolic
trans-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
(*E*)-Myroxide	0.02	Monoterpenic ether
Lilac aldehyde A	0.02	Monoterpenic aldehyde
Borneol	0.02	Monoterpenic alcohol
Terpinen-4-ol	0.21	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	5.41	Monoterpenic alcohol
Myrtenal	0.02	Monoterpenic aldehyde
Hodiendiol (2,6-dimethylocta-3,7-diene-2,6-diol)	0.04	Monoterpenic alcohol
Methylchavicol	0.01	Phenylpropanoid
Lilac alcohol A	0.01	Monoterpenic alcohol
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.03	Monoterpenic alcohol
Linalyl formate	0.01	Monoterpenic ester
Nerol	1.19	Monoterpenic alcohol
Unknown	0.03	Oxygenated monoterpene
Neral	0.04	Monoterpenic aldehyde
Phenylethyl acetate	0.07	Phenolic ester
Geraniol	3.31	Monoterpenic alcohol
Linalyl acetate	10.48	Monoterpenic ester
Geranial	0.05	Monoterpenic aldehyde
Bornyl acetate	0.01	Monoterpenic ester
Indole	0.11	Indole
1-Nitr*o*-2-phenylethane	0.03	Simple phenolic
Geranyl formate	0.01	Monoterpenic ester
Methyl anthranilate	0.12	Phenolic ester
δ-Elemene	0.04	Sesquiterpene
Linalyl propionate	0.04	Monoterpenic ester
Hodiendiol derivative	0.02	Oxygenated monoterpene
α-Terpinyl acetate	0.09	Monoterpenic ester
Eugenol	0.02	Phenylpropanoid
Neryl acetate	1.66	Monoterpenic ester
Geranyl acetate	3.18	Monoterpenic ester
β-Elemene	0.03	Sesquiterpene
(*Z*)-Jasmone	0.03	Jasmonate
Dimethyl anthranilate	0.07	Phenolic ester
β-Caryophyllene	0.56	Sesquiterpene

Aromadendrene	0.01	Sesquiterpene
α-Humulene	0.06	Sesquiterpene
Geranylacetone	0.02	Monoterpenic ketone
allo-Aromadendrene	0.01	Sesquiterpene
(*E*)-β-Farnesene	0.07	Sesquiterpene
Germacrene D	0.06	Sesquiterpene
Bicyclogermacrene	0.20	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
(3*Z*,6*E*)-α-Farnesene	0.01	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.05	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
Methyl N-formylanthranilate	0.04	Phenolic ester
(*E*)-Nerolidol	1.49	Sesquiterpenic alcohol
Spathulenol	0.03	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	Sesquiterpenic ether
Viridiflorol	0.01	Sesquiterpenic alcohol
τ-Cadinol	0.01	Sesquiterpenic alcohol
τ-Muurolol	0.02	Sesquiterpenic alcohol
α-Cadinol	0.01	Sesquiterpenic alcohol
(8*Z*)-Heptadecene	0.03	Alkene
2,3-Dihydrofarnesol	0.01	Sesquiterpenic alcohol
(2*E*,6*Z*)-Farnesol	0.03	Sesquiterpenic alcohol
(2*E*,6*Z*)-Farnesal	0.02	Sesquiterpenic aldehyde
(2*E*,6*E*)-Farnesol	1.11	Sesquiterpenic alcohol
(2*E*,6*E*)-Farnesal	0.03	Sesquiterpenic aldehyde
(2*E*,6*E*)-Farnesyl acetate	0.03	Sesquiterpenic ester
Heneicosane	0.01	Alkane
Phytol	0.02	Diterpenic alcohol
Tricosane	0.04	Alkane
Tetracosane	0.01	Alkane
Pentacosane	0.03	Alkane
Heptacosane	0.02	Alkane
Squalene	0.01	Triterpene
Consolidated total	**99.50**	

