Date : 2025-04-17

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 24F03-PTH01
Customer Identification : Star Anise - China - A20107R
Type : Essential Oil
Source : *Illicium verum*
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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

This report is an update from the first version issued on 2024-06-17 to correct the customer identification.

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 : 2024-06-14

Physicochemical data

Refractive index : 1.5522 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2024-06-06

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
Acetaldehyde	tr	Aliphatic aldehyde
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Hexanal	0.01	Aliphatic aldehyde
2-Methylfuran	tr	Furan
Styrene	0.02	Simple phenolic
α-Thujene	0.02	Monoterpene
α-Pinene	0.87	Monoterpene
Camphene	0.02	Monoterpene
Benzaldehyde	0.01	Simple phenolic
Sabinene	0.07	Monoterpene
β-Pinene	0.07	Monoterpene
Myrcene	0.11	Monoterpene
α-Phellandrene	0.49	Monoterpene
Pseudolimonene	0.01	Monoterpene
Δ3-Carene	0.20	Monoterpene
α-Terpinene	0.06	Monoterpene
para-Cymene	0.10	Monoterpene
1,8-Cineole	[0.54]	Monoterpenic ether
β-Phellandrene	[0.54]	Monoterpene
Limonene	0.36	Monoterpene
(*Z*)-β-Ocimene	0.02	Monoterpene
(*E*)-β-Ocimene	0.02	Monoterpene
γ-Terpinene	0.08	Monoterpene
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
trans-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Terpinolene	0.06	Monoterpene
Methyl benzoate	0.01	Phenolic ester
Linalool	1.44	Monoterpenic alcohol
Hotrienol	0.02	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	tr	Monoterpenic alcohol
trans-Pinocarveol	0.01	Monoterpenic alcohol
Borneol	0.02	Monoterpenic alcohol
Terpinen-4-ol	0.17	Monoterpenic alcohol
α-Terpineol	0.10	Monoterpenic alcohol
Methylchavicol	3.92	Phenylpropanoid
Dihydroanethole	0.05	Phenylpropanoid
(*Z*)-Anethole	0.25	Phenylpropanoid
para-Anisaldehyde	0.47	Simple phenolic

Geraniol	0.05	Monoterpenic alcohol
(*E*)-Anethole	85.51	Phenylpropanoid
α-Cubebene	0.01	Sesquiterpene
α-Copaene	0.15	Sesquiterpene
Methyl *para*-anisate	0.03	Phenolic ester
(*E*)-Anethole epoxide?	0.09	Phenylpropanoid
β-Elemene	0.04	Sesquiterpene
α-Gurjunene	0.03	Sesquiterpene
cis-α-Bergamotene	0.15	Sesquiterpene
β-Caryophyllene	0.53	Sesquiterpene
trans-α-Bergamotene	0.69	Sesquiterpene
cis-β-Bergamotene?	0.01	Sesquiterpene
α-Humulene	0.07	Sesquiterpene
9-epi-β-Caryophyllene	0.06	Sesquiterpene
all*o*-Aromadendrene	0.02	Sesquiterpene
Methyl (*Z*)-isoeugenol	0.04	Phenylpropanoid
(*E*)-β-Farnesene	0.07	Sesquiterpene
γ-Muurolene	0.01	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
Unknown	0.03	Phenylpropanoid
all*o*-Aromadendr-9-ene	0.02	Sesquiterpene
Viridiflorene	0.07	Sesquiterpene
Bicyclogermacrene	0.09	Sesquiterpene
α-Muurolene	0.10	Sesquiterpene
β-Bisabolene	0.10	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.13	Sesquiterpene
δ-Cadinene	0.12	Sesquiterpene
trans-Cadina-1,4-diene	0.01	Sesquiterpene
α-Cadinene	0.01	Sesquiterpene
α-Elemol	0.02	Sesquiterpenic alcohol
(*E*)-Nerolidol	0.12	Sesquiterpenic alcohol
Unknown	0.03	Unknown
Spathulenol	0.03	Sesquiterpenic alcohol
1-(4-Methoxyphenyl)propane-1,2-diol isomer II	0.02	Phenylpropanoid
Globulol	0.06	Sesquiterpenic alcohol
(*Z*)-Foeniculin	0.01	Phenylpropanoid
Viridiflorol	0.04	Sesquiterpenic alcohol
Eudes*m*-5-en-11-ol analog	0.02	Sesquiterpenic alcohol
Rosifoliol	0.01	Sesquiterpenic alcohol
γ-Eudesmol	0.02	Sesquiterpenic alcohol
τ-Cadinol	0.03	Sesquiterpenic alcohol
τ-Muurolol	0.02	Sesquiterpenic alcohol
α-Muurolol	0.01	Sesquiterpenic alcohol
β-Eudesmol	0.02	Sesquiterpenic alcohol

