Date : March 16, 2021

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 21B23-FEP04
Customer identification : Cinnamon Leaf - Sri Lanka - 13223A-12
Type : Essential oil
Source : *Cinnamomum zeylanicum*
Customer : Fern & Petal

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
Analysis date : March 16, 2021

Checked and approved by :

Alexis St-Gelais, M. Sc., chimiste 2013-174

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Méthode certifiée ISO 17025:2017 Certified method

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PHYSICOCHEMICAL DATA

Physical aspect: Yellow liquid
Refractive index: 1.5369 ± 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
Styrene	tr	Simple phenolic
α-Thujene	0.01	Monoterpene
α-Pinene	0.03	Monoterpene
Camphene	0.01	Monoterpene
Benzaldehyde	0.06	Simple phenolic
Sabinene	tr	Monoterpene
β-Pinene	0.02	Monoterpene
Myrcene	0.04	Monoterpene
α-Phellandrene	0.62	Monoterpene
Octanal	0.01	Aliphatic aldehyde
Δ3-Carene	0.03	Monoterpene
α-Terpinene	0.02	Monoterpene
para-Cymene	0.22	Monoterpene
Limonene	0.32	Monoterpene
1,8-Cineole	0.34	Monoterpenic ether
Benzyl alcohol	0.02	Simple phenolic
Acetophenone	tr	Simple phenolic
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.01	Monoterpene
para-Cymenene	0.01	Monoterpene
trans-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Linalool	2.52	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
(3*E*)-2,7-Dimethyl-3,6-octadien-2-ol	0.01	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.01	Monoterpenic alcohol
trans-Pinocarveol	tr	Monoterpenic alcohol
Camphor	0.01	Monoterpenic ketone
Hydrocinnamal	0.01	Phenylpropanoid
Borneol	0.03	Monoterpenic alcohol
Benzyl acetate	tr	Phenolic ester
3-Methylbenzofuran?	0.01	Phenylpropanoid
Terpinen-4-ol	0.04	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α-Terpineol	0.14	Monoterpenic alcohol
cis-α-Phellandrene epoxide (IPP vs Me)	0.03	Monoterpenic ether
trans-Piperitol	tr	Monoterpenic alcohol
(*Z*)-Cinnamal	0.01	Phenylpropanoid
Hydrocinnamyl alcohol	0.06	Phenylpropanoid
ortho-Anisaldehyde	0.01	Simple phenolic
Phenylethyl acetate	0.01	Phenolic ester
(*E*)-Cinnamal	1.31	Phenylpropanoid
Chavicol	0.03	Phenylpropanoid
Safrole	0.42	Phenylpropanoid
(*E*)-Cinnamyl alcohol	0.07	Phenylpropanoid
ortho-Methoxyhydrocinnamal?	0.01	Phenylpropanoid