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

Note: no correction factor was applied

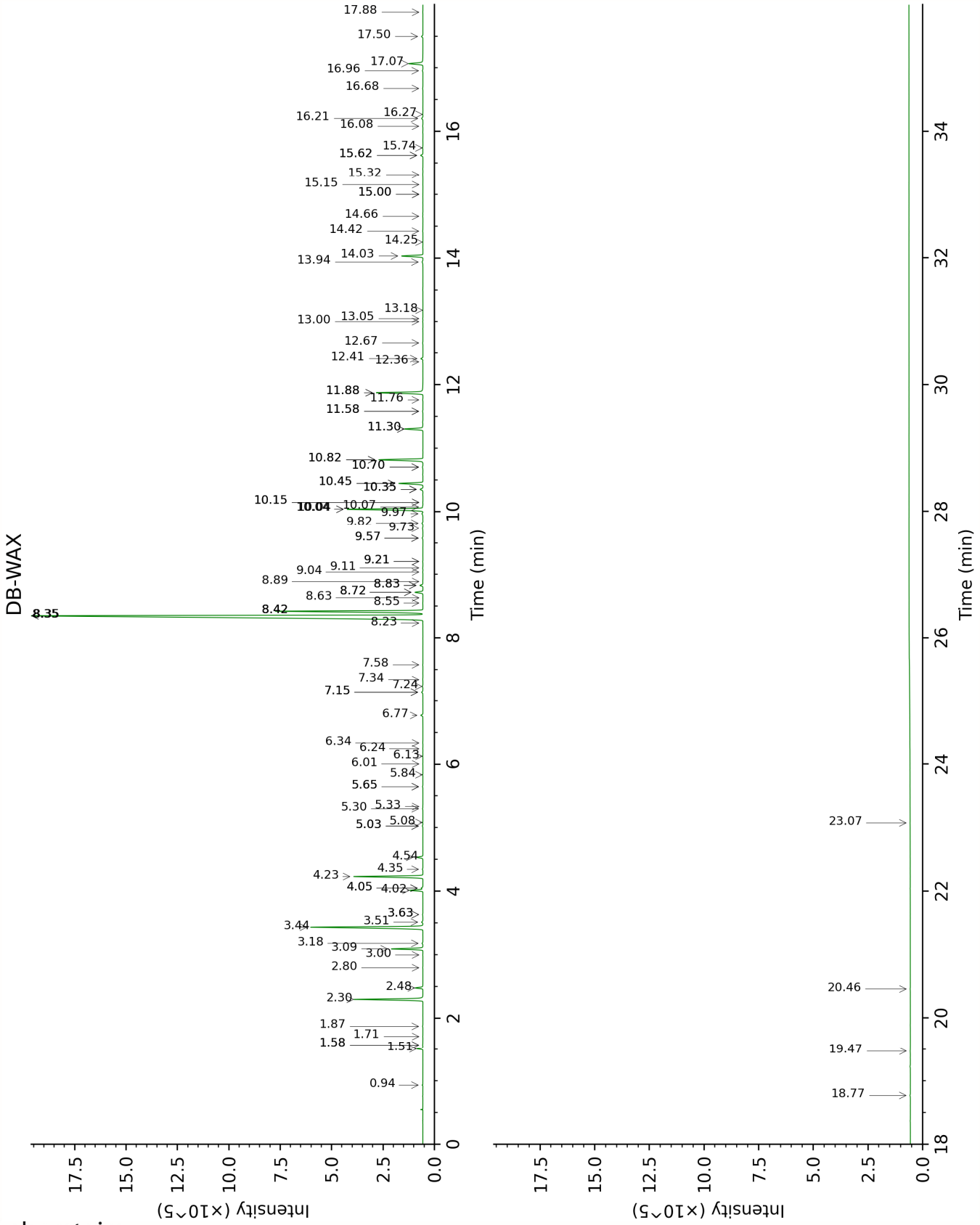
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

