Date : February 09, 2021

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 21B01-PTH02
Customer identification : Cinnamon Bark - CC0107207R
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 : Sarah-Eve Tremblay, M. Sc. A., Chimiste
Analysis date : février 03, 2021

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

This report is an update of the version first issued on February 08, 2021 to correct a mistake in the customer identification.

Méthode certifiée ISO 17025:2017 Certified method

Laboratoire PhytoChemia

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid
Refractive index: 1.5850 ± 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
Ethyl 2-methylbutyrate	tr	Aliphatic ester
Ethylbenzene	tr	Simple phenolic
Styrene	0.02	Simple phenolic
Hashishene	tr	Monoterpene
Tricyclene	0.01	Monoterpene
α-Thujene	0.25	Monoterpene
α-Pinene	2.58	Monoterpene
Camphene	0.39	Monoterpene
α-Fenchene	0.01	Monoterpene
Thuja-2,4(10)-diene	tr	Monoterpene
Benzaldehyde	0.18	Simple phenolic
Sabinene	0.09	Monoterpene
β-Pinene	0.34	Monoterpene
6-Methyl-5-hepten-2-one	tr	Aliphatic ketone
Myrcene	0.10	Monoterpene
α-Phellandrene	1.19	Monoterpene
Octanal	0.01	Aliphatic aldehyde
Δ3-Carene	0.10	Monoterpene
α-Terpinene	0.53	Monoterpene
ortho-Cymene	0.02	Monoterpene
para-Cymene	1.49	Monoterpene
1,8-Cineole	3.37	Monoterpenic ether
Limonene	1.42	Monoterpene
Benzyl alcohol	0.02	Simple phenolic
(*Z*)-β-Ocimene	0.06	Monoterpene
(*E*)-β-Ocimene	0.04	Monoterpene
γ-Terpinene	0.08	Monoterpene
Acetophenone	0.01	Simple phenolic
cis-Sabinene hydrate	tr	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Isoterpinolene	0.01	Monoterpene
trans-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Terpinolene	0.10	Monoterpene
para-Cymenene	0.04	Monoterpene
Linalool	2.61	Monoterpenic alcohol
(3*E*)-2,7-Dimethyl-3,6-octadien-2-ol	0.04	Monoterpenic alcohol
endo-Fenchol	0.02	Monoterpenic alcohol
Phenylethyl alcohol	tr	Simple phenolic
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
α-Campholenal	0.01	Monoterpenic aldehyde
trans-Pinocarveol	0.02	Monoterpenic alcohol
Camphor	0.10	Monoterpenic ketone
Camphene hydrate	0.01	Monoterpenic alcohol
Hydrocinnamal	0.18	Phenylpropanoid
Borneol	0.06	Monoterpenic alcohol

Benzyl acetate	0.02	Phenolic ester
3-Methylbenzofuran?	0.03	Phenylpropanoid
Terpinen-4-ol	0.23	Monoterpenic alcohol
Cryptone	0.04	Normonoterpenic ketone
para-Cymen-8-ol	tr	Monoterpenic alcohol
α-Terpineol	0.37	Monoterpenic alcohol
γ-Terpineol	0.03	Monoterpenic alcohol
cis-α-Phellandrene epoxide (IPP vs Me)	0.04	Monoterpenic ether
trans-Piperitol	0.02	Monoterpenic alcohol
(*Z*)-Cinnamal	0.31	Phenylpropanoid
Hydrocinnamyl alcohol	0.07	Phenylpropanoid
ortho-Anisaldehyde	0.02	Simple phenolic
(*E*)-Cinnamal	71.56	Phenylpropanoid
Safrole	0.02	Phenylpropanoid
(*E*)-Cinnamyl alcohol	0.03	Phenylpropanoid
Carvacrol	0.01	Monoterpenic alcohol
α-Cubebene	0.01	Sesquiterpene
Eugenol	2.72	Phenylpropanoid
ortho-Methoxyhydrocinnamal?	tr	Phenylpropanoid
Hydrocinnamyl acetate	0.02	Phenylpropanoid ester
α-Copaene	0.29	Sesquiterpene
cis-β-Elemene	0.01	Sesquiterpene
β-Cubebene	0.02	Sesquiterpene
β-Elemene	0.02	Sesquiterpene
Isocaryophyllene	0.02	Sesquiterpene
α-Gurjunene	0.03	Sesquiterpene
β-Caryophyllene	2.71	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.02	Sesquiterpene
Aromadendrene	0.08	Sesquiterpene
(*E*)-Cinnamyl acetate	3.28	Phenylpropanoid ester
α-Humulene	0.47	Sesquiterpene
(*E*)-Isoeugenol	0.01	Phenylpropanoid
(*E*)-Cinnamic acid	0.11	Phenylpropanoid
allo-Aromadendrene	tr	Sesquiterpene
trans-Cadina-1(6),4-diene	0.01	Sesquiterpene
γ-Muurolene	0.01	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
ar-Curcumene	0.04	Sesquiterpene
Bicyclogermacrene	0.01	Sesquiterpene
Viridiflorene	0.01	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
2,3-Epoxycinnamyl acetate I?	0.01	Phenylpropanoid ester
γ-Cadinene	0.02	Sesquiterpene
Cubebol	0.03	Sesquiterpenic alcohol
δ-Cadinene	0.02	Sesquiterpene
(*E*)-ortho-Methoxycinnamal	0.15	Phenylpropanoid
α-Calacorene	0.04	Sesquiterpene
Isocaryophyllene epoxide B	0.04	Sesquiterpenic ether
Caryophyllenyl alcohol	0.04	Sesquiterpenic alcohol
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.23	Sesquiterpenic ether