α-Eudesmol	0.01	Sesquiterpenic alcohol
α-Cadinol	0.07	Sesquiterpenic alcohol
(*E*)-Foeniculin	1.27	Phenylpropanoid
(2*E*,6*E*)-Farnesol	0.02	Sesquiterpenic alcohol
2,4-Bis-(4-methoxyphenyl)-3,5-dimethyltetrahydrofuran isomer I	0.01	Lignan
2,4-Bis-(4-methoxyphenyl)-3,5-dimethyltetrahydrofuran isomer II	0.01	Lignan
Consolidated total	**99.82**	

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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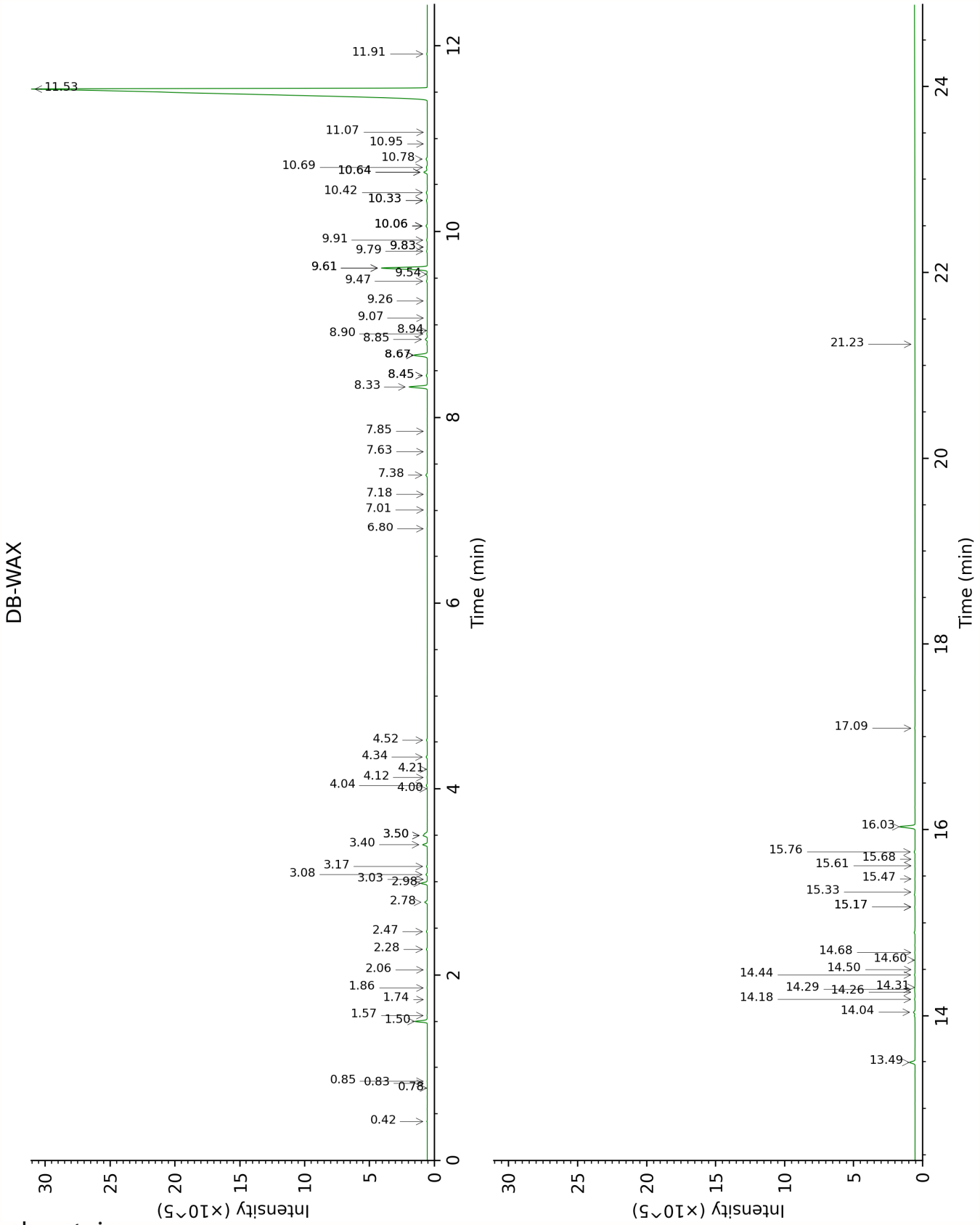
DB-WAX
Time (min)