Eugenol	78.34	Phenylpropanoid
Hydrocinnamyl acetate	0.10	Phenylpropanoid ester
α-Copaene	0.23	Sesquiterpene
β-Elemene	tr	Sesquiterpene
Vanillin	0.07	Simple phenolic
α-Gurjunene	0.01	Sesquiterpene
Methyleugenol	0.04	Phenylpropanoid
β-Caryophyllene	4.26	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.01	Sesquiterpene
Aromadendrene	0.03	Sesquiterpene
(*E*)-Cinnamyl acetate	1.47	Phenylpropanoid ester
(*E*)-Cinnamic acid	0.01	Phenylpropanoid
α-Humulene	0.27	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
γ-Muurolene	0.01	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
Unknown	0.01	Sesquiterpene
ar-Curcumene	0.01	Sesquiterpene
Bicyclogermacrene	0.01	Sesquiterpene
Viridiflorene	0.03	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
Cubebol	0.01	Sesquiterpenic alcohol
trans-Calamenene	0.01	Sesquiterpene
δ-Cadinene	0.06	Sesquiterpene
trans-Cadina-1,4-diene	tr	Sesquiterpene
(*E*)-ortho-Methoxycinnamal	0.01	Phenylpropanoid
Eugenyl acetate	2.45	Phenylpropanoid ester
α-Calacorene	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.03	Sesquiterpenic ether
Unknown	0.09	Phenylpropanoid
Caryophyllenyl alcohol	tr	Sesquiterpenic alcohol
Spathulenol	0.05	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.05	Sesquiterpenic ether
Caryophyllene oxide	0.32	Sesquiterpenic ether
Humulene epoxide II	0.05	Sesquiterpenic ether
Tetradecanal	0.01	Aliphatic aldehyde
Caryophylladienol I	0.01	Sesquiterpenic alcohol
Caryophylladienol II	0.02	Sesquiterpenic alcohol
τ-Muurolol	tr	Sesquiterpenic alcohol
τ-Cadinol	0.01	Sesquiterpenic alcohol
α-Muurolol	0.01	Sesquiterpenic alcohol
Unknown	tr	Sesquiterpenic alcohol
α-Cadinol	0.01	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.03	Sesquiterpenic alcohol
(*E*)-Coniferyl alcohol	0.10	Phenylpropanoid
(*E*)-Coniferaldehyde	0.06	Phenylpropanoid
Benzyl benzoate	3.72	Phenolic ester
Phenylethyl benzoate	0.02	Phenolic ester
Unknown	0.03	Unknown
Unknown	0.01	Unknown
Unknown	tr	Unknown

Unknown	0.05	Unknown
Unknown	0.17	Lignan
Unknown	0.05	Lignan
Unknown	0.07	Unknown
Unknown	0.03	Unknown
Consolidated total	**99.07%**	

