Date : 2026-02-23

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 26A19-PTH07
Customer Identification : Cardamom - India - CA3114R
Type : Essential Oil
Source : *Elettaria cardamomum*
Customer : Plant Therapy

Checked an approved by:

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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. The compliance status of the sample is provided to facilitate the reading of the report. The client remains ultimately responsible for reviewing the results presented within this report and to establish compliance of the tested batch against relevant quality criteria.

This report is an update of the version first issued on 2026-01-21 to make a correction in the sample identification section.

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 : 2026-01-20

Physicochemical data

Refractive index : 1.464 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2026-01-20

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
Ethanol	tr	Aliphatic alcohol
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
α-Thujene	0.11	Monoterpene
α-Pinene	1.46	Monoterpene
α-Fenchene	tr	Monoterpene
Camphene	0.03	Monoterpene
Sabinene	2.42	Monoterpene
β-Pinene	0.58	Monoterpene
6-Methyl-5-hepten-2-one	0.04	Aliphatic ketone
Myrcene	0.64	Monoterpene
α-Phellandrene	0.05	Monoterpene
Pseudolimonene	0.01	Monoterpene
Octanal	0.03	Aliphatic aldehyde
Δ3-Carene	0.01	Monoterpene
α-Terpinene	0.12	Monoterpene
para-Cymene	0.40	Monoterpene
Limonene	7.46	Monoterpene
1,8-Cineole	31.97	Monoterpenic ether
(*Z*)-β-Ocimene	0.02	Monoterpene
(*E*)-β-Ocimene	0.03	Monoterpene
γ-Terpinene	0.23	Monoterpene
cis-Sabinene hydrate	0.08	Monoterpenic alcohol
Unknown	tr	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.10	Monoterpene
para-Cymenene	0.01	Monoterpene
trans-Linalool oxide (fur.)	tr	Monoterpenic alcohol
trans-Sabinene hydrate	0.06	Monoterpenic alcohol
Linalool	5.42	Monoterpenic alcohol
Hotrienol	0.01	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.03	Monoterpenic alcohol
(*E*)-4,8-Dimethylnona-1,3,7-triene	0.04	Terpene derivative
cis-Limonene oxide	0.02	Monoterpenic ether
trans-Limonene oxide	0.01	Monoterpenic ether
Camphor	0.07	Monoterpenic ketone
Unknown	0.01	Oxygenated monoterpene
Borneol	0.02	Monoterpenic alcohol

δ-Terpineol	0.05	Monoterpenic alcohol
Terpinen-4-ol	1.59	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α-Terpineol	4.16	Monoterpenic alcohol
Myrtenal	0.02	Monoterpenic aldehyde
cis-Piperitol	0.01	Monoterpenic alcohol
trans-Piperitol	0.01	Monoterpenic alcohol
Decanal	0.01	Aliphatic aldehyde
Octyl acetate	0.03	Aliphatic ester
cis-Sabinene hydrate acetate?	0.01	Monoterpenic ester
cis-Carveol	0.04	Monoterpenic alcohol
Unknown	0.01	Unknown
Neral	0.09	Monoterpenic aldehyde
Geraniol	0.18	Monoterpenic alcohol
Linalyl acetate	3.84	Monoterpenic ester
(2*E*)-Decenal	0.02	Aliphatic aldehyde
Geranial	0.09	Monoterpenic aldehyde
Bornyl acetate	0.03	Monoterpenic ester
Geranyl formate	0.02	Monoterpenic ester
Terpinen-4-yl acetate	0.02	Monoterpenic ester
Methyl nerate?	0.02	Monoterpenic ester
δ-Terpinyl acetate	0.14	Monoterpenic ester
Methyl geranate	0.05	Monoterpenic ester
δ-Elemene	0.01	Sesquiterpene
Eugenol	0.02	Phenylpropanoid
α-Terpinyl acetate	35.24	Monoterpenic ester
Neryl acetate	0.02	Monoterpenic ester
α-Copaene	0.02	Sesquiterpene
Methyl (*E*)-cinnamate	0.02	Phenylpropanoid ester
Geranyl acetate	0.20	Monoterpenic ester
Decenyl acetate isomer II?	0.02	Aliphatic ester
β-Elemene	0.04	Sesquiterpene
β-Caryophyllene	0.07	Sesquiterpene
α-Terpinyl propionate	0.03	Monoterpenic ester
α-Humulene	0.04	Sesquiterpene
Unknown	0.01	Sesquiterpene
8-Acetoxy-*trans*-*para*-Menth-2-en-1-ol [2-(4-Hydroxy-4-methylcyclohex-2-enyl)propan-2-yl acetate]	0.02	Monoterpenic ester
Germacrene D	0.01	Sesquiterpene
Geranyl propionate	0.02	Monoterpenic ester
β-Selinene	0.14	Sesquiterpene
α-Selinene	0.06	Sesquiterpene
δ-Amorphene	0.02	Sesquiterpene
γ-Cadinene	0.04	Sesquiterpene