Intensity (×10^5)
11.91
11.53
11.07
10.95
10.78
10.69
10.64
10.42
10.33
10.06
9.91
9.79
9.83
9.61
9.54
9.47
9.26
9.07
8.90
8.85
8.94
8.67
8.45
8.33
7.85
7.63
7.38
7.18
7.01
6.80
4.52
4.34
4.21
4.12
4.04
4.00
3.50
3.40
3.17
3.08
3.03
2.98
2.78
2.47
2.28
2.06
1.86
1.74
1.57
1.50
0.85
0.83
0.78
0.42
21.23
17.09
16.03
15.76
15.68
15.61
15.47
15.33
15.17
14.68
14.60
14.50
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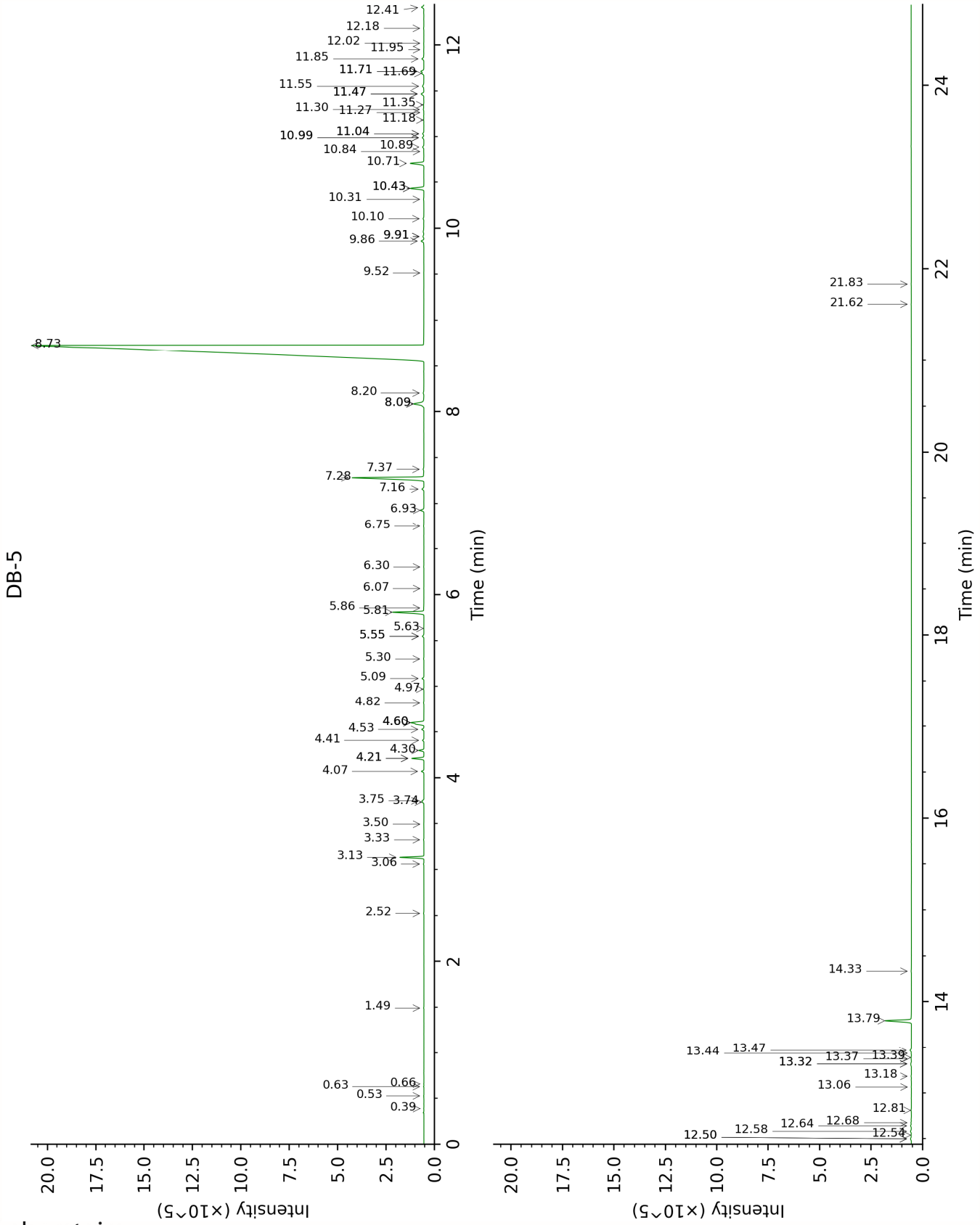
14.29
14.26
14.31
14.18
14.04
13.49



