Date : June 09, 2023

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 23E26-NPA02
Customer identification : Cinnamon - Sri Lanka - NPS00052
Type : Essential oil
Source : *Cinnamomum zeylanicum*
Customer : Nature Packaged

Analysis

Method: PC-MAT-014 ISO - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Amélie Simard, Analyste
Analysis date : June 07, 2023

Checked and approved by :

Alexis St-Gelais, Ph. D., Chimiste 2013-174

Notes: 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 June 9, 2023, to format it for online publication.

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PHYSICOCHEMICAL DATA

Physical aspect: Yellow liquid
Refractive index: 1.5332 ± 0.0003 (20 °C; method PC-MAT-016)

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
Hexanal	tr	Aliphatic aldehyde
Styrene	0.03	Simple phenolic
Tricyclene	0.02	Monoterpene
α-Thujene	0.15	Monoterpene
α-Pinene	1.04	Monoterpene
α-Fenchene	0.02	Monoterpene
Camphene	0.34	Monoterpene
Benzaldehyde	0.17	Simple phenolic
Sabinene	0.02	Monoterpene
β-Pinene	0.32	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	0.14	Monoterpene
Pseudolimonene	0.01	Monoterpene
Octanal	0.01	Aliphatic aldehyde
α-Phellandrene	1.15	Monoterpene
Δ3-Carene	0.09	Monoterpene
α-Terpinene	0.13	Monoterpene
meta-Cymene	0.02	Monoterpene
para-Cymene	0.73	Monoterpene
1,8-Cineole	0.54	Monoterpenic ether
Limonene	0.32	Monoterpene
Benzyl alcohol	0.04	Simple phenolic
(*Z*)-β-Ocimene	0.04	Monoterpene
(*E*)-β-Ocimene	0.06	Monoterpene
γ-Terpinene	0.04	Monoterpene
cis-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
Isoterpinolene	0.02	Monoterpene
Terpinolene	0.11	Monoterpene
trans-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
para-Cymenene	0.02	Monoterpene
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Linalool	2.12	Monoterpenic alcohol
(3*E*)-2,7-Dimethyl-3,6-octadien-2-ol	0.06	Monoterpenic alcohol
Phenylethyl alcohol	0.01	Simple phenolic
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
trans-Pinocarveol	0.01	Monoterpenic alcohol
Camphor	0.02	Monoterpenic ketone
Camphene hydrate	0.01	Monoterpenic alcohol
Hydrocinnamal	0.08	Phenylpropanoid
Borneol	0.04	Monoterpenic alcohol
Benzyl acetate	0.04	Phenolic ester
3-Methylbenzofuran?	0.05	Phenylpropanoid
Terpinen-4-ol	0.10	Monoterpenic alcohol
Cryptone	0.02	Normonoterpenic ketone