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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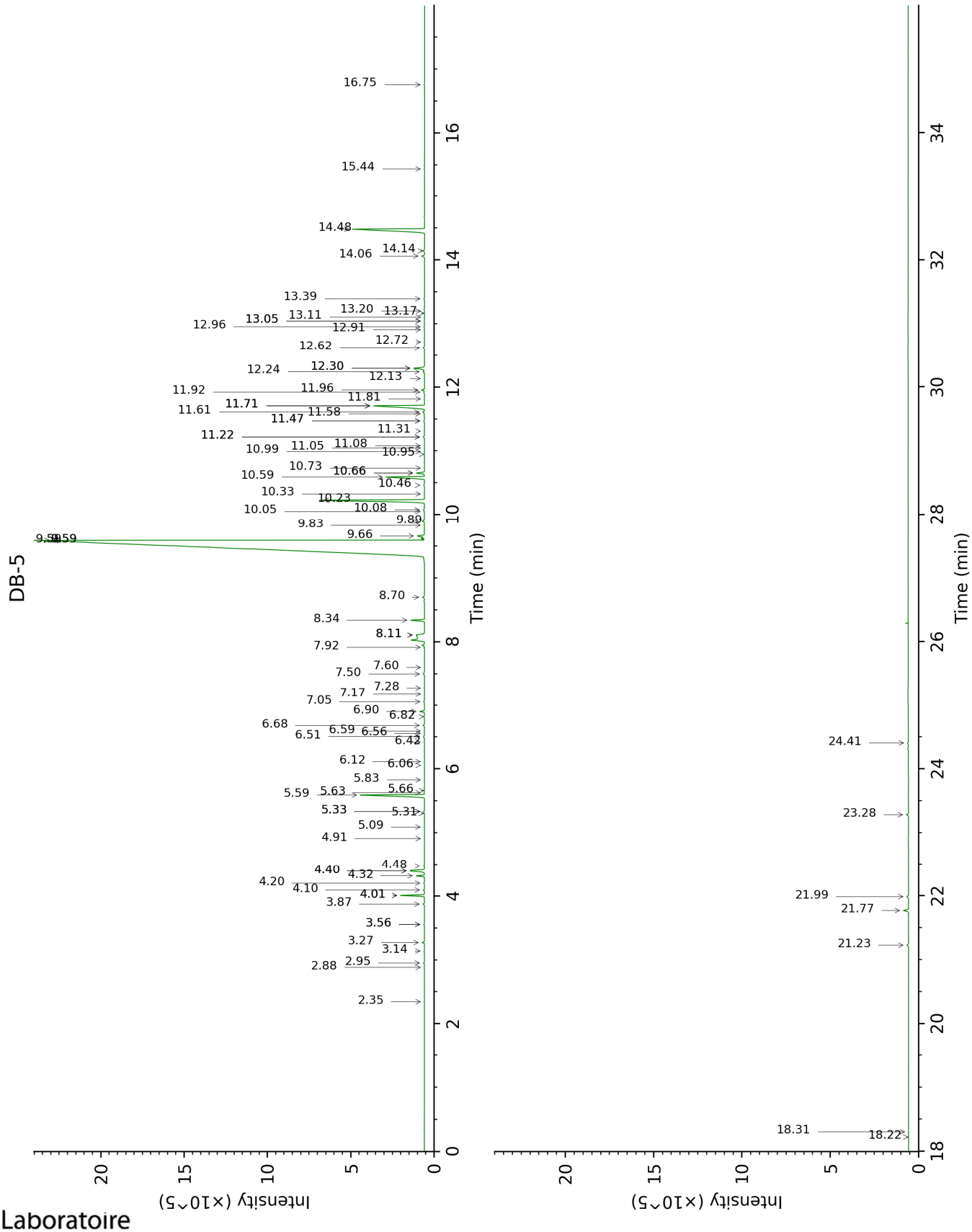
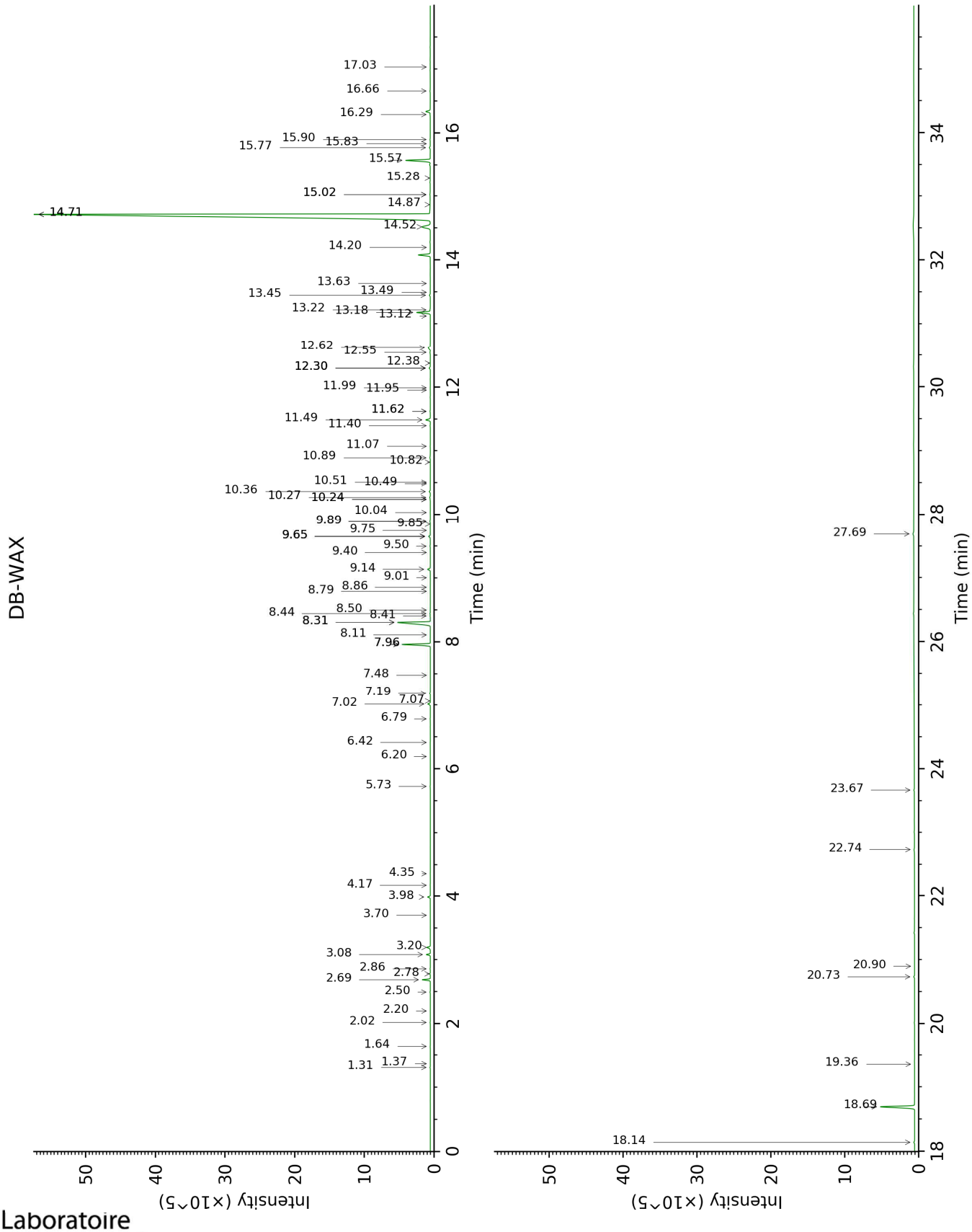