Cubebol	tr	Sesquiterpenic alcohol
8-Sobreryl acetate	0.03	Monoterpenic ester
Germacrene B	0.04	Sesquiterpene
(*E*)-Nerolidol	1.15	Sesquiterpenic alcohol
8-Acetoxycarvotanacetone	0.07	Monoterpenic ester
Unknown	0.02	Unknown
Dendrolasin	0.01	Sesquiterpenic ether
(3*E*,7*E*)-4,8,12-Trimethyl-1,3,7,11-tridecatetraene	0.03	Terpene derivative
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Unknown	0.01	Oxygenated sesquiterpene
(2*E*,6*Z*)-Farnesal	0.01	Sesquiterpenic aldehyde
(2*E*,6*E*)-Farnesol	0.02	Sesquiterpenic alcohol
(2*E*,6*E*)-Farnesal	0.01	Sesquiterpenic aldehyde
(2*E*,6*E*)-Farnesyl acetate	0.01	Sesquiterpenic ester
meta-Camphorene	0.01	Diterpene
Coronarin E	0.04	Diterpene
Consolidated total	**99.52**	

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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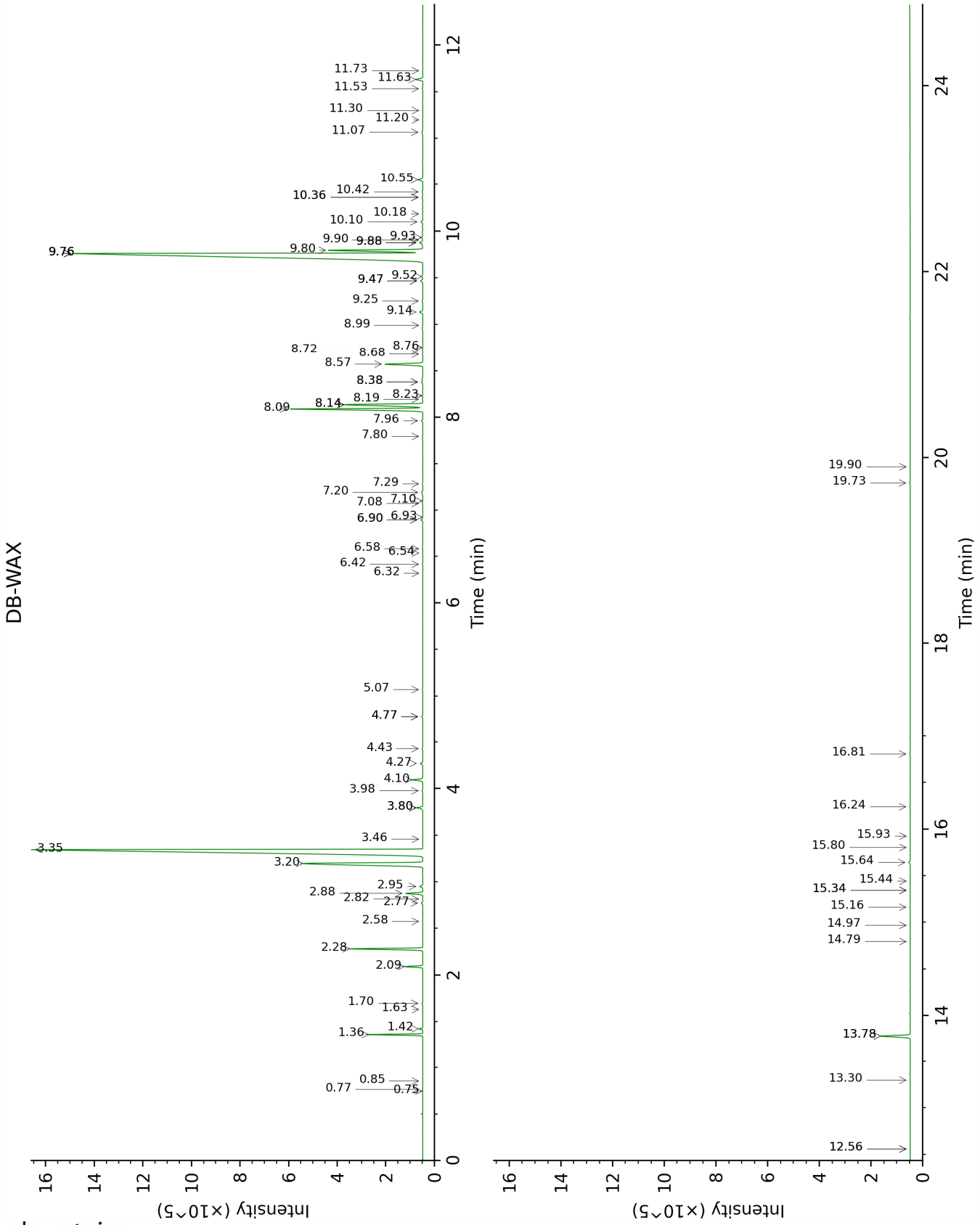
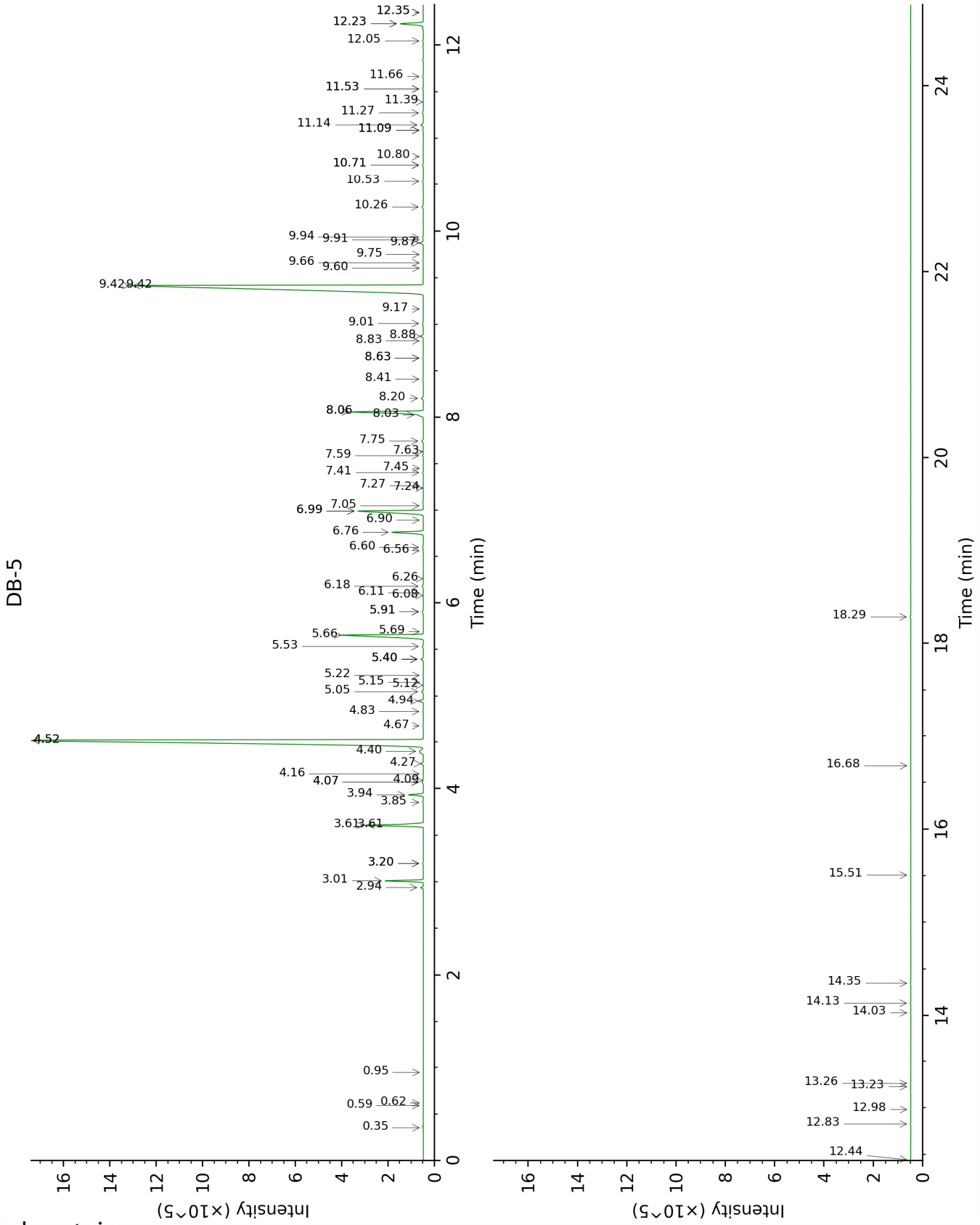

