Date : 2024-08-12

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24G29-PTH04
Customer Identification : Sweet Marjoram - Egypt - M20114R
Type : Essential Oil
Source : *Origanum majorana ct. Sabinene hydrate*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

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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 : Sylvain Mercier, M. Sc., Chimiste 2014-005
Date : 2024-08-07

Physicochemical data

Refractive index : 1.4729 ± 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.

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Analysis Summary - Consolidated Contents

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Methyl 2-methylbutyrate	0.02	Aliphatic ester
Hexanal	tr	Aliphatic aldehyde
Octane	tr	Alkane
(2*E*)-Hexenal	0.02	Aliphatic aldehyde
(3*Z*)-Hexenol	0.02	Aliphatic alcohol
(2*E*)-Hexenol	0.01	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
Isobutyl isobutyrate	0.01	Aliphatic ester
α-Thujene	1.90	Monoterpene
α-Pinene	0.78	Monoterpene
Camphene	0.03	Monoterpene
Thujadiene isomer	0.01	Monoterpene
Sabinene	8.92	Monoterpene
β-Pinene	0.42	Monoterpene
Octen-3-ol	0.01	Aliphatic alcohol
3-Methylpentyl acetate	tr	Aliphatic ester
Octan-3-one	0.06	Aliphatic ketone
Myrcene	2.11	Monoterpene
Pseudolimonene	0.07	Monoterpene
α-Phellandrene	1.15	Monoterpene
(3*Z*)-Hexenyl acetate	0.02	Aliphatic ester
α-Terpinene	10.67	Monoterpene
Carvomenthene	0.02	Aliphatic alcohol
para-Cymene	1.68	Monoterpene
1,8-Cineole	[2.95]	Monoterpenic ether
Limonene	2.23	Monoterpene
β-Phellandrene	[2.95]	Monoterpene
(*Z*)-β-Ocimene	0.05	Monoterpene
(*E*)-β-Ocimene	0.08	Monoterpene
γ-Terpinene	16.84	Monoterpene
cis-Sabinene hydrate	3.75	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Isoperillene	0.01	Monoterpenic ether
trans-Linalool oxide (fur.)	0.05	Monoterpenic alcohol
Terpinolene	3.89	Monoterpene

para-Cymenene	0.03	Monoterpene
trans-Sabinene hydrate	9.45	Monoterpenic alcohol
Unknown	tr	Oxygenated monoterpene
Linalool	1.37	Monoterpenic alcohol
Unknown	0.02	Monoterpenic alcohol
trans-para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.70	Monoterpenic alcohol
α-Campholenal	0.03	Monoterpenic aldehyde
4-Hydroxy-4-methylcyclohex-2-enone	0.03	Aliphatic alcohol
trans-Pinocarveol	0.08	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.41	Monoterpenic alcohol
Unknown	0.02	Unknown
1,4-Dimethyl-4-acetylcyclohexene	0.02	Monoterpenic ketone
Pinocarvone	0.01	Monoterpenic ketone
Isomenthone	0.01	Monoterpenic ketone
Borneol	0.06	Monoterpenic alcohol
δ-Terpineol	0.02	Monoterpenic alcohol
Terpinen-4-ol	22.66	Monoterpenic alcohol
Cryptone	0.04	Normonoterpenic ketone
para-Cymen-8-ol	0.04	Monoterpenic alcohol
α-Terpineol	2.69	Monoterpenic alcohol
Myrtenol	tr	Monoterpenic alcohol
cis-Piperitol	0.11	Monoterpenic alcohol
cis-Dihydrocarvone	0.02	Monoterpenic ketone
Methylchavicol	0.05	Phenylpropanoid
Unknown	0.02	Unknown
trans-Piperitol	0.13	Monoterpenic alcohol
trans-Carveol	0.02	Monoterpenic alcohol
cis-Sabinene hydrate acetate?	0.03	Monoterpenic ester
Nerol	0.02	Monoterpenic alcohol
Citronellol	0.02	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Carvone	0.02	Monoterpenic ketone
Carvenone	0.02	Monoterpenic ketone
trans-Sabinene hydrate acetate	0.06	Monoterpenic ester
Linalyl acetate	1.42	Monoterpenic ester
Geraniol	0.04	Monoterpenic alcohol
trans-Ascaridole glycol	0.05	Monoterpenic alcohol
Bornyl acetate	0.02	Monoterpenic ester
cis-Ascaridole glycol	0.02	Monoterpenic alcohol
Terpinen-4-yl acetate	0.06	Monoterpenic ester
Thymol	0.01	Monoterpenic alcohol
Thymol analogue II	0.02	Monoterpenic alcohol
Unknown	0.02	Monoterpenic alcohol
Unknown	0.06	Monoterpenic alcohol