DB-5
Time (min)
Intensity (×10^5)
16.75
15.44
14.48
14.06
14.14
13.39
13.20
13.17
13.11
13.05
12.96
12.91
12.62
12.72
12.24
12.30
12.13
11.92
11.96
11.81
11.61
11.71
11.47
11.58
11.31
11.22
10.99
11.05
11.08
10.95
10.73
10.59
10.66
10.46
10.33
10.23
10.05
10.08
9.83
9.80
9.66
8.70
8.34
8.11
7.92
7.50
7.60
7.17
7.28
7.05
6.90
6.82
6.68
6.51
6.59
6.56
6.42
6.12
6.06
5.83
5.59
5.63
5.66
5.33
5.31
5.09
4.91
4.48
4.40
4.32
4.20
4.10
4.01
3.87
3.56
3.27
3.14
2.88
2.95
2.35
24.41
23.28
21.99
21.77
21.23
18.31
18.22


DB-WAX
Intensity (×10^5)
Time (min)
17.03
16.66
16.29
15.77
15.90
15.83
15.57
15.28
15.02
14.87
14.71
14.52
14.20
13.63
13.45
13.49
13.22
13.18
13.12
12.62
12.55
12.38
12.30
11.99
11.95
11.62
11.49
11.40
11.07
10.89
10.82
10.51
10.49
10.36
10.27
10.24
10.04
9.89
9.85
9.75
9.65
9.50
9.40
9.14
9.01
8.86
8.79
8.50
8.44
8.41
8.31
8.11
7.96
7.48
7.19
7.07
7.02
6.79
6.42
6.20
5.73
4.35
4.17
3.98
3.70
3.20
3.08
2.86
2.78
2.69
2.50
2.20
2.02
1.64
1.37
1.31
27.69
23.67
22.74
20.90
20.73
19.36
18.69
18.14