para-Cymen-8-ol	0.04	Monoterpenic alcohol
α-Terpineol	0.26	Monoterpenic alcohol
cis-α-Phellandrene epoxide (iPr vs Me)	0.05	Monoterpenic ether
trans-Piperitol	0.03	Monoterpenic alcohol
(*Z*)-Cinnamal	0.02	Phenylpropanoid
Hydrocinnamyl alcohol	0.10	Phenylpropanoid
ortho-Anisaldehyde	0.02	Simple phenolic
Phenylethyl acetate	0.02	Phenolic ester
(*E*)-Cinnamal	1.33	Phenylpropanoid
Chavicol	0.13	Phenylpropanoid
Safrole	0.80	Phenylpropanoid
(*E*)-Cinnamyl alcohol	0.11	Phenylpropanoid
α-Cubebene	0.03	Sesquiterpene
Eugenol	75.49	Phenylpropanoid
ortho-Methoxyhydrocinnamal?	0.07	Phenylpropanoid
Hydrocinnamyl acetate	0.11	Phenylpropanoid ester
α-Copaene	0.53	Sesquiterpene
cis-β-Elemene	0.03	Sesquiterpene
β-Cubebene	0.03	Sesquiterpene
β-Elemene	0.03	Sesquiterpene
α-Gurjunene	0.01	Sesquiterpene
Methyleugenol	0.04	Phenylpropanoid
β-Caryophyllene	3.02	Sesquiterpene
Aromadendrene	0.04	Sesquiterpene
(*E*)-Cinnamyl acetate	1.39	Phenylpropanoid ester
α-Humulene	0.55	Sesquiterpene
allo-Aromadendrene	0.02	Sesquiterpene
trans-Cadina-1(6),4-diene	0.01	Sesquiterpene
γ-Muurolene	0.02	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
ar-Curcumene	0.02	Sesquiterpene
Viridiflorene	0.05	Sesquiterpene
Bicyclogermacrene	0.08	Sesquiterpene
α-Muurolene	0.03	Sesquiterpene
γ-Cadinene	0.05	Sesquiterpene
trans-Calamenene	0.02	Sesquiterpene
δ-Cadinene	0.08	Sesquiterpene
Eugenyl acetate	2.01	Phenylpropanoid ester
(*E*)-ortho-Methoxycinnamal	0.01	Phenylpropanoid
α-Calacorene	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.02	Sesquiterpenic ether
Caryophyllenyl alcohol	0.02	Sesquiterpenic alcohol
Spathulenol	0.04	Sesquiterpenic alcohol
Caryophyllene oxide	0.35	Sesquiterpenic ether
Humulene epoxide II	0.07	Sesquiterpenic ether
1,10-diepi-Cubenol	0.02	Sesquiterpenic alcohol
Caryophylladienol I	0.02	Sesquiterpenic alcohol
Caryophylladienol II	0.03	Sesquiterpenic alcohol
τ-Muurolol	0.04	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.03	Sesquiterpenic alcohol
(*E*)-Coniferyl alcohol	0.02	Phenylpropanoid
Benzyl benzoate	3.25	Phenolic ester

Phenylethyl benzoate	0.05	Phenolic ester
Unknown	0.01	Unknown
Unknown	0.03	Lignan
Unknown	0.02	Lignan
Consolidated total	**98.96%**	

tr: The compound has been detected below 0.005% of 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.