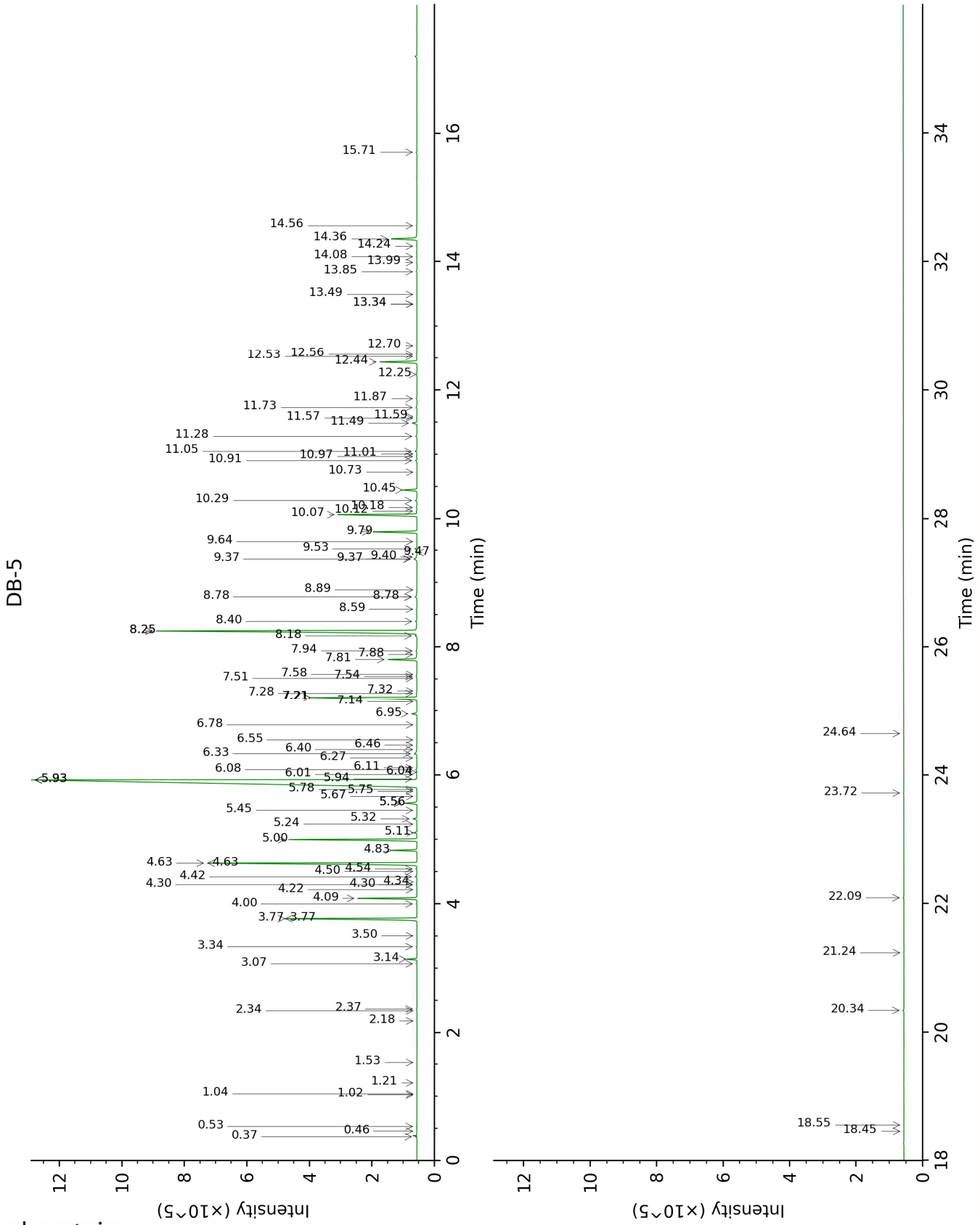
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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)
17.88
17.50
17.07
16.96
16.68
16.27
16.21
16.08
15.74
15.62
15.32
15.15
15.00
14.66
14.42
14.25
14.03
13.94
13.18
13.00
13.05
12.67
12.41
12.36
11.88
11.76
11.58
11.30
10.82
10.70
10.45
10.35
10.15
10.04
10.07
9.97
9.82
9.73
9.57
9.21
9.11
9.04
8.89
8.83
8.72
8.63
8.55
8.42
8.35
8.23
7.58
7.34
7.24
7.15
6.77
6.34
6.24
6.13
6.01
5.84
5.65
5.33
5.30
5.08
5.03
4.54
4.35
4.23
4.05
4.02
3.63
3.51
3.44
3.18
3.09
3.00
2.80
2.48
2.30
1.87
1.71
1.58
1.51
0.94
23.07
20.46
19.47
18.77