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Styrene	2.35	886	tr	3.70	1206	tr
α-Thujene	2.88	927	0.01	1.37	1001	tr
α-Pinene	2.95	931	0.03	1.31	992	0.02
Camphene	3.14	944	0.01	1.64	1028	0.01
Benzaldehyde	3.27	953	0.06	7.19	1461	0.06
Sabinene	3.56*	972	0.02	2.20	1085	tr
β-Pinene	3.56*	972	[0.02]	2.02	1067	0.02
Myrcene	3.87	993	0.04	2.78	1135	0.04
α-Phellandrene	4.01*	1002	0.62	2.69	1127	0.62
Octanal	4.01*	1002	[0.62]	4.35	1254	0.01
Δ3-Carene	4.10	1008	0.03	2.50	1112	0.03
α-Terpinene	4.20	1015	0.02	2.86	1141	0.02
para-Cymene	4.32	1022	0.22	3.98	1227	0.22
Limonene	4.40*	1027	0.64	3.08	1158	0.32
1,8-Cineole	4.40*	1027	[0.64]	3.20	1167	0.34
Benzyl alcohol	4.48	1032	0.02	11.62*	1821	0.03
Acetophenone	4.91	1060	tr	8.79	1585	0.01
cis-Linalool oxide (fur.)	5.09	1071	0.01	6.42	1403	0.01
Terpinolene	5.31	1085	0.01	4.17	1240	0.01
para-Cymenene	5.33*	1087	0.03	6.20	1387	0.01
trans-Linalool oxide (fur.)	5.33*	1087	[0.03]	6.78	1431	0.02
Linalool	5.59	1103	2.52	7.96*	1520	2.52
Nonanal	5.63	1105	0.01	5.73	1353	0.02
(3*E*)-2,7-Dimethyl-3,6-octadien-2-ol	5.66	1107	0.01	8.11	1531	0.01
cis-para-Menth-2-en-1-ol	5.83	1118	0.01	7.96*	1520	[2.52]
trans-Pinocarveol	6.06	1133	tr	9.00	1601	0.01
Camphor	6.12	1136	0.01	7.07	1452	0.01
Hydrocinnamal	6.42	1156	0.01	10.36	1713	0.11
Borneol	6.51	1162	0.03	9.65*	1654	0.16
Benzyl acetate	6.56	1165	tr	9.89*	1673	0.05
3-Methylbenzofuran?	6.59	1167	0.01	10.04	1686	0.01
Terpinen-4-ol	6.68	1173	0.04	8.44	1557	0.04
para-Cymen-8-ol	6.82	1182	0.02	11.40	1801	0.03
α-Terpineol	6.90	1187	0.14	9.65*	1654	[0.16]
cis-α-Phellandrene epoxide (IPP vs Me)	7.05	1197	0.03	10.89	1758	0.07
trans-Piperitol	7.18	1205	tr	10.24*	1702	0.02
(*Z*)-Cinnamal	7.28	1212	0.01	11.62*	1821	[0.03]
Hydrocinnamyl alcohol	7.50	1226	0.06	13.45	1988	0.09
ortho-Anisaldehyde	7.60	1233	0.01	12.30*	1881	0.12
Phenylethyl acetate	7.92	1254	0.01	10.82	1752	0.01
(*E*)-Cinnamal	8.11*†	1267	1.46	13.18	1962	1.31
Chavicol	8.11*†	1267	[1.46]	16.29	2271	0.03
Safrole	8.34	1283	0.42	11.49	1809	0.44
(*E*)-Cinnamyl alcohol	8.70	1307	0.07	15.77	2217	0.08
ortho-Methoxyhydrocinnamal?	9.59*	1370	78.28	13.63	2005	0.01