Globulol	0.02	Sesquiterpenic alcohol
Humulene epoxide II	0.05	Sesquiterpenic ether
Tetradecanal	0.09	Aliphatic aldehyde
1,10-diepi-Cubenol	0.01	Sesquiterpenic alcohol
Caryophylladienol I	0.01	Sesquiterpenic alcohol
Caryophylladienol II	0.01	Sesquiterpenic alcohol
τ-Cadinol	0.01	Sesquiterpenic alcohol
α-Muurolol	0.01	Sesquiterpenic alcohol
Unknown	tr	Sesquiterpenic alcohol
α-Cadinol	tr	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.02	Sesquiterpenic alcohol
Benzyl benzoate	0.27	Phenolic ester
Phenylethyl benzoate	0.01	Phenolic ester
Unknown	0.01	Unknown
Unknown	0.04	Unknown
Unknown	0.02	Unknown
Unknown	0.01	Lignan
Consolidated total	**99.48%**	

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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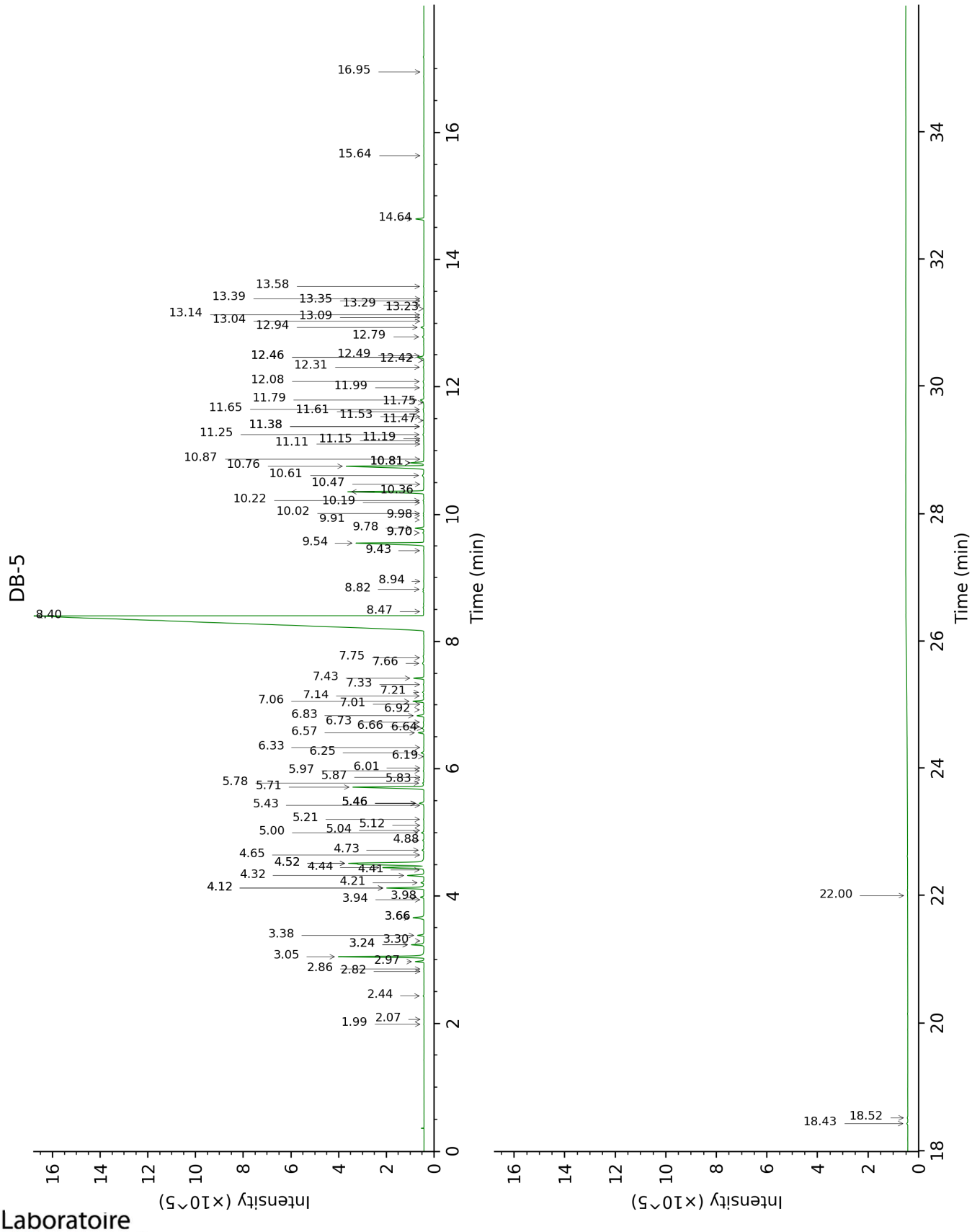
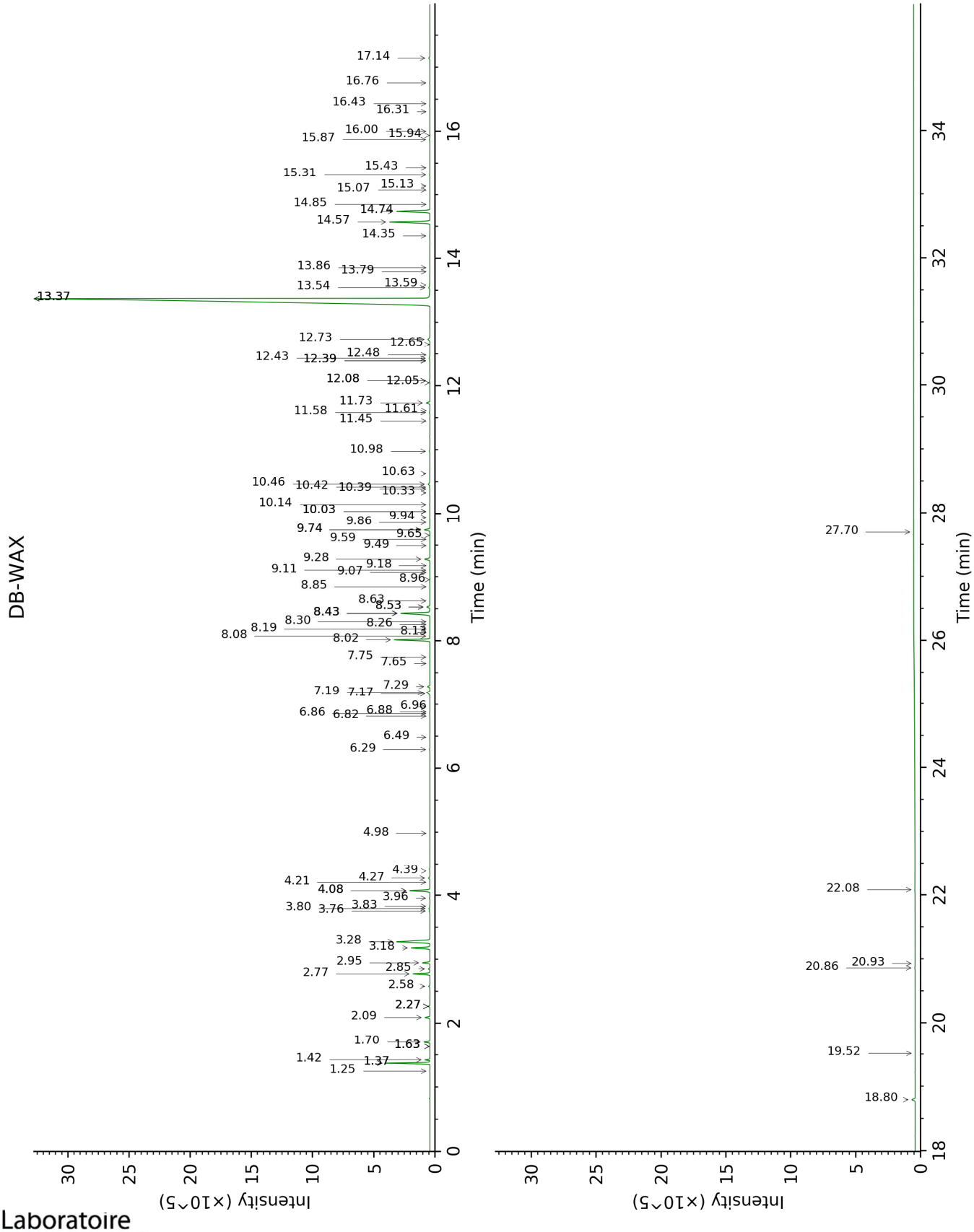