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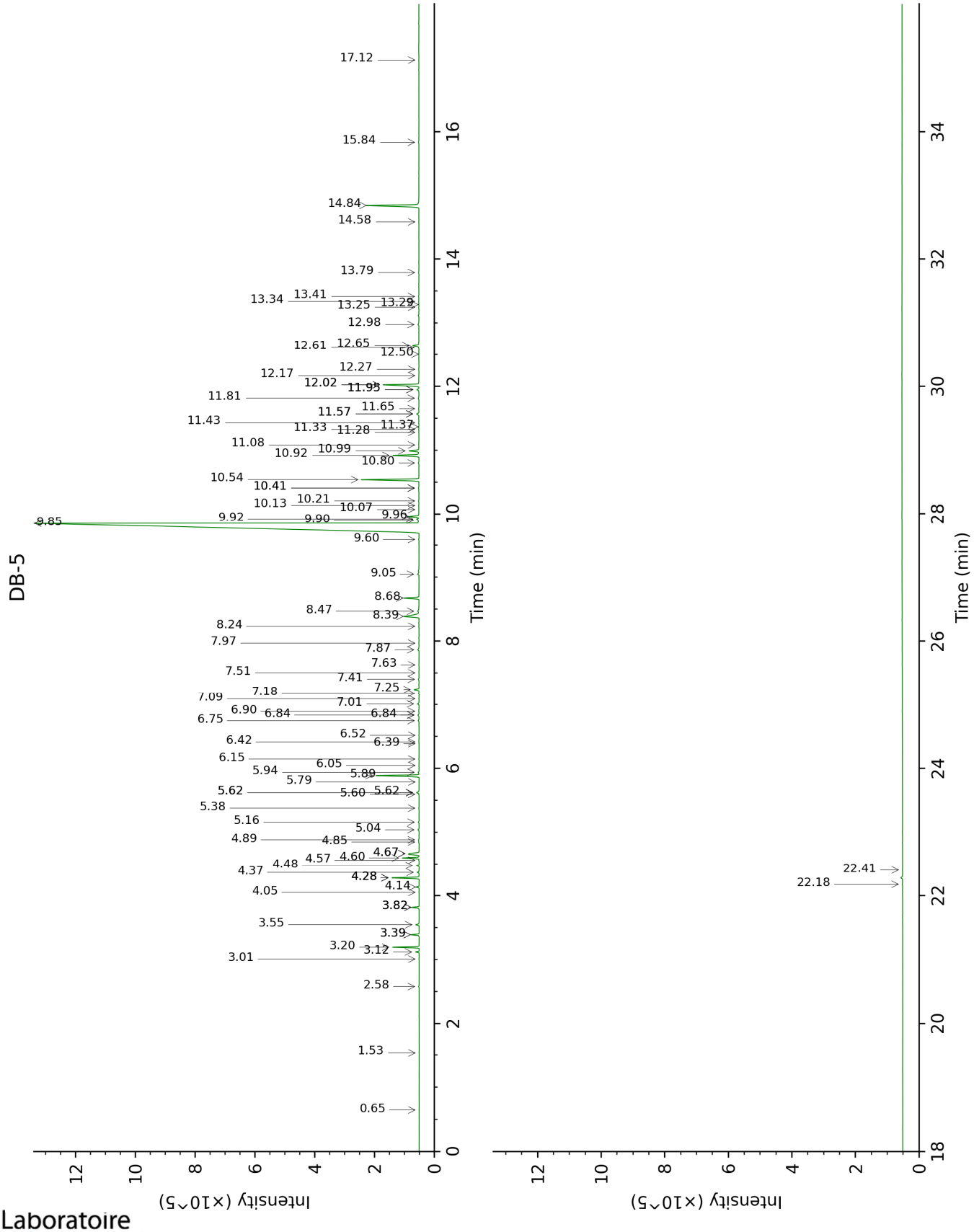
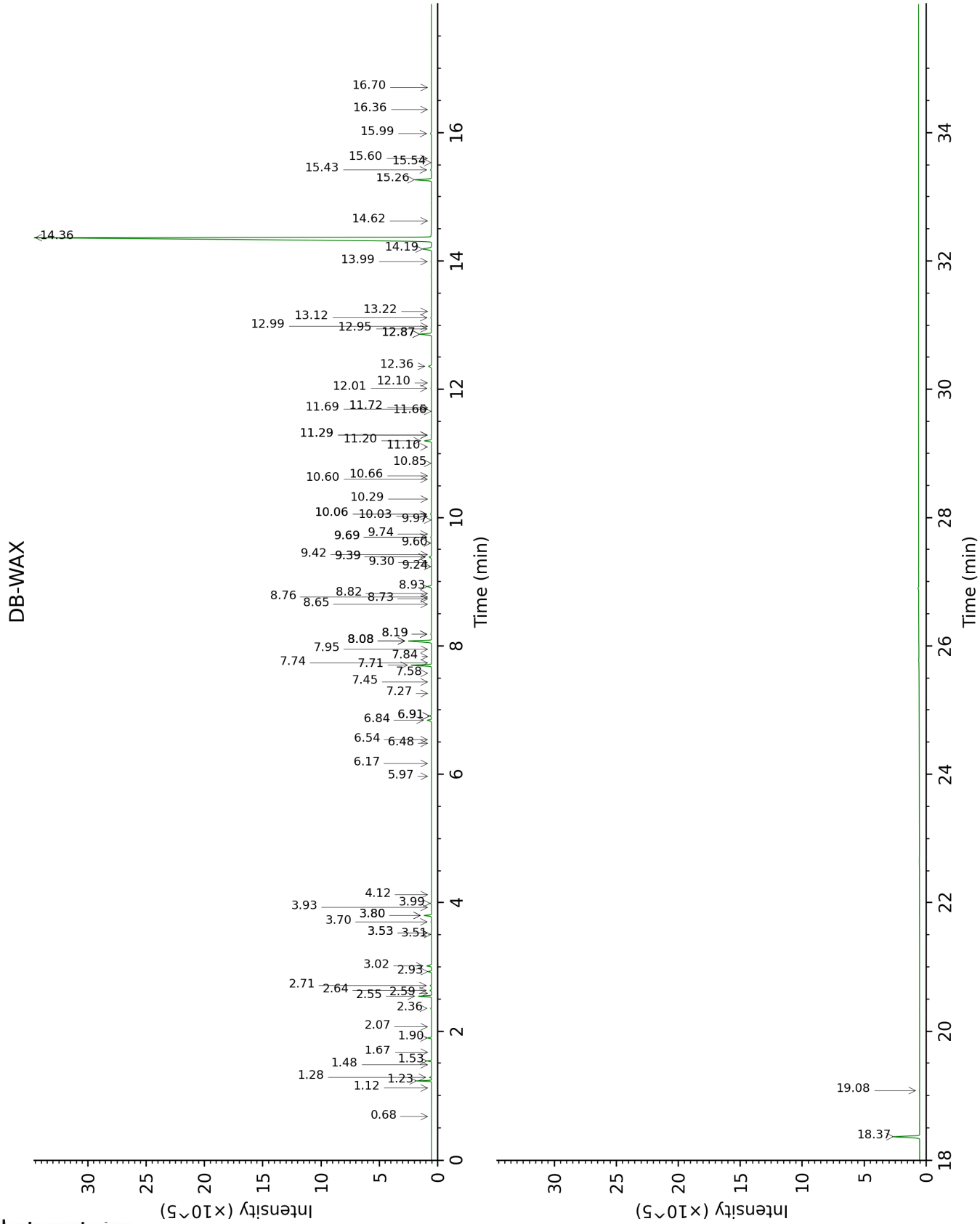

