Date : January 31, 2022

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 22A25-PTH03
Customer identification : Cinnamon Bark - Sri Lanka - CC0108217R
Type : Essential oil
Source : *Cinnamomum zeylanicum*
Customer : Plant Therapy

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 : Sylvain Mercier, M. Sc., Chimiste 2014-005
Analysis date : January 27, 2022

Checked and 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid
Refractive index: 1.5895 ± 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
Hexanal	tr	Aliphatic aldehyde
Ethyl 2-methylbutyrate	tr	Aliphatic ester
Ethylbenzene	tr	Simple phenolic
Styrene	0.02	Simple phenolic
Hashishene	tr	Monoterpene
Tricyclene	tr	Monoterpene
α-Thujene	0.18	Monoterpene
α-Pinene	1.89	Monoterpene
Camphene	0.21	Monoterpene
α-Fenchene	0.01	Monoterpene
Benzaldehyde	0.16	Simple phenolic
β-Pinene	0.20	Monoterpene
Sabinene	0.08	Monoterpene
Myrcene	0.06	Monoterpene
α-Phellandrene	0.71	Monoterpene
Pseudolimonene	tr	Monoterpene
Octanal	0.01	Aliphatic aldehyde
Δ3-Carene	0.05	Monoterpene
α-Terpinene	0.49	Monoterpene
meta-Cymene	0.01	Monoterpene
para-Cymene	0.88	Monoterpene
Limonene	1.16	Monoterpene
1,8-Cineole	2.93	Monoterpenic ether
(*Z*)-β-Ocimene	0.04	Monoterpene
Butyl 2-methylbutyrate	0.01	Aliphatic ester
(*E*)-β-Ocimene	0.02	Monoterpene
γ-Terpinene	0.05	Monoterpene
Acetophenone	tr	Simple phenolic
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Isoterpinolene	0.01	Monoterpene
trans-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.07	Monoterpene
para-Cymenene	0.03	Monoterpene
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Linalool	2.40	Monoterpenic alcohol
(3*E*)-2,7-Dimethyl-3,6-octadien-2-ol	0.03	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	0.08	Monoterpenic ketone
Hydrocinnamal	0.20	Phenylpropanoid
Borneol	0.06	Monoterpenic alcohol
Terpinen-4-ol	0.23	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol

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Myrtenal	tr	Monoterpenic aldehyde
α-Terpineol	0.30	Monoterpenic alcohol
cis-α-Phellandrene epoxide (iPr vs Me)	0.01	Monoterpenic ether
(*Z*)-Cinnamal	0.44	Phenylpropanoid
ortho-Anisaldehyde	0.02	Simple phenolic
Chavicol	0.04	Phenylpropanoid
Safrole	0.08	Phenylpropanoid
(*E*)-Cinnamal	75.26	Phenylpropanoid
α-Cubebene	tr	Sesquiterpene
Eugenol	3.59	Phenylpropanoid
α-Copaene	0.17	Sesquiterpene
Hydrocinnamyl acetate	0.04	Phenylpropanoid ester
β-Cubebene	0.03	Sesquiterpene
Isocaryophyllene	0.01	Sesquiterpene
α-Gurjunene	0.01	Sesquiterpene
β-Caryophyllene	1.93	Sesquiterpene
Aromadendrene	0.01	Sesquiterpene
(*E*)-Cinnamyl acetate	2.79	Phenylpropanoid ester
(*E*)-Isoeugenol	tr	Phenylpropanoid
α-Humulene	0.31	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
trans-Cadina-1(6),4-diene	tr	Sesquiterpene
γ-Muurolene	0.01	Sesquiterpene
Germacrene D	tr	Sesquiterpene
ar-Curcumene	0.02	Sesquiterpene
Viridiflorene	0.02	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
Cubebol	0.02	Sesquiterpenic alcohol
trans-Calamenene	0.02	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
trans-Cadina-1,4-diene	tr	Sesquiterpene
Eugenyl acetate	0.02	Phenylpropanoid ester
(*E*)-ortho-Methoxycinnamal	0.18	Phenylpropanoid
α-Calacorene	0.02	Sesquiterpene
Isocaryophyllene epoxide B	0.02	Sesquiterpenic ether
Unknown	tr	Phenylpropanoid
Caryophyllenyl alcohol	0.03	Sesquiterpenic alcohol
(*E*)-Nerolidol	0.01	Sesquiterpenic alcohol
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.16	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Globulol	0.02	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated sesquiterpene
Tetradecanal	0.08	Aliphatic aldehyde
Caryophylladienol I	0.01	Sesquiterpenic alcohol
τ-Cadinol	0.01	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.02	Sesquiterpenic alcohol
Benzyl benzoate	0.43	Phenolic ester
Phenylethyl benzoate	0.01	Phenolic ester
Unknown	0.01	Unknown
Unknown	0.06	Unknown
Unknown	0.03	Unknown