DB-5
Time (min)
Intensity (×10^5)
15.71
14.56
14.36
14.24
14.08
13.99
13.85
13.49
13.34
12.70
12.53
12.56
12.44
12.25
11.87
11.73
11.57
11.49
11.59
11.28
11.05
10.91
10.97
11.01
10.73
10.45
10.29
10.18
10.07
10.12
9.79
9.64
9.53
9.47
9.37
9.37
9.40
8.89
8.78
8.78
8.59
8.40
8.25
8.18
7.94
7.81
7.88
7.51
7.58
7.54
7.28
7.21
7.32
7.14
6.95
6.78
6.55
6.40
6.46
6.33
6.27
6.08
6.11
6.04
6.01
5.94
5.93
5.78
5.67
5.75
5.56
5.45
5.24
5.32
5.11
5.00
4.83
4.63
4.63
4.50
4.54
4.42
4.30
4.30
4.34
4.22
4.09
4.00
3.77
3.77
3.50
3.34
3.07
3.14
2.34
2.37
2.18
1.53
1.21
1.04
1.02
0.53
0.37
0.46
24.64
23.72
22.09
21.24
20.34
18.55
18.45

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Ethanol	0.94	905.4	0.02	0.37	499.9	0.02
Methacrolein				0.46	547.9	tr
2-Methyl-3-buten-2-ol	1.71	1013.0	0.01	0.53	606.8	0.01
Isoamyl alcohol	3.63*	1176.0	[0.03]	1.02	733.4	tr
2-Methylbutanol	3.63*	1176.0	[0.03]	1.04	735.8	tr
Toluene	1.58*	1000.1	[0.02]	1.21	759.7	tr
Octane				1.53	803.9	tr
(3*Z*)-Hexenol	6.01	1346.6	0.01	2.18	858.3	0.01
(2*E*)-Hexenol	6.34	1370.1	0.02	2.34	871.4	0.01
Hexanol	5.65*	1321.1	[0.03]	2.37	873.7	0.03
α-Thujene	1.58*	1000.1	[0.02]	3.07	926.0	0.02
α-Pinene	1.51	993.6	0.34	3.14	930.7	0.34
Camphene	1.87	1028.3	0.03	3.34	943.5	0.03
Benzaldehyde	7.58	1460.8	0.02	3.50	954.7	0.01
Sabinene	2.48	1086.1	0.49	3.77*	972.3	[5.11]
β-Pinene	2.30	1068.8	4.61	3.77*	972.3	[5.11]
6-Methyl-5-hepten-2-one	5.30	1296.4	0.03	4.00	987.4	0.03
Myrcene	3.09	1134.7	1.95	4.09	993.1	1.96
α-Phellandrene	3.00	1127.5	0.01	4.22	1002.0	0.02
cis-Dehydroxylinalool oxide	4.05*	1207.0	[0.11]	4.30*	1006.9	[0.03]
Δ3-Carene	2.80	1112.0	0.02	4.30*	1006.9	[0.03]
(3*Z*)-Hexenyl acetate	5.08	1280.8	0.01	4.34	1009.6	0.01
α-Terpinene	3.18	1141.4	0.06	4.42	1014.6	0.06
(2*E*)-Hexenyl acetate	5.34	1298.8	0.01	4.50	1019.8	0.01
para-Cymene	4.35	1228.1	0.04	4.54	1022.2	0.04
β-Phellandrene	3.51	1166.9	0.10	4.63*	1027.8	[8.84]
Limonene	3.44	1160.8	8.74	4.63*	1027.8	[8.84]
(*Z*)-β-Ocimene	4.02	1204.5	0.84	4.83	1040.3	0.85
(*E*)-β-Ocimene	4.23	1220.0	4.72	5.00	1050.7	4.71
γ-Terpinene	4.05*	1207.0	[0.11]	5.10	1057.3	0.11
cis-Sabinene hydrate	7.15*	1429.0	[0.11]	5.24	1065.7	0.01
cis-Linalool oxide (fur.)	6.77	1401.4	0.15	5.32	1070.9	0.15
Octanol	8.42*†	1524.3	[10.51]	5.45	1079.1	0.01
trans-Linalool oxide (fur.)	7.15*	1429.0	[0.11]	5.56*	1086.0	[0.50]