DB-5
Intensity (×10^5)
Time (min)
17.12
15.84
14.84
14.58
13.79
13.34
13.41
13.25
13.29
12.98
12.61
12.65
12.50
12.17
12.27
12.02
11.95
11.81
11.57
11.65
11.43
11.33
11.28
11.37
11.08
10.92
10.99
10.80
10.54
10.41
10.13
10.21
10.07
9.92
9.90
9.96
9.85
9.60
9.05
8.68
8.47
8.39
8.24
7.97
7.87
7.63
7.51
7.41
7.09
7.18
7.25
7.01
6.90
6.84
6.84
6.75
6.52
6.42
6.39
6.15
6.05
5.94
5.89
5.79
5.62
5.60
5.62
5.38
5.16
5.04
4.89
4.85
4.67
4.57
4.60
4.48
4.37
4.28
4.14
4.05
3.82
3.55
3.39
3.20
3.12
3.01
2.58
1.53
0.65
22.41
22.18


DB-WAX
Time (min)
Intensity (×10^5)
16.70
16.36
15.99
15.60
15.54
15.43
15.26
14.62
14.36
14.19
13.99
13.22
13.12
12.99
12.95
12.87
12.36
12.10
12.01
11.72
11.69
11.66
11.29
11.20
11.10
10.85
10.66
10.60
10.29
10.06
10.03
9.97
9.74
9.69
9.60
9.42
9.39
9.30
9.24
8.93
8.82
8.76
8.73
8.65
8.19
8.08
7.95
7.84
7.74
7.71
7.58
7.45
7.27
6.91
6.84
6.54
6.48
6.17
5.97
4.12
3.99
3.93
3.80
3.70
3.53
3.51
3.02
2.93
2.71
2.64
2.59
2.55
2.36
2.07
1.90
1.67
1.53
1.48
1.28
1.23
1.12
0.68
19.08
18.37