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Unknown	0.01	Lignan
Consolidated total	**98.73%**	

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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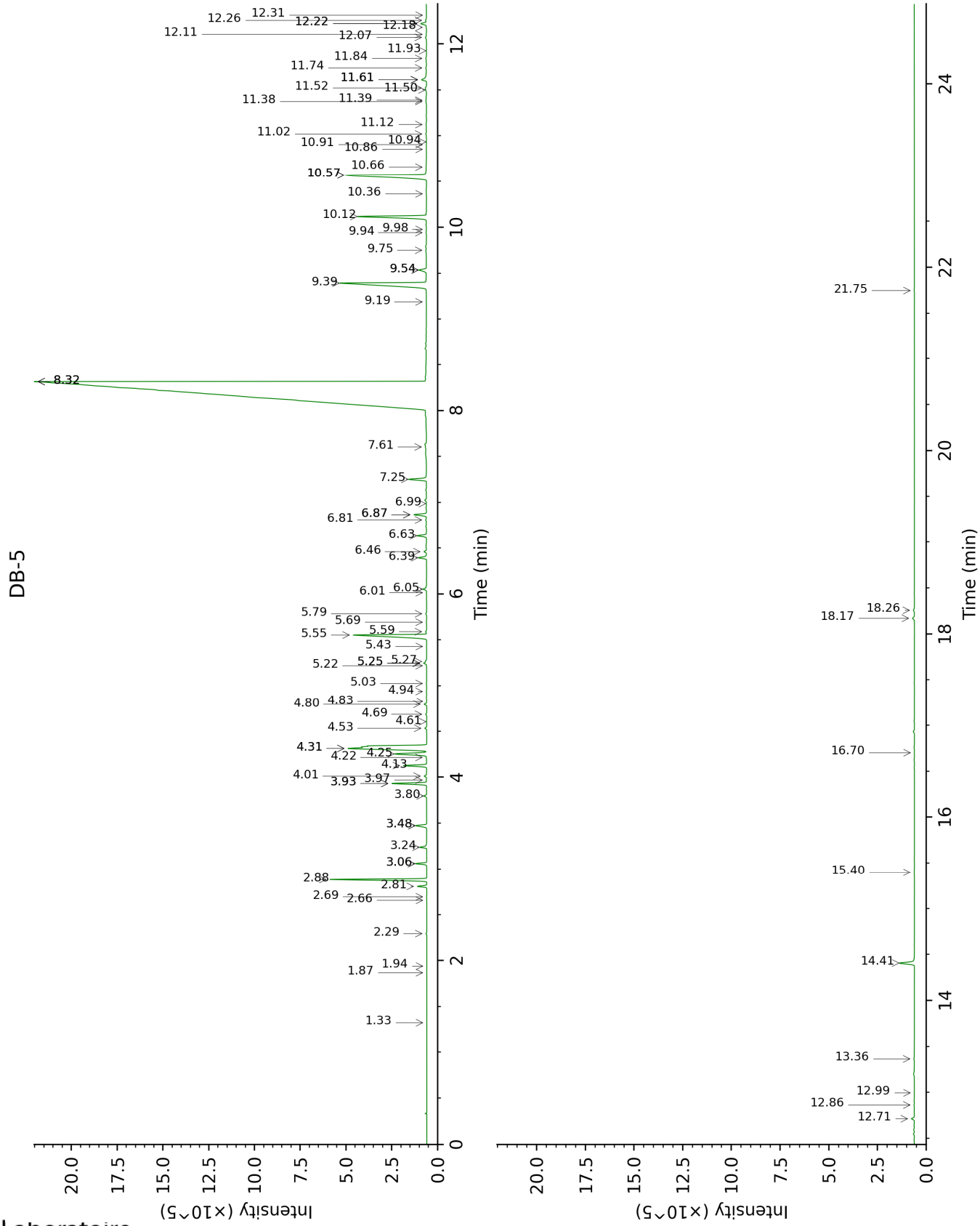
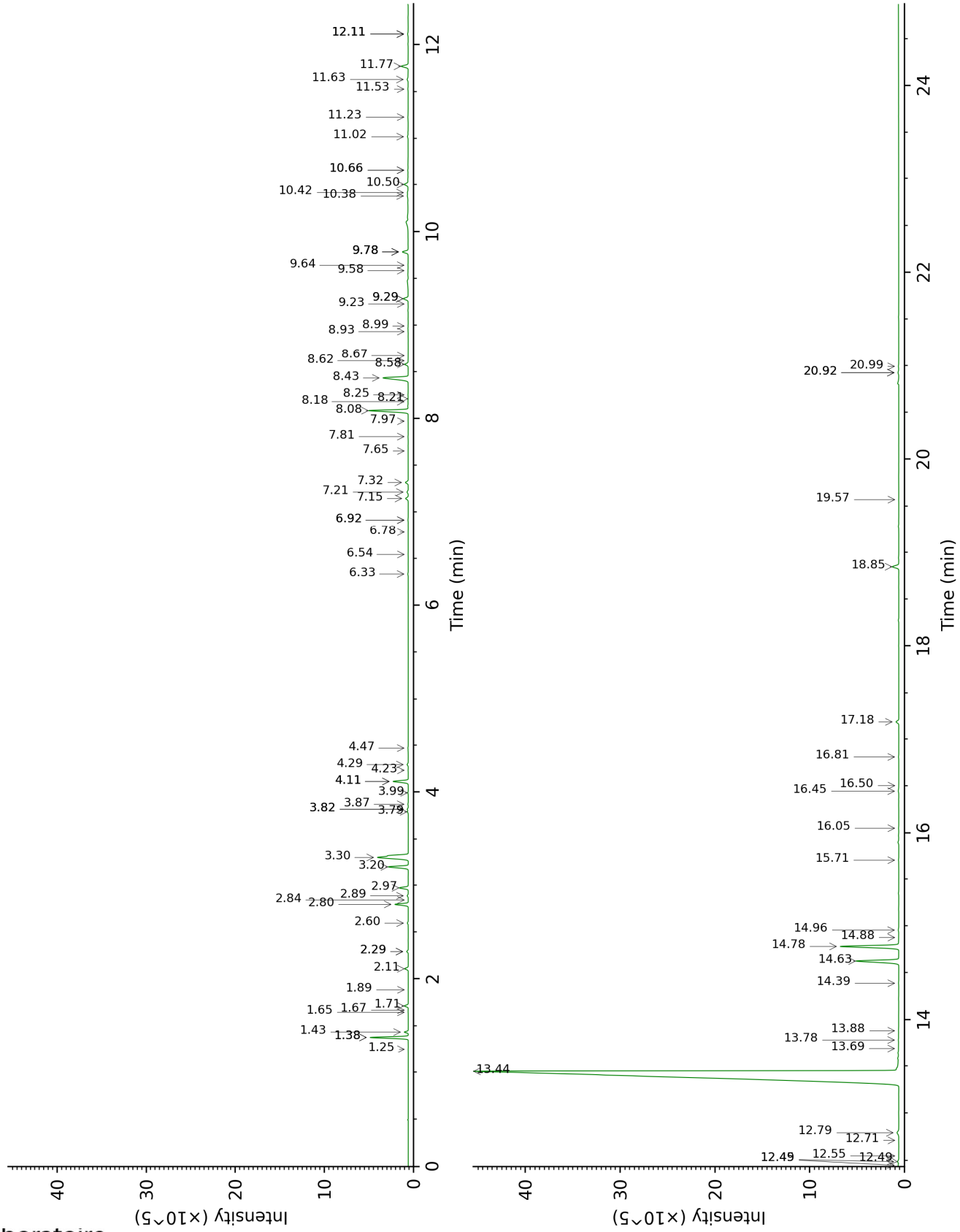