Eugenol	9.59*	1370	[78.28]	14.72*†	2110	78.35
Hydrocinnamyl acetate	9.59*	1370	[78.28]	12.30*	1881	[0.12]
α-Copaene	9.66	1375	0.23	7.02	1448	0.23
β-Elemene	9.83	1387	tr	8.31*	1547	4.27
Vanillin	9.89	1392	0.07	18.14	2473	0.07
α-Gurjunene	10.05	1403	0.01	7.48	1483	0.01
Methyleugenol	10.08	1405	0.04	13.12	1957	tr
β-Caryophyllene	10.23	1416	4.26	8.31*	1547	[4.27]
Caryophylla-4(12),8(13)-diene	10.33	1424	0.01	8.50	1562	0.01
Aromadendrene	10.46	1434	0.03	8.41	1554	0.03
(*E*)-Cinnamyl acetate	10.59	1443	1.47	14.52	2091	1.36
(*E*)-Cinnamic acid	10.66*	1448	0.27	20.90	2802	0.01
α-Humulene	10.66*	1448	[0.27]	9.14	1612	0.27
allo-Aromadendrene	10.73	1454	0.01	8.86	1590	0.01
γ-Muurolene	10.95	1470	0.01	9.40	1634	0.01
Germacrene D	10.99	1473	0.01	9.65*	1654	[0.16]
Unknown [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	11.05	1477	0.01	9.75	1662	tr
ar-Curcumene	11.08	1480	0.01	10.51	1725	0.01
Bicyclogermacrene	11.22*	1490	0.05	9.89*	1673	[0.05]
Viridiflorene	11.22*	1490	[0.05]	9.50	1642	0.03
α-Muurolene	11.31	1497	0.01	9.85	1670	tr
γ-Cadinene	11.47*	1509	0.04	10.24*	1702	[0.02]
Cubebol	11.47*	1509	[0.04]	12.38	1888	0.01
trans-Calamenene	11.58	1518	0.01	11.07	1773	0.02
δ-Cadinene	11.61	1520	0.06	10.27	1705	0.06
trans-Cadina-1,4-diene	11.71*	1528	2.49	10.49	1723	tr
(*E*)-ortho-Methoxycinnamal	11.71*	1528	[2.49]	17.03	2350	0.01
Eugenyl acetate	11.71*	1528	[2.49]	15.57	2196	2.45
α-Calacorene	11.82	1536	0.01	11.95	1850	0.01
Isocaryophyllene epoxide B	11.92	1545	0.03	11.99	1854	0.02
Unknown [m/z 180, 93 (70), 55 (62), 77 (55), 164 (55), 103 (50)]	11.96	1547	0.09	20.73	2781	0.08
Caryophyllenyl alcohol	12.13	1562	tr	13.50	1992	0.01
Spathulenol	12.24	1570	0.05	14.20	2060	0.01
Caryophyllene oxide isomer	12.30*	1574	0.42	12.55	1904	0.05
Caryophyllene oxide	12.30*	1574	[0.42]	12.62	1910	0.32
Humulene epoxide II	12.62	1600	0.05	13.22	1966	0.04
Tetradecanal	12.72	1608	0.01	12.30*	1881	[0.12]
Caryophylladienol I	12.91	1623	0.01	15.83	2223	0.01
Caryophylladienol II	12.96	1627	0.02	15.90	2230	0.02
τ-Muurolol	13.05*	1635	0.02	14.87	2125	tr
τ-Cadinol	13.05*	1635	[0.02]	14.72*†	2110	[78.35]
α-Muurolol	13.11	1640	0.01	15.02*	2141	0.03
Unknown cadinol analog II [m/z 95, 121	13.17	1645	tr	15.02*	2141	[0.03]

(73), 43 (57), 79 (43), 161 (43), 109)40)... 204 (35), 222 (2)]						
α-Cadinol	13.20	1648	0.01	15.28	2167	0.01
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.40	1664	0.03	16.66	2310	0.03
(*E*)-Coniferyl alcohol	14.06	1720	0.10	22.74	3043	0.07
(*E*)-Coniferaldehyde	14.14	1727	0.06	23.67	3171	0.05
Benzyl benzoate	14.48	1756	3.72	18.69	2536	3.56
Phenylethyl benzoate	15.44	1841	0.02	19.36	2614	0.01
Unknown [m/z 93, 92 (57), 136 (34), 91 (23), 77 (13), 134 (11)...]	16.76	1964	0.03			
Unknown [m/z 69, 91 (57), 41 (49), 181 (32), 169 (25), 167 (22)...]	18.22	2108	0.01			
Unknown [m/z 69, 91 (56), 41 (49), 169 (34), 239 (28), 93 (23)...]	18.31	2117	tr			
Unknown [m/z 151, 93 (44), 153 (29), 92 (21), 179 (18)... 314? (10)]	21.23	2436	0.05			
Unknown [m/z 326, 148 (67), 147 (41), 117 (30), 91 (22)...]	21.77	2499	0.17	27.69	3725	0.12
Unknown [m/z 326, 150 (54), 161 (42), 202 (41), 201 (28)]	21.99	2525	0.05			
Unknown [m/z 164, 165 (12), 55 (11), 81 (10), 69 (10), 95 (10)...]	23.28	2685	0.07			
Unknown [m/z 137, 166 (86), 177 (80), 138 (72), 342 (37), 178 (12)...]	24.41	2831	0.03			
Total identified		**98.58%**			**98.41%**	
Total reported		**99.09%**			**98.61%**	

*: 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