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.65	640	tr	0.68	887	tr
Hexanal	1.53	799	tr	1.67	1043	tr
Styrene	2.58	886	0.03	3.51	1207	0.04
Tricyclene	3.01	918	0.02	1.12	974	0.01
α-Thujene	3.12	926	0.15	1.28	1003	0.14
α-Pinene	3.20	930	1.04	1.23	993	1.04
α-Fenchene	3.39*	943	0.36	1.48	1023	0.02
Camphene	3.39*	943	[0.36]	1.53	1029	0.34
Benzaldehyde	3.55	953	0.17	6.91*	1456	0.18
Sabinene	3.82*	971	0.34	2.07	1085	0.02
β-Pinene	3.82*	971	[0.34]	1.90	1067	0.32
6-Methyl-5-hepten-2-one	4.05	987	0.01			
Myrcene	4.14	992	0.14	2.64	1135	0.14
Pseudolimonene	4.28*	1002	1.15	2.59	1132	0.01
Octanal	4.28*	1002	[1.15]	4.12	1255	0.01
α-Phellandrene	4.28*	1002	[1.15]	2.55	1128	1.15
Δ3-Carene	4.37	1007	0.09	2.36	1113	0.09
α-Terpinene	4.48	1014	0.13	2.71	1141	0.12
meta-Cymene	4.56	1019	0.02	3.80*	1230	0.74
para-Cymene	4.60	1022	0.73	3.80*	1230	[0.74]
1,8-Cineole	4.67*†	1026	0.86	3.02	1167	0.54
Limonene	4.67*†	1026	[0.86]	2.93	1159	0.32
Benzyl alcohol	4.85	1037	0.04	11.29*	1813	0.05
(*Z*)-β-Ocimene	4.89	1040	0.04	3.53*	1209	0.07
(*E*)-β-Ocimene	5.04	1049	0.06	3.70	1222	0.06
γ-Terpinene	5.16	1057	0.04	3.53*	1209	[0.07]
cis-Linalool oxide (fur.)	5.38	1070	0.03	6.17	1401	0.02
Isoterpinolene	5.60	1084	0.02	3.93	1240	0.02
Terpinolene	5.62*	1086	0.16	3.99	1244	0.11
trans-Linalool oxide (fur.)	5.62*	1086	[0.16]	6.54	1428	0.03
para-Cymenene	5.62*	1086	[0.16]	5.97	1386	0.02
trans-Sabinene hydrate	5.79	1096	0.01	7.58	1507	0.01
Linalool	5.89	1102	2.12	7.71	1517	2.13
(3*E*)-2,7-Dimethyl-3,6-octadien-2-ol	5.94	1105	0.06	7.84	1527	0.02
Phenylethyl alcohol	6.05	1112	0.01	11.69	1849	0.02
cis-para-Menth-2-en-1-ol	6.15	1119	0.02	7.74	1520	0.01
trans-Pinocarveol	6.39	1134	0.01	8.76	1600	0.01
Camphor	6.42	1136	0.02	6.91*	1456	[0.18]
Camphene hydrate	6.52	1142	0.01	8.08*	1547	3.03
Hydrocinnamal	6.75	1157	0.08	10.06*	1707	0.15
Borneol	6.84*	1162	0.08	9.39*	1651	0.30
Benzyl acetate	6.84*	1162	[0.08]	9.60	1669	0.04
3-Methylbenzofuran?	6.90	1166	0.05	9.74	1681	0.03
Terpinen-4-ol	7.01	1174	0.10	8.19*	1555	0.12
Cryptone	7.10	1179	0.02	8.74	1598	0.01
para-Cymen-8-ol	7.18	1184	0.04	11.10	1797	0.03