DB-5
Intensity (×10^5)
Time (min)
12.26
12.31
12.22
12.18
12.11
12.07
11.93
11.84
11.74
11.61
11.52
11.50
11.38
11.39
11.12
11.02
10.91
10.94
10.86
10.66
10.57
10.36
10.12
9.94
9.98
9.75
9.54
9.39
9.19
8.32
7.61
7.25
6.99
6.81
6.87
6.63
6.46
6.39
6.01
6.05
5.79
5.69
5.55
5.59
5.43
5.22
5.25
5.27
5.03
4.94
4.80
4.83
4.69
4.61
4.53
4.31
4.22
4.25
4.13
4.01
3.93
3.97
3.80
3.48
3.24
3.06
2.88
2.81
2.69
2.66
2.29
1.94
1.87
1.33
21.75
18.17
18.26
16.70
15.40
14.41
13.36
12.99
12.86
12.71

DB-WAX


Intensity (×10^5)
Time (min)
12.11
11.77
11.63
11.53
11.23
11.02
10.66
10.50
10.42
10.38
9.78
9.64
9.58
9.29
9.23
8.99
8.93
8.67
8.62
8.58
8.43
8.25
8.21
8.18
8.08
7.97
7.81
7.65
7.32
7.21
7.15
6.92
6.78
6.54
6.33
4.47
4.29
4.23
4.11
3.99
3.87
3.82
3.79
3.30
3.20
2.97
2.89
2.84
2.80
2.60
2.29
2.11
1.89
1.71
1.67
1.65
1.43
1.38
1.25
13.44
12.79
12.71
12.55
12.49
12.49
13.88
13.78
13.69
14.96
14.88
14.78
14.63
14.39
16.81
16.50
16.45
16.05
15.71
17.18
19.57
18.85
20.99
20.92