DB-5
16.95
15.64
14.64
13.58
13.39
13.35
13.29
13.23
13.14
13.04
13.09
12.94
12.79
12.46
12.49
12.42
12.31
12.08
11.99
11.79
11.75
11.65
11.61
11.53
11.47
11.38
11.25
11.19
11.11
11.15
10.87
10.81
10.76
10.61
10.47
10.36
10.22
10.19
10.02
9.91
9.98
9.78
9.70
9.54
9.43
8.94
8.82
8.47
8.40
7.75
7.66
7.43
7.33
7.21
7.14
7.06
7.01
6.92
6.83
6.73
6.66
6.64
6.57
6.33
6.25
6.19
6.01
5.97
5.87
5.83
5.78
5.71
5.46
5.43
5.21
5.12
5.04
5.00
4.88
4.73
4.65
4.52
4.44
4.41
4.32
4.21
4.12
3.98
3.94
3.66
3.38
3.30
3.24
3.05
2.97
2.86
2.82
2.44
2.07
1.99
22.00
18.52
18.43
Time (min)
Intensity (×10^5)


DB-WAX
Time (min)
Intensity (×10^5)
17.14
16.76
16.43
16.31
16.00
15.94
15.87
15.43
15.31
15.13
15.07
14.85
14.74
14.57
14.35
13.86
13.79
13.59
13.54
13.37
12.73
12.65
12.48
12.43
12.39
12.08
12.05
11.73
11.61
11.58
11.45
10.98
10.63
10.46
10.42
10.39
10.33
10.14
10.03
9.94
9.86
9.74
9.65
9.59
9.49
9.28
9.18
9.11
9.07
8.96
8.85
8.63
8.53
8.43
8.30
8.26
8.19
8.13
8.08
8.02
7.75
7.65
7.29
7.19
7.17
6.96
6.88
6.86
6.82
6.49
6.29
4.98
4.39
4.27
4.21
4.08
3.96
3.83
3.80
3.76
3.28
3.18
2.95
2.85
2.77
2.58
2.27
2.09
1.70
1.63
1.42
1.37
1.25
27.70
22.08
20.93
20.86
19.52
18.80