α-Terpineol	7.24	1188	0.26	9.39*	1651	[0.30]
cis-α-Phellandrene epoxide (iPr vs Me)	7.41	1199	0.05	10.60	1754	0.05
trans-Piperitol	7.51	1205	0.03	9.97	1700	0.01
(*Z*)-Cinnamal	7.63	1213	0.02	11.29*	1813	[0.05]
Hydrocinnamyl alcohol	7.87	1229	0.10	13.12	1981	0.09
ortho-Anisaldehyde	7.97	1236	0.02	12.10	1886	0.03
Phenylethyl acetate	8.24	1254	0.02	10.66	1758	0.02
(*E*)-Cinnamal	8.39	1264	1.33	12.87*	1957	1.40
Chavicol	8.47	1270	0.13	15.99	2269	0.15
Safrole	8.68	1283	0.80	11.20	1805	0.81
(*E*)-Cinnamyl alcohol	9.05	1308	0.11	15.43	2209	0.13
α-Cubebene	9.60	1347	0.03	6.48	1424	0.02
Eugenol	9.85	1364	75.49	14.36	2101	75.51
ortho-Methoxyhydrocinnamal?	9.90	1368	0.07			
Hydrocinnamyl acetate	9.92	1370	0.11	12.01	1878	0.08
α-Copaene	9.96	1372	0.53	6.84	1451	0.50
cis-β-Elemene	10.07	1380	0.03	7.95	1536	0.01
β-Cubebene	10.14	1385	0.03	7.45	1497	0.02
β-Elemene	10.21	1390	0.03	8.08*	1547	[3.03]
α-Gurjunene	10.41*	1404	0.05	7.27	1483	0.01
Methyleugenol	10.41*	1404	[0.05]	12.87*	1957	[1.40]
β-Caryophyllene	10.54	1414	3.02	8.08*	1547	[3.03]
Aromadendrene	10.80	1433	0.04	8.19*	1555	[0.12]
(*E*)-Cinnamyl acetate	10.92	1442	1.39	14.19	2084	1.37
α-Humulene	10.99	1447	0.55	8.93	1614	0.52
allo-Aromadendrene	11.08	1454	0.02	8.65	1592	0.02
trans-Cadina-1(6),4-diene	11.28	1469	0.01	8.82	1605	0.01
γ-Muurolene	11.33	1472	0.02	9.24	1639	0.04
Germacrene D	11.37	1475	0.02	9.42	1654	0.02
ar-Curcumene	11.43	1480	0.02	10.30	1727	0.02
Viridiflorene	11.57*	1490	0.16	9.30	1644	0.05
Bicyclogermacrene	11.57*	1490	[0.16]	9.69*	1677	0.12
α-Muurolene	11.65	1496	0.03	9.69*	1677	[0.12]
γ-Cadinene	11.81	1509	0.05	10.03	1704	0.04
trans-Calamenene	11.95*	1519	0.13	10.85	1775	0.02
δ-Cadinene	11.95*	1519	[0.13]	10.06*	1707	[0.15]
Eugenyl acetate	12.02*	1525	2.04	15.26	2192	2.01
(*E*)-ortho-Methoxycinnamal	12.02*	1525	[2.04]	16.70	2346	0.01
α-Calacorene	12.17	1536	0.01	11.66	1846	0.01
Isocaryophyllene epoxide B	12.27	1544	0.02	11.72	1852	0.01
Caryophyllenyl alcohol	12.50	1563	0.02	13.22	1990	0.01
Spathulenol	12.61	1571	0.04	13.99	2065	0.06
Caryophyllene oxide	12.65	1574	0.35	12.36	1909	0.40
Humulene epoxide II	12.98	1600	0.07	12.95	1965	0.07
1,10-diepi-Cubenol	13.25	1622	0.02	12.99	1968	0.01
Caryophylladienol I	13.29	1625	0.02	15.54	2221	0.01
Caryophylladienol II	13.34	1629	0.03	15.60	2228	0.03

τ-Muurolol	13.42	1636	0.04	14.62	2127	0.02
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.79	1667	0.03	16.36	2308	0.04
(*E*)-Coniferyl alcohol	14.58	1733	0.02			
Benzyl benzoate	14.84	1756	3.25	18.37	2533	3.22
Phenylethyl benzoate	15.84	1844	0.05	19.08	2617	0.03
Unknown [m/z 93, 92 (57), 136 (34), 91 (23), 77 (13), 134 (11)...]	17.12	1963	0.01			
Unknown [m/z 326, 148 (67), 147 (41), 117 (30), 91 (22)...]	22.18	2501	0.03			
Unknown [m/z 326, 150 (54), 161 (42), 202 (41), 201 (28)]	22.41	2528	0.02			
Total identified		**98.96%**			**98.52%**	
Total reported		**99.02%**			**98.52%**	

*: Two or more compounds are coeluting on this column
[xx]: Duplicate percentage due to coelutions, not 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