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Hexanal	1.33	800	tr	1.88	1043	tr
Ethyl 2-methylbutyrate	1.87	850	tr	1.67	1022	tr
Ethylbenzene	1.94	856	tr	2.29*	1083	0.09
Styrene	2.29	887	0.02	3.87	1210	0.02
Hashishene	2.66	915	tr	1.38*	991	1.86
Tricyclene	2.69	918	tr	1.25	970	tr
α-Thujene	2.81	926	0.18	1.43	999	0.18
α-Pinene	2.88	931	1.89	1.38*	991	[1.86]
Camphene	3.06*	943	0.22	1.71	1026	0.21
α-Fenchene	3.06*	943	[0.22]	1.64	1019	0.01
Benzaldehyde	3.24	955	0.16	7.32	1458	0.17
β-Pinene	3.48*	971	0.28	2.11	1065	0.20
Sabinene	3.48*	971	[0.28]	2.29*	1083	[0.09]
Myrcene	3.80	993	0.06	2.89	1133	0.05
α-Phellandrene	3.93*	1002	0.72	2.80	1126	0.71
Pseudolimonene	3.93*	1002	[0.72]	2.84	1129	tr
Octanal	3.97	1004	0.01	4.47	1254	0.02
Δ3-Carene	4.01	1007	0.05	2.60	1110	0.05
α-Terpinene	4.13	1014	0.49	2.97	1140	0.48
meta-Cymene	4.22	1020	0.01	4.11*	1228	0.88
para-Cymene	4.25	1022	0.88	4.11*	1228	[0.88]
Limonene	4.31*	1026	4.16	3.20	1158	1.16
1,8-Cineole	4.31*	1026	[4.16]	3.30	1166	2.93
(*Z*)-β-Ocimene	4.53	1040	0.04	3.79†	1204	0.10
Butyl 2-methylbutyrate	4.60	1045	0.01	3.82*†	1206	[0.10]
(*E*)-β-Ocimene	4.69	1050	0.02	3.99	1219	0.02
γ-Terpinene	4.80	1057	0.05	3.82*†	1206	[0.10]
Acetophenone	4.83	1059	tr	8.93	1582	0.01
cis-Sabinene hydrate	4.94	1066	0.01	6.92*	1428	0.02
cis-Linalool oxide (fur.)	5.03	1071	0.01	6.54	1401	0.01
Isoterpinolene	5.22	1084	0.01	4.23	1237	0.01
trans-Linalool oxide (fur.)	5.25*†	1085	0.10	6.92*	1428	[0.02]
Terpinolene	5.25*†	1085	[0.10]	4.29	1241	0.07
para-Cymenene	5.27†	1087	[0.10]	6.33	1386	0.03
trans-Sabinene hydrate	5.43	1097	0.01	7.97	1507	0.01
Linalool	5.55	1105	2.40	8.08	1516	2.35
(3*E*)-2,7-Dimethyl-3,6-octadien-2-ol	5.59	1107	0.03	8.25	1529	0.01
Phenylethyl alcohol	5.69	1114	0.01	12.11*	1848	0.05
cis-para-Menth-2-en-1-ol	5.79	1120	0.02	8.18	1524	0.02