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Ethyl 2-methylbutyrate	1.99	851	tr	1.63*	1023	0.02
Ethylbenzene	2.07	857	tr	2.27*	1085	0.10
Styrene	2.44	887	0.02	3.83	1211	0.03
Hashishene	2.82	916	tr	1.37*	995	2.59
Tricyclene	2.86	918	0.01	1.25	975	0.01
α-Thujene	2.97	926	0.25	1.42	1002	0.27
α-Pinene	3.05	931	2.58	1.37*	995	[2.59]
Camphene	3.24*	943	0.40	1.70	1029	0.39
α-Fenchene	3.24*	943	[0.40]	1.63*	1023	[0.02]
Thuja-2,4(10)-diene	3.30	947	tr	2.27*	1085	[0.10]
Benzaldehyde	3.38	953	0.18	7.29	1462	0.19
Sabinene	3.66*	971	0.43	2.27*	1085	[0.10]
β-Pinene	3.66*	971	[0.43]	2.09	1068	0.34
6-Methyl-5-hepten-2-one	3.94	989	tr	4.98	1297	tr
Myrcene	3.98	992	0.10	2.85	1135	0.11
α-Phellandrene	4.12*	1002	1.20	2.78	1128	1.19
Octanal	4.12*	1002	[1.20]	4.39	1253	0.01
Δ3-Carene	4.21	1007	0.10	2.58	1113	0.09
α-Terpinene	4.32	1014	0.53	2.95	1142	0.53
ortho-Cymene	4.41	1019	0.02	4.08*	1230	1.51
para-Cymene	4.44	1022	1.49	4.08*	1230	[1.51]
1,8-Cineole	4.52*	1026	4.80	3.28	1168	3.37
Limonene	4.52*	1026	[4.80]	3.18	1160	1.42
Benzyl alcohol	4.65	1035	0.02	11.61	1811	0.01
(*Z*)-β-Ocimene	4.73	1039	0.06	3.76	1206	0.07
(*E*)-β-Ocimene	4.88	1049	0.04	3.96	1221	0.04
γ-Terpinene	5.00	1056	0.08	3.80	1209	0.08
Acetophenone	5.04	1059	0.01	8.85	1582	tr
cis-Sabinene hydrate	5.12	1064	tr	6.88	1432	tr
cis-Linalool oxide (fur.)	5.21	1070	0.02	6.48	1402	0.02
Isoterpinolene	5.43	1084	0.01	4.21	1239	0.01
trans-Linalool oxide (fur.)	5.46*	1086	0.16	6.86	1430	0.02
Terpinolene	5.46*	1086	[0.16]	4.27	1244	0.10
para-Cymenene	5.46*	1086	[0.16]	6.29	1389	0.04
Linalool	5.71	1102	2.61	8.02	1517	2.62
(3*E*)-2,7-Dimethyl-3,6-octadien-2-ol	5.78	1106	0.04	8.19	1530	0.02
endo-Fenchol	5.83	1109	0.02	8.26	1536	0.02
Phenylethyl alcohol	5.87	1112	tr	12.05	1850	0.01
cis-para-Menth-2-en-1-ol	5.97	1118	0.02	8.08	1522	0.02
α-Campholenal	6.01	1121	0.01	6.96	1438	0.01
trans-Pinocarveol	6.19	1133	0.02	9.11	1602	0.02
Camphor	6.25	1137	0.10	7.17	1454	0.07
Camphene hydrate	6.33	1142	0.01	8.43*	1550	2.72
Hydrocinnamal	6.56	1157	0.18	10.46	1713	0.17
Borneol	6.64	1162	0.06	9.74*	1654	0.46
Benzyl acetate	6.66	1163	0.02	9.94	1670	0.02