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FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Acetaldehyde	0.42	638.8	0.01	0.39	499.6	tr
2-Methyl-3-buten-2-ol	1.74	1014.0	0.01	0.53	606.2	0.01
Isovaleral	0.85	886.2	0.01	0.63	641.2	0.01
2-Methylbutyral	0.83	878.4	tr	0.66	651.3	tr
Hexanal	2.06	1044.6	0.01	1.49	800.1	0.01
2-Methylfuran	0.78	860.7	tr			
Styrene	4.12	1209.4	0.02	2.52	887.5	0.02
α-Thujene	1.57	997.5	0.02	3.06	926.5	0.02
α-Pinene	1.50	990.5	0.86	3.14	931.4	0.87
Camphene	1.86	1026.0	0.02	3.33	944.0	0.02
Benzaldehyde	7.63	1463.7	0.01	3.50	955.2	0.01
Sabinene	2.47	1083.7	0.07	3.74*†	971.1	[0.06]
β-Pinene	2.28	1065.6	0.07	3.75*†	972.0	[0.07]
Myrcene	3.08	1132.1	0.10	4.07	993.3	0.11
α-Phellandrene	2.98	1125.0	0.49	4.21*	1002.6	[0.49]
Pseudolimonene	3.03	1128.2	0.01	4.21*	1002.6	[0.49]
Δ3-Carene	2.78	1109.7	0.21	4.30	1008.2	0.20
α-Terpinene	3.17	1138.7	0.06	4.41	1015.1	0.06
para-Cymene	4.34	1224.7	0.10	4.53	1022.5	0.10
1,8-Cineole	3.50*	1163.8	[0.54]	4.60*	1027.2	[0.89]
β-Phellandrene	3.50*	1163.8	[0.54]	4.60*	1027.2	[0.89]
Limonene	3.40	1156.4	0.36	4.60*	1027.2	[0.89]
(*Z*)-β-Ocimene	4.00	1200.8	0.02	4.82	1040.6	0.02
(*E*)-β-Ocimene	4.21	1215.5	0.02	4.97	1050.5	0.02
γ-Terpinene	4.04	1203.3	0.09	5.09	1057.8	0.08
cis-Linalool oxide (fur.)	6.80	1402.1	0.02	5.30	1071.1	0.02
trans-Linalool oxide (fur.)	7.18	1429.9	0.02	5.55*	1086.6	[0.08]
Terpinolene	4.52	1237.3	0.06	5.55*	1086.6	[0.08]
Methyl benzoate	8.94	1563.1	0.01	5.63	1092.0	0.01
Linalool	8.33	1516.1	1.46	5.81	1103.1	1.44
Hotrienol	9.08	1573.5	0.01	5.86	1106.0	0.02
cis-para-Menth-2-en-1-ol	8.45*	1525.4	[0.10]	6.07	1119.5	tr
trans-Pinocarveol	9.47	1604.3	0.08	6.30	1134.5	0.01
Borneol	10.06*	1651.8	[0.12]	6.75	1163.1	0.02
Terpinen-4-ol	8.85	1555.9	0.17	6.93	1174.5	0.17
α-Terpineol	10.06*	1651.8	[0.12]	7.16	1189.2	0.10
Methylchavicol	9.61*	1615.6	[3.95]	7.28	1197.2	3.92
Dihydroanethole	8.90	1560.4	0.05	7.37	1203.0	0.05
(*Z*)-Anethole	10.64*	1699.0	[0.31]	8.09*	1250.7	[0.72]
para-Anisaldehyde	13.49	1947.2	0.47	8.09*	1250.7	[0.72]
Geraniol	11.91	1806.2	0.05	8.20	1258.6	0.05
(*E*)-Anethole	11.53	1773.9	85.22	8.73	1293.7	85.51
α-Cubebene	7.01	1417.5	0.01	9.52	1348.7	0.01