Bicycloelemene	0.11	Sesquiterpene
α-Terpinyl acetate	0.01	Monoterpenic ester
Eugenol	0.03	Phenylpropanoid
Neryl acetate	0.03	Monoterpenic ester
Geranyl acetate	0.04	Monoterpenic ester
β-Elemene	0.01	Sesquiterpene
β-Caryophyllene	0.90	Sesquiterpene
β-Copaene	0.02	Sesquiterpene
Aromadendrene	0.10	Sesquiterpene
α-Humulene	0.03	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
Bicyclogermacrene	0.13	Sesquiterpene
Viridiflorene	0.04	Sesquiterpene
γ-Cadinene	0.01	Sesquiterpene
δ-Cadinene	0.01	Sesquiterpene
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
Isospathulenol	0.01	Sesquiterpenic alcohol
Consolidated total	**99.30**	

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.

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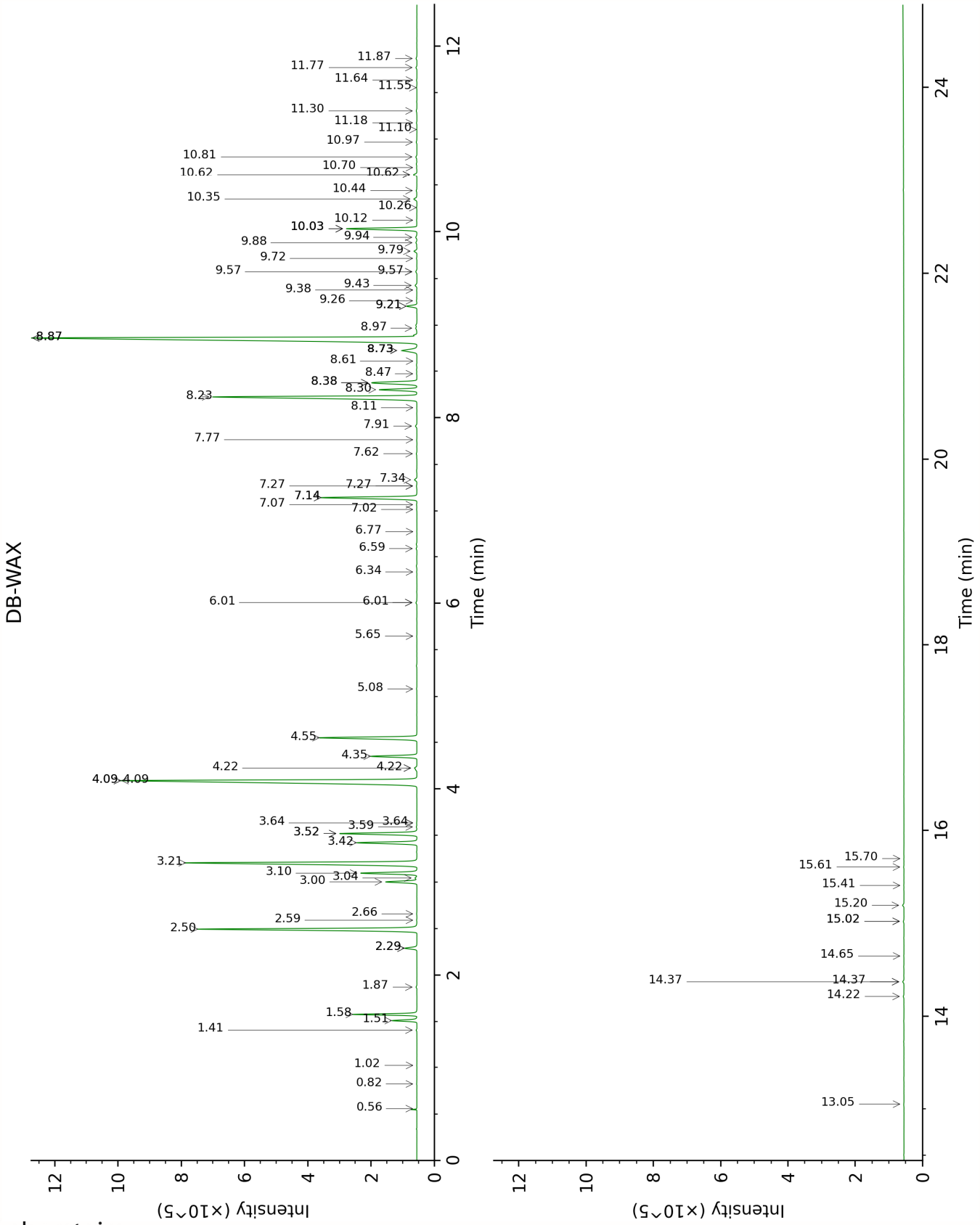
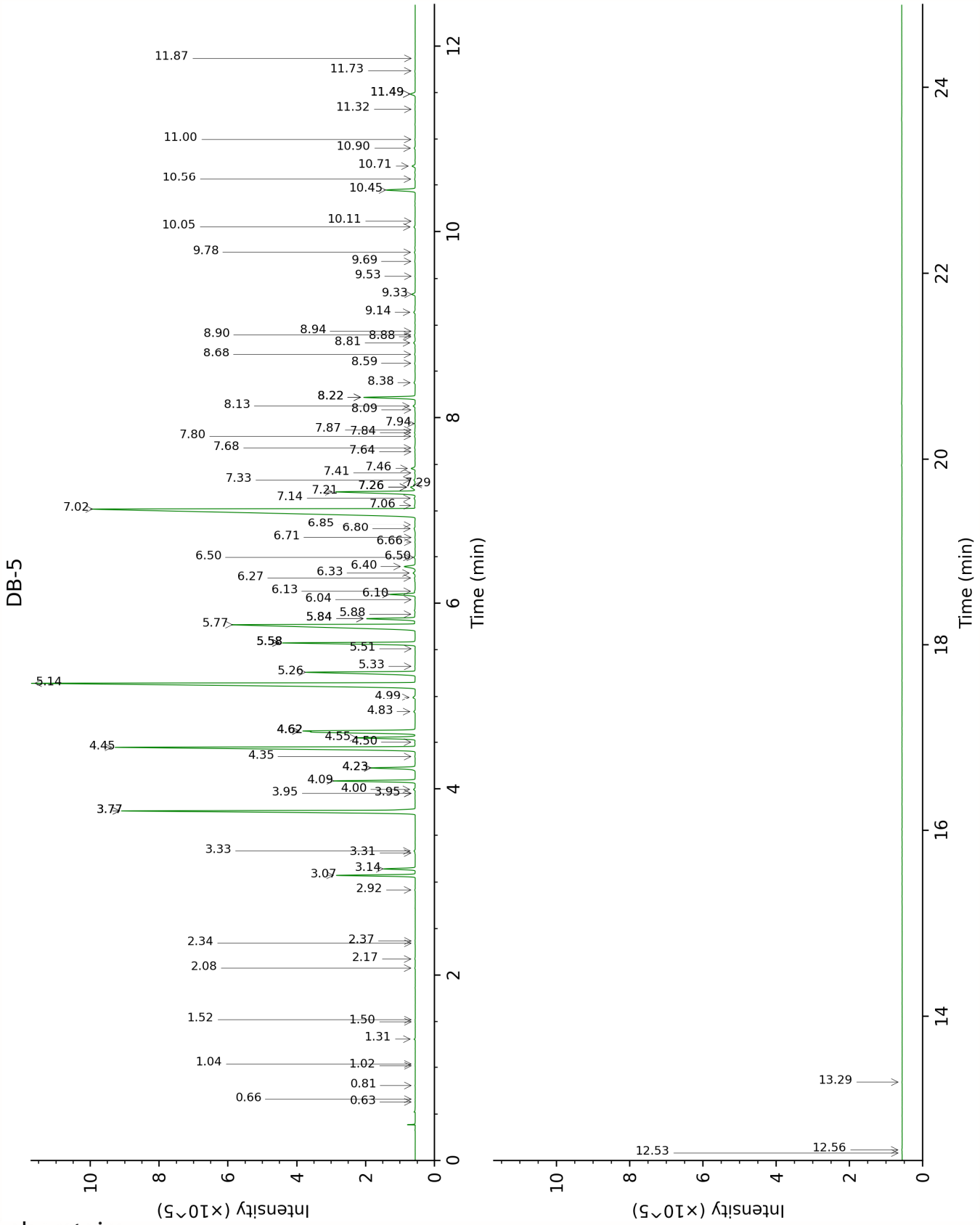