DB-WAX
Time (min)
Intensity (×10^5)
11.73
11.63
11.53
11.30
11.20
11.07
10.55
10.42
10.36
10.18
10.10
9.90
9.88
9.93
9.80
9.76
9.52
9.47
9.25
9.14
8.99
8.76
8.72
8.68
8.57
8.38
8.23
8.19
8.14
8.09
7.96
7.80
7.29
7.20
7.10
7.08
6.93
6.90
6.58
6.54
6.42
6.32
5.07
4.77
4.43
4.27
4.10
3.98
3.80
3.46
3.35
3.20
2.95
2.88
2.82
2.77
2.58
2.28
2.09
1.70
1.63
1.42
1.36
0.85
0.77
0.75
19.90
19.73
16.81
16.24
15.93
15.80
15.64
15.44
15.34
15.16
14.97
14.79
13.78
13.30
12.56


DB-5
Time (min)
Intensity (×10^5)
12.35
12.23
12.05
11.66
11.53
11.39
11.27
11.14
11.09
10.80
10.71
10.53
10.26
9.94
9.91
9.87
9.75
9.66
9.60
9.42
9.42
9.17
9.01
8.88
8.83
8.63
8.41
8.20
8.06
8.03
7.75
7.63
7.59
7.45
7.41
7.27
7.24
7.05
6.99
6.90
6.76
6.60
6.56
6.26
6.18
6.11
6.08
5.91
5.69
5.66
5.53
5.40
5.22
5.15
5.12
5.05
4.94
4.83
4.67
4.52
4.40
4.27
4.16
4.09
4.07
3.94
3.85
3.61
3.61
3.20
3.01
2.94
0.95
0.62
0.59
0.35
18.29
16.68
15.51
14.35
14.13
14.03
13.26
13.23
12.98
12.83
12.44