Terpinolene	4.54	1241.7	0.42	5.56*	1086.0	[0.50]
α-Pinene oxide	5.65*	1321.1	[0.03]	5.67	1092.6	0.01
trans-Sabinene hydrate	8.24	1509.9	0.02	5.75	1097.7	0.01
Rosefuran	6.24	1363.6	0.01	5.78	1099.4	0.01
Linalool	8.35*†	1518.8	[45.51]	5.93*	1108.8	[45.60]
Hotrienol	9.04	1571.8	0.02	5.93*	1108.8	[45.60]
Nonanal	6.13	1355.3	0.01	5.93*	1108.8	[45.60]
(*Z*)-6-Methyl-3,5-heptadien-2-one	8.42*†	1524.3	[10.51]	5.94	1109.6	0.05
Phenylethyl alcohol	12.36	1847.5	0.03	6.01	1114.2	0.03
(*E*)-4,8-Dimethylnona-1,3,7-triene	5.03*	1276.8	[0.04]	6.04	1116.3	0.01
(*E*)-4,8-Dimethyl-1,3,7-nonatriene	5.03*	1276.8	[0.04]	6.08	1118.9	0.05
cis-para-Menth-2-en-1-ol	8.35*†	1518.8	[45.51]	6.11	1120.8	0.02
allo-Ocimene	5.84	1334.5	0.02	6.27	1130.4	0.02
Benzeneacetonitrile	12.41	1851.9	0.15	6.33	1134.7	0.16
trans-para-Menth-2-en-1-ol	9.21*	1584.6	[0.02]	6.40	1138.8	0.02
(*E*)-Myroxide	7.34	1443.5	0.02	6.46	1143.1	0.02
Lilac aldehyde A				6.55	1148.4	0.02
Borneol	10.04*	1651.4	[5.43]	6.78	1163.3	0.02
Terpinen-4-ol	8.83*	1555.6	[0.21]	6.95	1174.3	0.21
para-Cymen-8-ol	11.76	1794.8	0.03	7.14	1186.4	0.01
α-Terpineol	10.04*	1651.4	[5.43]	7.21*	1190.8	[5.42]
Myrtenal	8.89	1560.3	0.02	7.21*	1190.8	[5.42]
Hodiendiol (2,6-dimethylocta-3,7-diene-2,6-diol)	13.05	1909.0	0.02	7.28	1194.9	0.04
Methylchavicol	9.58*	1614.0	[0.06]	7.32	1197.5	0.01
Lilac alcohol A	10.15*	1660.0	[0.02]	7.51	1210.3	0.01
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	11.58*	1779.4	[0.04]	7.54	1212.3	0.03
Linalyl formate	8.63	1540.6	0.01	7.58	1214.5	0.01
Nerol	11.30*	1756.0	[1.31]	7.81	1229.9	1.19
Unknown CIAU II [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	11.58*	1779.4	[0.04]	7.88	1235.1	0.03
Neral	9.73	1626.5	0.05	7.94	1238.8	0.04
Phenylethyl acetate	11.30*	1756.0	[1.31]	8.18	1254.5	0.07