DB-WAX
Time (min)
Intensity (×10^5)
11.87
11.77
11.64
11.55
11.30
11.18
11.10
10.97
10.81
10.70
10.62
10.62
10.44
10.35
10.26
10.12
10.03
9.94
9.88
9.79
9.72
9.57
9.57
9.43
9.38
9.26
9.21
8.97
8.87
8.73
8.61
8.47
8.38
8.30
8.23
8.11
7.91
7.77
7.62
7.34
7.27
7.27
7.14
7.07
7.02
6.77
6.59
6.34
6.01
6.01
5.65
5.08
4.55
4.35
4.22
4.22
4.09
4.09
3.64
3.64
3.59
3.52
3.42
3.21
3.10
3.04
3.00
2.66
2.59
2.50
2.29
1.87
1.58
1.51
1.41
1.02
0.82
0.56
15.70
15.61
15.41
15.20
15.02
14.65
14.37
14.37
14.22
13.05


DB-5
Time (min)
Intensity (×10^5)
11.87
11.73
11.49
11.32
11.00
10.90
10.71
10.56
10.45
10.11
10.05
9.78
9.69
9.53
9.33
9.14
8.94
8.90
8.88
8.81
8.68
8.59
8.38
8.22
8.13
8.09
7.94
7.87
7.84
7.80
7.68
7.64
7.46
7.41
7.33
7.29
7.26
7.21
7.14
7.06
7.02
6.85
6.80
6.71
6.66
6.50
6.50
6.40
6.33
6.27
6.13
6.10
6.04
5.88
5.84
5.77
5.58
5.51
5.33
5.26
5.14
4.99
4.83
4.62
4.55
4.50
4.45
4.35
4.23
4.09
4.00
3.95
3.95
3.77
3.33
3.31
3.14
3.07
2.92
2.37
2.34
2.17
2.08
1.52
1.50
1.31
1.04
1.02
0.81
0.66
0.63
13.29
12.56
12.53