3-Methylbenzofuran?	6.73	1168	0.03	10.14	1686	0.02
Terpinen-4-ol	6.83	1174	0.23	8.53*	1557	0.26
Cryptone	6.92	1180	0.04	9.07	1600	tr
para-Cymen-8-ol	7.01	1186	tr	11.45	1797	tr
α-Terpineol	7.06	1189	0.37	9.74*	1654	[0.46]
γ-Terpineol	7.14	1195	0.03	9.86	1663	0.02
cis-α-Phellandrene epoxide (IPP vs Me)	7.21	1199	0.04	10.98	1757	0.05
trans-Piperitol	7.33	1207	0.02	10.33	1702	0.01
(*Z*)-Cinnamal	7.43	1214	0.31	11.73	1822	0.30
Hydrocinnamyl alcohol	7.66	1230	0.07	13.54	1987	0.12
ortho-Anisaldehyde	7.75	1236	0.02	12.39*	1881	0.03
(*E*)-Cinnamal	8.40	1282	71.56	13.37*	1971	71.51
Safrole	8.47	1286	0.02	11.58	1808	0.05
(*E*)-Cinnamyl alcohol	8.82	1305	0.03	15.87	2215	0.04
Carvacrol	8.94	1314	0.01	15.31	2159	0.03
α-Cubebene	9.42	1348	0.01	6.82	1427	0.01
Eugenol	9.54	1356	2.72	14.74	2101	2.73
ortho-Methoxyhydrocinnamal?	9.70*	1368	0.03	13.79	2010	tr
Hydrocinnamyl acetate	9.70*	1368	[0.03]	12.39*	1881	[0.03]
α-Copaene	9.78	1373	0.29	7.19	1455	0.30
cis-β-Elemene	9.91	1382	0.01	8.30	1540	tr
β-Cubebene	9.98	1387	0.02	7.75	1497	0.02
β-Elemene	10.02	1390	0.02	8.43*	1550	[2.72]
Isocaryophyllene	10.19	1402	0.02	8.13	1526	0.01
α-Gurjunene	10.22	1404	0.03	7.65	1489	0.01
β-Caryophyllene	10.36	1414	2.71	8.43*	1550	[2.72]
Caryophylla-4(12),8(13)-diene	10.48	1423	0.02	8.63	1565	0.02
Aromadendrene	10.61	1433	0.08	8.53*	1557	[0.26]
(*E*)-Cinnamyl acetate	10.76†	1444	3.75	14.57	2085	3.28
α-Humulene	10.81*†	1448	[3.75]	9.28	1616	0.47
(*E*)-Isoeugenol	10.81*†	1448	[3.75]	16.43	2274	0.01
(*E*)-Cinnamic acid	10.81*†	1448	[3.75]	22.08	2939	0.11
allo-Aromadendrene	10.87	1452	tr	8.96	1591	tr
trans-Cadina-1(6),4-diene	11.10	1470	0.01	9.18	1608	tr
γ-Muurolene	11.15	1473	0.01	9.49	1634	0.01
Germacrene D	11.19	1476	0.01	9.65	1647	0.01
ar-Curcumene	11.25	1481	0.04	10.63	1727	0.01
Bicyclogermacrene	11.38*	1490	0.02	10.03*	1678	0.03
Viridiflorene	11.38*	1490	[0.02]	9.59	1642	0.01
α-Muurolene	11.47	1497	0.01	10.03*	1678	[0.03]
2,3-Epoxycinnamyl acetate I?	11.53	1502	0.01	16.31	2261	0.01
γ-Cadinene	11.61	1508	0.02	10.39	1706	0.01
Cubebol	11.65	1510	0.03	12.48	1889	0.01
δ-Cadinene	11.75	1519	0.02	10.42	1709	0.03
(*E*)-ortho-Methoxycinnamal	11.79	1522	0.15	17.14	2350	0.10
α-Calacorene	11.99	1537	0.04	12.08*	1853	0.06

Isocaryophyllene epoxide B	12.08	1545	0.04	12.08*	1853	[0.06]
Caryophyllenyl alcohol	12.31	1562	0.04	13.59	1990	0.04
Spathulenol	12.42	1571	0.01	14.35	2064	0.03
Caryophyllene oxide isomer	12.46*	1574	0.25	12.66	1904	0.02
Caryophyllene oxide	12.46*	1574	[0.25]	12.74	1911	0.23
Globulol	12.49	1576	0.02	13.86	2016	0.01
Humulene epoxide II	12.79	1600	0.05	13.37*	1971	[71.51]
Tetradecanal	12.94	1612	0.09	12.43	1884	0.10
1,10-diepi-Cubenol	13.04	1620	0.01	13.37*	1971	[71.51]
Caryophylladienol I	13.09	1625	0.01	16.00	2229	0.02
Caryophylladienol II	13.14	1629	0.01	15.94	2222	tr
τ-Cadinol	13.23	1636	0.01	14.85	2112	0.01
α-Muurolol	13.29	1641	0.01	15.13	2141	0.01
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109)40)... 204 (35), 222 (2)]	13.35	1646	tr	15.07	2135	tr
α-Cadinol	13.39	1649	tr	15.43	2171	0.01
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.58	1665	0.02	16.76	2308	0.03
Benzyl benzoate	14.64	1755	0.27	18.80	2534	0.28
Phenylethyl benzoate	15.64	1843	0.01	19.52	2618	0.01
Unknown [m/z 93, 92 (57), 136 (34), 91 (23), 77 (13), 134 (11)...]	16.95	1965	0.01			
Unknown [m/z 69, 91 (57), 41 (49), 181 (32), 169 (25), 167 (22)...]	18.43	2110	0.04	20.86	2782	0.03
Unknown [m/z 69, 91 (56), 41 (49), 169 (34), 239 (28), 93 (23)...]	18.52	2119	0.02	20.93	2791	0.01
Unknown [m/z 326, 148 (67), 147 (41), 117 (30), 91 (22)...]	22.00	2501	0.01	27.70	3705	0.01
Total identified		**99.30%**			**99.23%**	
Total reported		**99.38%**			**99.28%**	

*: 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