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trans-Pinocarveol	6.01	1134	0.01	9.23	1605	0.01
Camphor	6.05	1137	0.08	7.22	1451	0.08
Hydrocinnamal	6.39	1159	0.20	10.50	1709	0.25
Borneol	6.46	1163	0.06	9.78*	1650	0.36
Terpinen-4-ol	6.63	1174	0.23	8.58	1554	0.22
para-Cymen-8-ol	6.81	1186	0.02	11.53	1796	0.02
Myrtenal	6.87*	1189	0.30	8.67	1562	tr
α-Terpineol	6.87*	1189	[0.30]	9.78*	1650	[0.36]
cis-α-Phellandrene epoxide (iPr vs Me)	6.99	1197	0.01	11.02	1753	0.05
(*Z*)-Cinnamal	7.25	1215	0.44	11.77	1818	0.46
ortho-Anisaldehyde	7.61	1238	0.02	12.49*	1881	0.08
Chavicol	8.32*	1286	75.47	16.44	2266	0.04
Safrole	8.32*	1286	[75.47]	11.63	1805	0.08
(*E*)-Cinnamal	8.32*	1286	[75.47]	13.44	1969	75.26
α-Cubebene	9.19	1347	tr	6.78	1418	0.01
Eugenol	9.39	1361	3.59	14.78	2097	3.61
α-Copaene	9.54*	1371	0.22	7.15	1446	0.17
Hydrocinnamyl acetate	9.54*	1371	[0.22]	12.45	1878	0.04
β-Cubebene	9.75	1386	0.03	7.81	1495	0.01
Isocaryophyllene	9.94	1400	0.01	8.21	1526	0.01
α-Gurjunene	9.98	1402	0.01	7.65	1483	0.01
β-Caryophyllene	10.12	1413	1.93	8.43	1543	1.89
Aromadendrene	10.36	1431	0.01	8.62	1557	0.01
(*E*)-Cinnamyl acetate	10.57*	1447	3.29	14.63	2082	2.79
(*E*)-Isoeugenol	10.57*	1447	[3.29]	16.50	2272	tr
α-Humulene	10.57*	1447	[3.29]	9.28*	1610	0.31
allo-Aromadendrene	10.66	1454	0.01	8.99	1587	0.01
trans-Cadina-1(6),4-diene	10.86	1468	tr	9.28*	1610	[0.31]
γ-Muurolene	10.91	1472	0.01	9.58	1634	0.01
Germacrene D	10.94	1474	tr	9.78*	1650	[0.36]
ar-Curcumene	11.02	1480	0.02	10.66*	1723	0.02
Viridiflorene	11.12	1488	0.02	9.64	1639	0.01
γ-Cadinene	11.38	1507	0.02	10.38	1699	0.06
Cubebol	11.39	1508	0.02	12.55	1887	0.01
trans-Calamenene	11.50	1517	0.02	11.23	1771	0.02
δ-Cadinene	11.52	1518	0.04	10.42	1702	0.04
trans-Cadina-1,4-diene	11.61*	1526	0.19	10.66*	1723	[0.02]
Eugenyl acetate	11.61*	1526	[0.19]	15.71	2190	0.02
(*E*)-ortho-Methoxycinnamal	11.61*	1526	[0.19]	17.18	2345	0.18
α-Calacorene	11.74	1536	0.02	12.11*	1848	[0.05]
Isocaryophyllene epoxide B	11.84	1544	0.02	12.11*	1848	[0.05]

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Unknown [m/z 180, 93 (70), 55 (62), 77 (55), 164 (55), 103 (50)]	11.93	1550	tr	20.92*	2779	0.06
Caryophyllenyl alcohol	12.07	1562	0.03	13.69	1992	0.03
(*E*)-Nerolidol	12.10	1564	0.01	13.78	2001	0.03
Spathulenol	12.18	1570	0.01	14.39	2059	0.02
Caryophyllene oxide	12.22*†	1574	0.19	12.79	1909	0.16
Caryophyllene oxide isomer	12.22*†	1574	[0.19]	12.71	1902	0.01
Globulol	12.26†	1576	[0.19]	13.88	2010	0.02
Unknown [m/z 161, 159 (69), 91 (41), 187 (38), 105 (37), 146 (35), 131 (34)...]	12.31	1581	0.01	14.96	2114	0.03
Tetradecanal	12.71	1613	0.08	12.49*	1881	[0.08]
Caryophylladienol I	12.86	1625	0.01	16.05	2225	0.02
τ-Cadinol	12.99	1636	0.01	14.88	2106	0.01
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.36	1666	0.02	16.81	2304	0.02
Benzyl benzoate	14.41	1756	0.43	18.85	2530	0.44
Phenylethyl benzoate	15.40	1843	0.01	19.57	2614	0.01
Unknown [m/z 93, 92 (57), 136 (34), 91 (23), 77 (13), 134 (11)...]	16.70	1965	0.01			
Unknown [m/z 69, 91 (57), 41 (49), 181 (32), 169 (25), 167 (22)...]	18.17	2110	0.06	20.92*	2779	[0.06]
Unknown [m/z 69, 91 (56), 41 (49), 169 (34), 239 (28), 93 (23)...]	18.26	2118	0.03	20.99	2787	0.03
Unknown [m/z 326, 148 (67), 147 (41), 117 (30), 91 (22)...]	21.75	2503	0.01			
Total identified	**98.98%**			**98.72%**		
Total reported	**99.10%**			**98.78%**		

*: 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

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