FULL ANALYSIS DATA

Isovaleral	**Column DB-WAX**			**Column DB-5**		
				0.63	641.3	tr
2-Methylbutyral	0.82	880.3	tr	0.66	651.7	tr
2-Ethylfuran	1.02	918.9	tr	0.81	702.4	tr
Isoamyl alcohol	3.64*	1176.2	[0.01]	1.02	733.2	tr
2-Methylbutanol	3.64*	1176.2	[0.01]	1.04	735.9	tr
Methyl 2-methylbutyrate	1.41	978.1	0.02	1.31	774.4	0.02
Hexanal				1.50	800.4	tr
Octane	0.56	784.8	tr	1.52	803.6	tr
(2*E*)-Hexenal	3.59	1172.9	0.02	2.08	849.5	0.02
(3*Z*)-Hexenol	6.01*	1346.9	[0.04]	2.17	857.6	0.02
(2*E*)-Hexenol	6.34	1370.3	0.01	2.34	871.6	0.01
Hexanol	5.65	1321.2	0.01	2.37	873.7	0.01
Isobutyl isobutyrate	2.29*	1068.2	[0.46]	2.92	915.8	0.01
α-Thujene	1.58	1000.5	1.91	3.07	926.2	1.90
α-Pinene	1.51	993.7	0.79	3.14	930.8	0.78
Camphene	1.87	1028.4	0.03	3.31*†	942.0	[0.01]
Thujadiene isomer	2.59	1096.4	0.01	3.34*†	943.5	[0.04]
Sabinene	2.50	1087.7	8.92	3.76*	971.9	[9.34]
β-Pinene	2.29*	1068.2	[0.46]	3.76*	971.9	[9.34]
Octen-3-ol	7.02	1419.5	0.01	3.95*	984.2	[0.01]
3-Methylpentyl acetate	4.09*	1209.8	[16.92]	3.95*	984.2	[0.01]
Octan-3-one	4.22*	1219.5	[0.10]	4.00	987.1	0.06
Myrcene	3.10	1135.0	2.11	4.09	993.2	2.11
Pseudolimonene	3.04	1131.0	0.07	4.23*	1002.3	[1.23]
α-Phellandrene	3.00	1127.8	1.15	4.23*	1002.3	[1.23]
(3*Z*)-Hexenyl acetate	5.08	1280.7	0.01	4.35	1010.0	0.02
α-Terpinene	3.21	1143.5	10.70	4.45	1016.2	10.67
Carvomenthene	2.66	1101.6	0.02	4.50	1019.6	0.02
para-Cymene	4.35	1228.5	1.69	4.55	1022.6	1.68
1,8-Cineole	3.52*	1167.5	[2.95]	4.62*	1027.2	[5.16]
Limonene	3.42	1159.9	2.23	4.62*	1027.2	[5.16]
β-Phellandrene	3.52*	1167.5	[2.95]	4.62*	1027.2	[5.16]
(*Z*)-β-Ocimene	4.09*	1209.8	[16.92]	4.83	1040.2	0.05
(*E*)-β-Ocimene	4.22*	1219.5	[0.10]	4.99	1050.2	0.08
γ-Terpinene	4.09*	1209.8	[16.92]	5.14	1059.7	16.84
cis-Sabinene hydrate	7.14*	1428.9	[3.79]	5.26	1067.1	3.75
cis-Linalool oxide (fur.)	6.77	1401.4	tr	5.32	1071.1	0.02

Isoperillene				5.51	1082.9	0.01
trans-Linalool oxide (fur.)	7.14*	1428.9	[3.79]	5.58*	1086.8	[3.90]
Terpinolene	4.55	1242.7	3.89	5.58*	1086.8	[3.90]
para-Cymenene	6.59	1388.2	0.03	5.58*	1086.8	[3.90]
trans-Sabinene hydrate	8.23	1509.2	9.53	5.77	1099.0	9.45
Unknown CEDE I [m/z 95, 150 (45), 110 (35), 107 (23), 109 (21)]	6.01*	1346.9	[0.04]	5.84*	1103.1	[1.37]
Linalool	8.30	1515.2	1.37	5.84*	1103.1	[1.37]
Unknown ORMA I [m/z 119, 109 (94), 43 (61), 95 (56), 91 (48), 77 (32), 152 (32), 137 (31), 134 (24)]	8.73*	1547.8	[0.99]	5.88	1106.2	0.02
trans-para-Mentha-2,8-dien-1-ol	9.21*	1584.6	[0.39]	6.04	1116.1	0.02
cis-para-Menth-2-en-1-ol	8.38*	1520.9	[2.15]	6.10	1119.7	0.70
α-Campholenal	7.27*	1438.1	[0.03]	6.13	1121.8	0.03
4-Hydroxy-4-methylcyclohex-2-enone	14.37*	2032.2	[0.05]	6.27	1130.9	0.03
trans-Pinocarveol	9.43	1602.1	0.08	6.33	1134.3	0.08
trans-para-Menth-2-en-1-ol	9.21*	1584.6	[0.39]	6.40	1138.8	0.41
Unknown MEAL II [m/z 109, 124 (45), 119 (41), 43 (35), 91 (28), 95 (25)...]	7.07	1423.3	0.02	6.50*	1145.1	[0.04]
1,4-Dimethyl-4-acetylcyclohexene	7.62	1463.6	0.02	6.50*	1145.1	[0.04]
Pinocarvone	8.11	1500.3	0.01	6.66	1155.5	0.01
Isomenthone	7.27*	1438.1	[0.03]	6.71	1158.7	0.01
Borneol	10.03*	1650.9	[2.72]	6.80	1164.8	0.06
δ-Terpineol	9.72	1625.4	0.02	6.85	1167.6	0.02
Terpinen-4-ol	8.87*	1558.4	[22.67]	7.02	1178.6	22.66
Cryptone	9.38	1598.1	0.01	7.06	1181.0	0.04
para-Cymen-8-ol	11.77	1795.4	0.04	7.14	1186.0	0.04
α-Terpineol	10.03*	1650.9	[2.72]	7.21	1190.4	2.69
Myrtenol	11.10	1739.1	tr	7.26*	1193.6	[0.19]