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Ethanol	0.86	909.2	tr	0.35	505.8	tr
Isovaleral	0.76	888.8	tr	0.59	643.1	tr
2-Methylbutyral	0.75	882.2	tr	0.62	653.1	tr
Isoamyl alcohol	3.46	1180.5	0.01	0.95	732.8	tr
α-Thujene	1.42	1000.3	0.10	2.94	926.3	0.11
α-Pinene	1.36	991.6	1.44	3.01	931.2	1.46
α-Fenchene	1.63	1020.9	tr	3.20*	943.6	[0.04]
Camphene	1.70	1027.3	0.03	3.20*	943.6	[0.04]
Sabinene	2.28	1085.4	2.42	3.61*	971.3	[3.05]
β-Pinene	2.09	1066.5	0.58	3.61*	971.3	[3.05]
6-Methyl-5-hepten-2-one	5.07	1300.4	0.02	3.85	987.8	0.04
Myrcene	2.88	1134.8	0.62	3.94	993.3	0.64
α-Phellandrene	2.77	1126.6	0.05	4.07*	1002.4	[0.06]
Pseudolimonene	2.82	1130.1	0.01	4.07*	1002.4	[0.06]
Octanal	4.43	1253.1	0.03	4.09	1003.7	0.03
Δ3-Carene	2.58	1111.2	0.01	4.16	1008.1	0.01
α-Terpinene	2.95	1140.6	0.12	4.27	1015.2	0.12
para-Cymene	4.10	1228.6	0.39	4.40	1023.7	0.40
Limonene	3.20	1160.0	7.46	4.52*	1031.0	[39.23]
1,8-Cineole	3.35	1171.7	31.97	4.52*	1031.0	[39.23]
(*Z*)-β-Ocimene	3.80*	1206.6	[0.25]	4.67	1041.0	0.02
(*E*)-β-Ocimene	3.98	1219.9	0.03	4.83	1050.8	0.03
γ-Terpinene	3.80*	1206.6	[0.25]	4.94	1058.1	0.23
cis-Sabinene hydrate	6.90*	1430.7	[0.08]	5.05	1064.9	0.08
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	4.77*	1278.3	[0.04]	5.12	1069.4	tr
cis-Linalool oxide (fur.)	6.54	1403.8	0.01	5.15	1071.3	0.01
Octanol	8.19	1527.6	0.02	5.22	1076.1	0.02
Terpinolene	4.27	1241.4	0.10	5.40*	1087.2	[0.11]
para-Cymenene	6.32	1388.1	0.01	5.40*	1087.2	[0.11]
trans-Linalool oxide (fur.)	6.90*	1430.7	[0.08]	5.40*	1087.2	[0.11]
trans-Sabinene hydrate	7.96	1509.8	0.06	5.53	1095.9	0.06
Linalool	8.09	1519.6	5.42	5.66	1103.7	5.42
Hotrienol	8.76	1571.2	0.01	5.69	1106.1	0.01
cis-para-Menth-2-en-1-ol	8.14*	1523.2	[3.77]	5.91*	1120.0	[0.07]
(*E*)-4,8-Dimethylnona-1,3,7-triene	4.77*	1278.3	[0.04]	5.91*	1120.0	[0.07]
cis-Limonene oxide	6.42	1395.0	0.02	6.08	1131.3	0.02
trans-Limonene oxide	6.58	1407.2	0.01	6.11	1133.2	0.01
Camphor	7.20	1452.5	0.07	6.18	1137.8	0.07

Unknown PLOR I [m/z 109, 43 (73), 71 (54), 124 (51), 69 (37), 41 (35)...152 (5)]				6.26	1143.2	0.01
Borneol	9.76*	1651.2	[35.14]	6.56	1162.7	0.02
δ-Terpineol	9.47*	1627.6	[0.11]	6.60	1165.1	0.05
Terpinen-4-ol	8.57	1556.9	1.58	6.76	1175.6	1.59
para-Cymen-8-ol	11.53	1799.2	0.02	6.90	1184.6	0.02
α-Terpineol	9.80	1654.1	4.16	6.99*	1191.0	[4.21]
Myrtenal	8.68	1565.3	0.02	6.99*	1191.0	[4.21]
cis-Piperitol	9.52	1631.3	0.05	7.05	1194.7	0.01
trans-Piperitol	10.36*	1700.0	[0.05]	7.24	1207.2	0.01
Decanal	7.29	1459.3	0.02	7.27	1208.9	0.01
Octyl acetate	7.08	1443.7	0.02	7.41	1218.6	0.03
cis-Sabinene hydrate acetate?				7.45	1221.7	0.01
cis-Carveol	11.73	1816.3	0.01	7.59	1231.0	0.04
Unknown MISC III [m/z 43, 71 (64), 68 (54), 81 (49), 93 (34), 121 (33)...]	7.80	1497.0	0.01	7.63	1234.0	0.01
Neral	9.47*	1627.6	[0.11]	7.74	1241.7	0.09
Geraniol	11.63	1808.1	0.30	8.03	1261.0	0.18
Linalyl acetate	8.14*	1523.2	[3.77]	8.06*	1263.3	[3.86]
(2*E*)-Decenal	8.99	1589.5	0.02	8.06*	1263.3	[3.86]
Geranial	10.10	1678.6	0.08	8.20	1273.3	0.09
Bornyl acetate	8.23	1530.7	0.02	8.41	1287.4	0.03
Geranyl formate	9.88*	1660.6	[0.14]	8.64*	1303.0	[0.04]
Terpinen-4-yl acetate	8.72	1568.3	0.02	8.64*	1303.0	[0.04]
Methyl nerate?				8.83	1312.7	0.02
δ-Terpinyl acetate	9.14	1600.7	0.14	8.88	1316.2	0.14
Methyl geranate	9.76*	1651.2	[35.14]	9.01	1326.0	0.05
δ-Elemene	6.93	1432.9	tr	9.17	1336.9	0.01
Eugenol	14.79	2100.5	0.02	9.42*	1354.8	[35.25]
α-Terpinyl acetate	9.76*	1651.2	[35.14]	9.42*	1354.8	[35.25]
Neryl acetate	10.18	1685.4	0.01	9.60	1367.9	0.02
α-Copaene	7.10	1445.8	0.01	9.66	1372.1	0.02
Methyl (*E*)-cinnamate	13.78*	2002.6	[1.21]	9.75	1378.4	0.02
Geranyl acetate	10.55	1716.0	0.20	9.87	1387.1	0.20
Decenyl acetate isomer II?				9.91	1389.6	0.02
β-Elemene	8.38*†	1542.0	[0.06]	9.94	1391.5	0.04
β-Caryophyllene	8.38*†	1542.0	[0.06]	10.26	1415.0	0.07
α-Terpinyl propionate	10.42	1704.9	0.03	10.53	1435.6	0.03
α-Humulene	9.25	1610.2	0.04	10.71*	1449.1	[0.05]
Unknown ELCA I [m/z				10.71*	1449.1	[0.05]