Geraniol	11.88*	1804.7	[3.33]	8.25*	1259.5	[13.79]
Linalyl acetate	8.42*†	1524.3	[10.51]	8.25*	1259.5	[13.79]
Geranial	10.35*	1676.6	[0.23]	8.40	1269.4	0.05
Bornyl acetate	8.55	1534.3	0.02	8.59	1282.1	0.01
Indole	17.50	2349.3	0.11	8.78*	1294.7	[0.11]
1-Nitro-2-phenylethane	14.42	2036.9	0.03	8.78*	1294.7	[0.11]
Geranyl formate	10.15*	1660.0	[0.02]	8.89	1302.1	0.01
Methyl anthranilate	15.62*	2154.4	[0.18]	9.37*	1335.8	[0.17]
δ-Elemene	7.24	1435.8	0.04	9.37*	1335.8	[0.17]
Linalyl propionate	9.10	1576.8	0.02	9.40	1338.0	0.04
Hodiendiol derivative	13.18	1921.2	0.01	9.47	1342.9	0.02
α-Terpinyl acetate	9.97	1645.6	0.09	9.52	1347.0	0.09
Eugenol	15.00*	2092.5	[0.01]	9.64	1355.0	0.02
Neryl acetate	10.45*	1684.1	[1.66]	9.79	1365.6	1.66
Geranyl acetate	10.82*	1715.2	[3.21]	10.07	1385.1	3.18
β-Elemene	8.72*	1547.3	[0.58]	10.12	1388.9	0.03
(*Z*)-Jasmone	12.67	1874.6	0.04	10.18	1393.0	0.03
Dimethyl anthranilate	13.94	1990.6	0.08	10.29	1400.6	0.07
β-Caryophyllene	8.72*	1547.3	[0.58]	10.45	1412.6	0.56
Aromadendrene	8.83*	1555.6	[0.21]	10.73	1433.1	0.01
α-Humulene	9.58*	1614.0	[0.06]	10.91	1446.6	0.06
Geranylacetone	11.88*	1804.7	[3.33]	10.97	1451.3	0.02
allo-Aromadendrene	9.21*	1584.6	[0.02]	11.01	1454.2	0.01
(*E*)-β-Farnesene	9.82	1633.5	0.07	11.05	1457.2	0.07
Germacrene D	10.08	1654.2	0.04	11.28	1474.5	0.06
Bicyclogermacrene	10.35*	1676.6	[0.23]	11.49	1489.8	0.20
α-Muurolene	10.35*	1676.6	[0.23]	11.57	1495.6	0.02
(3*Z*,6*E*)-α-Farnesene	10.45*	1684.1	[1.66]	11.59	1497.4	0.01
(3*E*,6*E*)-α-Farnesene	10.82*	1715.2	[3.21]	11.73	1508.1	0.05
δ-Cadinene	10.70*	1705.4	[0.06]	11.87	1518.9	0.04
Methyl N-formylanthranilate				12.25	1548.4	0.04
(*E*)-Nerolidol	14.03	1999.7	1.48	12.44	1563.7	1.49
Spathulenol	14.66	2059.3	0.02	12.53	1570.5	0.03
Caryophyllene oxide	13.00	1904.7	0.02	12.56	1573.1	0.02
Viridiflorol	14.25	2020.6	0.01	12.70	1584.1	0.01
τ-Cadinol	15.16	2107.8	0.01	13.34*	1636.2	[0.01]
τ-Muurolol	15.32	2123.8	0.02	13.34*	1636.2	[0.01]
α-Cadinol	15.74	2166.2	0.02	13.49	1648.6	0.01
(8*Z*)-Heptadecene	10.70*	1705.4	[0.06]	13.85	1677.6	0.03

2,3-Dihydrofarnesol	16.27	2220.1	0.01	13.99	1689.4	0.01
(2*E*,6*Z*)-Farnesol	16.68	2262.2	0.03	14.08	1696.8	0.03
(2*E*,6*Z*)-Farnesal	15.62*	2154.4	[0.18]	14.24	1710.6	0.02
(2*E*,6*E*)-Farnesol	17.07	2303.5	1.14	14.36	1720.5	1.11
(2*E*,6*E*)-Farnesal	16.08	2200.7	0.03	14.56	1738.0	0.03
(2*E*,6*E*)-Farnesyl acetate	16.21	2213.4	0.11	15.71	1839.2	0.03
Heneicosane	15.00*	2092.5	[0.01]	18.45	2101.3	0.01
Phytol	19.47	2571.0	0.02	18.55	2111.4	0.02
Tricosane	16.96	2291.4	0.04	20.34	2300.7	0.04
Tetracosane	17.88	2390.5	0.01	21.24	2400.9	0.01
Pentacosane	18.77	2489.9	0.03	22.09	2500.3	0.03
Heptacosane	20.46	2688.3	0.02	23.72	2700.0	0.02
Squalene	23.07	3023.6	0.01	24.64	2820.2	0.01
Total reported		99.39%			99.47%	

*: 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