cis-Piperitol	9.79	1631.6	0.11	7.26*	1193.6	[0.19]
cis-Dihydrocarvone	8.73*	1547.8	[0.99]	7.28	1195.4	0.02
Methylchavicol	9.57*	1613.9	[0.05]	7.33	1198.4	0.05
Unknown PIMA 7 [m/z 95, 93 (32), 121 (24), 79 (22), 91 (21), 105 (16)... 154 (2)]	11.18	1745.2	0.02	7.41	1203.4	0.02
trans-Piperitol	10.62*	1698.2	[0.14]	7.46	1206.6	0.13
trans-Carveol	11.64	1783.9	0.01	7.64	1218.6	0.02
cis-Sabinene hydrate acetate?	7.77	1474.6	0.01	7.68	1221.3	0.03
Nerol	11.30	1756.0	0.04	7.80	1229.6	0.02
Citronellol	10.97	1727.8	0.03	7.84	1232.3	0.02
Unknown CIAU II [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	11.55	1777.0	0.02	7.87	1234.3	0.02
Carvone	10.26	1669.1	0.02	7.94	1238.8	0.02
Carvenone	10.12	1658.2	0.01	8.09	1248.6	0.02
trans-Sabinene hydrate acetate	7.91	1485.4	0.06	8.13	1251.4	0.06
Linalyl acetate	8.38*	1520.9	[2.15]	8.22*	1257.6	[1.46]
Geraniol	11.87	1804.0	0.04	8.22*	1257.6	[1.46]
trans-Ascaridole glycol	14.37*	2032.2	[0.05]	8.38	1268.1	0.05
Bornyl acetate	8.47	1528.3	0.02	8.59	1282.0	0.02
cis-Ascaridole glycol	15.02*	2094.7	[0.03]	8.68	1288.4	0.02
Terpinen-4-yl acetate	8.97	1566.5	0.06	8.81	1297.1	0.06
Thymol	15.41	2133.0	0.01	8.88	1301.5	0.01
Thymol analogue II	15.61	2152.6	0.01	8.90	1302.8	0.02
Unknown MEAL I analog	14.22	2017.2	0.03	8.94	1305.6	0.02
Unknown MEAL I [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	15.20	2111.8	0.06	9.14	1319.9	0.06
Bicycloelemene	7.34	1443.0	0.10	9.33	1333.5	0.11
α-Terpinyl acetate	9.94	1643.5	0.06	9.53	1347.0	0.01
Eugenol	15.02*	2094.7	[0.03]	9.68	1358.2	0.03
Neryl acetate	10.44	1683.7	0.02	9.78	1365.0	0.03
Geranyl acetate	10.81	1714.4	0.05	10.05	1384.1	0.04

β-Elemene	8.73*	1547.8	[0.99]	10.11	1388.4	0.01
β-Caryophyllene	8.73*	1547.8	[0.99]	10.45	1412.5	0.90
β-Copaene	8.61	1538.8	0.01	10.56	1421.1	0.02
Aromadendrene	8.87*	1558.4	[22.67]	10.71	1432.1	0.10
α-Humulene	9.57*	1613.9	[0.05]	10.90	1446.4	0.03
allo-Aromadendrene	9.26	1589.0	0.02	11.00	1453.4	0.01
Germacrene D	10.03*	1650.9	[2.72]	11.32	1477.4	0.01
Bicyclogermacrene	10.35	1676.4	0.13	11.49*	1489.6	[0.17]
Viridiflorene	9.88	1638.8	0.04	11.49*	1489.6	[0.17]
γ-Cadinene	10.62*	1698.2	[0.14]	11.73	1508.4	0.01
δ-Cadinene	10.70	1704.7	0.02	11.87	1518.9	0.01
Spathulenol	14.65	2058.7	0.01	12.53	1570.4	0.01
Caryophyllene oxide	13.05	1909.0	0.02	12.56	1573.0	0.01
Isospathulenol	15.70	2161.6	tr	13.29	1631.6	0.01
Total reported		99.27%			99.31%	

*: 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

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