43, 109 (35), 96 (23), 93 (22), 137 (21), 81 (20)...204 (5)]						
8-Acetoxy-*trans-para*-Menth-2-en-1-ol [2-(4-Hydroxy-4-methylcyclohex-2-enyl)propan-2-yl acetate]	15.16	2137.5	0.03	10.80	1456.0	0.02
Germacrene D	9.76*	1651.2	[35.14]	11.09*	1477.1	[0.03]
Geranyl propionate	11.30	1779.4	0.02	11.09*	1477.1	[0.03]
β-Selinene	9.88*	1660.6	[0.14]	11.14	1481.5	0.14
α-Selinene	9.93	1665.2	0.06	11.27	1491.1	0.06
δ-Amorphene	9.90	1662.8	0.02	11.39	1500.0	0.02
γ-Cadinene	10.36*	1700.0	[0.05]	11.53*	1510.6	[0.04]
Cubebol	12.56*	1889.9	[0.01]	11.53*	1510.6	[0.04]
8-Sobreryl acetate	16.24	2247.5	0.03	11.66	1521.2	0.03
Germacrene B	11.07	1759.6	0.08	12.05	1551.3	0.04
(*E*)-Nerolidol	13.78*	2002.6	[1.21]	12.23*	1566.0	[1.22]
8-Acetoxycarvotanacetone	15.64	2185.6	0.07	12.23*	1566.0	[1.22]
Unknown MISC CLVII [m/z 109, 69 (60), 43 (40), 93 (28), 41 (25), 111 (22)...]	13.30	1957.9	0.02	12.35*	1575.4	[0.03]
Dendrolasin	12.56*	1889.9	[0.01]	12.35*	1575.4	[0.03]
(3*E*,7*E*)-4,8,12-Trimethyl-1,3,7,11-tridecatetraene	11.20	1770.8	0.01	12.44	1582.5	0.03
Unknown SWGL V [m/z 81, 43 (52), 161 (49), 105 (30), 207 (27), 95 (26), 93 (24), 109 (24)...]	14.97	2118.0	0.01	12.83	1613.4	0.02
Unknown ELCA II [m/z 43, 71 (53), 108 (47), 126 (41), 109 (35), 93 (25)...]	19.90	2658.8	0.01	12.98	1626.4	0.01
Unknown ELCA III [m/z 43, 135 (59), 94 (33), 59 (25), 137 (25), 93 (19)...]				13.23	1646.8	0.01
Unknown JUVI XVI [m/z 43, 81 (84), 41 (64), 67 (62), 95 (58), 79 (58)... 204 (48), 220 (2)]	15.44	2165.5	0.01	13.26	1649.7	0.01
(2*E*,6*Z*)-Farnesal	15.34*	2155.6	[0.02]	14.03	1713.5	0.01
(2*E*,6*E*)-Farnesol	16.81	2307.0	0.03	14.13	1722.6	0.02
(2*E*,6*E*)-Farnesal	15.80	2202.0	0.02	14.35	1741.2	0.01

(2*E*,6*E*)-Farnesyl acetate	15.92	2214.7	0.01	15.51	1844.0	0.01
meta-Camphorene	15.34*	2155.6	[0.02]	16.68	1953.1	0.01
Coronarin E	19.73	2638.0	0.03	18.28	2110.8	0.04
Total reported		99.17%			99.42%	

*: 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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