α-Copaene	7.38	1445.2	0.14	9.86	1373.1	0.15
Methyl *para*-anisate	14.26	2017.9	0.03	9.91*†	1376.6	[0.06]
(*E*)-Anethole epoxide?				9.91*†	1376.6	[0.06]
β-Elemene	8.67*	1542.2	[1.27]	10.10	1390.2	0.04
α-Gurjunene	7.85	1479.9	0.01	10.31	1405.1	0.03
cis-α-Bergamotene	8.45*	1525.4	[0.10]	10.43*	1414.0	[0.68]
β-Caryophyllene	8.67*	1542.2	[1.27]	10.43*	1414.0	[0.68]
trans-α-Bergamotene	8.67*	1542.2	[1.27]	10.71	1434.8	0.69
cis-β-Bergamotene?				10.84	1444.4	0.01
α-Humulene	9.54	1610.3	0.06	10.89	1448.0	0.07
9-epi-β-Caryophyllene	9.61*	1615.6	[3.95]	10.99*	1455.6	[0.08]
allo-Aromadendrene	9.26	1587.5	0.02	10.99*	1455.6	[0.08]
Methyl (*Z*)-isoeugenol	14.44	2035.4	0.04	11.04*	1458.8	[0.07]
(*E*)-β-Farnesene	9.79	1630.0	0.07	11.04*	1458.8	[0.07]
γ-Muurolene	9.83*	1633.6	[0.02]	11.18	1469.9	0.01
Germacrene D	10.06*	1651.8	[0.12]	11.27	1476.0	0.01
Unknown MISC CCXLVIII [m/z 148, 147 (39), 117 (15), 133 (15), 149 (11)...]				11.30	1478.5	0.03
allo-Aromadendr-9-ene	9.83*	1633.6	[0.02]	11.35	1482.3	0.02
Viridiflorene	9.91	1639.6	0.07	11.47*	1491.1	[0.16]
Bicyclogermacrene	10.33*	1673.7	[0.12]	11.47*	1491.1	[0.16]
α-Muurolene	10.33*	1673.7	[0.12]	11.55	1497.3	0.10
β-Bisabolene	10.42	1680.4	0.11	11.69	1507.9	0.10
γ-Cadinene	10.64*	1699.0	[0.31]	11.71*	1509.6	[0.16]
(3*E*,6*E*)-α-Farnesene	10.78	1710.8	0.13	11.71*	1509.6	[0.16]
δ-Cadinene	10.69	1703.3	0.11	11.85	1520.4	0.12
trans-Cadina-1,4-diene	10.95	1724.5	0.01	11.95	1528.2	0.01
α-Cadinene	11.07	1734.9	0.01	12.02	1533.7	0.01
α-Elemol	14.31	2022.8	0.02	12.18	1546.5	0.02
(*E*)-Nerolidol	14.04	1997.5	0.13	12.41	1564.6	0.12
Unknown UNKN CCCVIII [m/z 137, 109 (28), 77 (21), 94 (18), 91 (16)...]				12.50*	1571.5	[0.06]
Spathulenol	14.68	2058.2	0.03	12.50*	1571.5	[0.06]
1-(4-Methoxyphenyl)propane-1,2-diol isomer II	21.23	2768.4	0.01	12.54	1574.7	0.02
Globulol	14.18	2010.6	0.05	12.58	1577.9	0.06
(*Z*)-Foeniculin	14.50	2040.9	0.01	12.64*†	1582.6	[0.05]
Viridiflorol	14.29	2020.9	0.04	12.68*†	1585.3	[0.02]
Eudesm-5-en-11-ol analog				12.81	1595.9	0.02
Rosifoliol	14.60	2050.5	0.01	13.06	1616.4	0.01
γ-Eudesmol	15.17*	2105.4	[0.03]	13.18	1626.2	0.02

τ-Cadinol	15.17*	2105.4	[0.03]	13.32*	1637.4	[0.05]
τ-Muurolol	15.33	2121.2	0.02	13.32*	1637.4	[0.05]
α-Muurolol	15.47	2135.0	0.02	13.37	1641.9	0.01
β-Eudesmol	15.68	2155.8	0.01	13.39	1643.1	0.02
α-Eudesmol	15.61	2148.9	0.01	13.44	1647.1	0.01
α-Cadinol	15.76	2163.5	0.06	13.47	1649.7	0.07
(*E*)-Foeniculin	16.03	2190.4	1.28	13.80	1676.8	1.27
(2*E*,6*E*)-Farnesol	17.09	2299.1	0.03	14.33	1722.2	0.02
2,4-Bis-(4-methoxyphenyl)-3,5-dimethyltetrahydrofuran isomer I				21.62	2450.8	0.01
2,4-Bis-(4-methoxyphenyl)-3,5-dimethyltetrahydrofuran isomer II				21.83	2476.1	0.01
Total reported		99.25%			99.75%	

*: 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