Date : August 17, 2020

Certificate of Analysis – GC Profiling

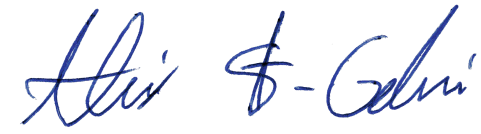
Sample identification

Internal code : 20H14-PTH22
Customer identification : Cinnamon Leaf - CB0104206R
Type : Essential oil
Source : *Cinnamomum verum*
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 : Fanny Charlier, B. Sc., chimiste à l'entraînement
Analysis date : August 17, 2020

Checked and approved by :



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

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Méthode certifiée ISO 17025:2017 Certified method

Laboratoire PhytoChemia

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PHYSICOCHEMICAL DATA

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

ISO 3524:2004 - OIL OF CINNAMON LEAF, SRI LANKA TYPE

Compound	Min. %	Max. %	Observed %	Complies?
Benzyl benzoate	2.0	4.0	3.3	Yes
Eugenyl acetate	1.3	3.0	2.5	Yes
(E)-Cinnamyl acetate	1.1	1.8	1.4	Yes
Eugenol	70.0	83.0	75.0	Yes
(E)-Cinnamal	0.8	1.5	1.2	Yes
Refractive index	1.5270	1.5400	1.5332	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

Analysis summary – Consolidated contents

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Hexanal	tr	Aliphatic aldehyde
Styrene	0.02	Simple phenolic
Tricyclene	0.01	Monoterpene
α-Thujene	0.13	Monoterpene
α-Pinene	0.94	Monoterpene
Camphene	0.30	Monoterpene
α-Fenchene	0.01	Monoterpene
Benzaldehyde	0.15	Simple phenolic
β-Pinene	0.30	Monoterpene
Sabinene	0.02	Monoterpene
Myrcene	0.13	Monoterpene
Pseudolimonene	0.02	Monoterpene
α-Phellandrene	1.01	Monoterpene
Octanal	0.03	Aliphatic aldehyde
Δ3-Carene	0.09	Monoterpene
α-Terpinene	0.11	Monoterpene
ortho-Cymene	0.02	Monoterpene
para-Cymene	0.72	Monoterpene
Limonene	0.29	Monoterpene
β-Phellandrene	0.37	Monoterpene
1,8-Cineole	0.13	Monoterpenic ether
Benzyl alcohol	0.03	Simple phenolic
(*Z*)-β-Ocimene	0.03	Monoterpene
(*E*)-β-Ocimene	0.04	Monoterpene
γ-Terpinene	0.03	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Isoterpinolene	0.01	Monoterpene
trans-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
Terpinolene	0.09	Monoterpene
trans-Sabinene hydrate	0.01	Monoterpenic alcohol
Linalool	2.12	Monoterpenic alcohol
(3*E*)-2,7-Dimethyl-3,6-octadien-2-ol	0.02	Monoterpenic alcohol
Phenylethyl alcohol	0.01	Simple phenolic
cis-para-Menth-2-en-1-ol	0.01	Monoterpenic alcohol
Camphor	0.01	Monoterpenic ketone
trans-Sabinol	0.01	Monoterpenic alcohol
Camphene hydrate	0.01	Monoterpenic alcohol
Hydrocinnamal	0.05	Phenylpropanoid
Benzyl acetate	0.08	Phenolic ester
3-Methylbenzofuran?	0.01	Phenylpropanoid
Terpinen-4-ol	0.09	Monoterpenic alcohol
para-Cymen-8-ol	0.03	Monoterpenic alcohol

α-Terpineol	0.26	Monoterpenic alcohol
cis-α-Phellandrene epoxide (IPP vs Me)	0.05	Monoterpenic ether
trans-Piperitol	0.01	Monoterpenic alcohol
Hydrocinnamyl alcohol	0.08	Phenylpropanoid
ortho-Anisaldehyde	0.02	Simple phenolic
Chavicol	0.13	Phenylpropanoid
(*E*)-Cinnamal	1.18	Phenylpropanoid
Safrole	0.96	Phenylpropanoid
(*E*)-Cinnamyl alcohol	0.13	Phenylpropanoid
Carvacrol	0.09	Monoterpenic alcohol
α-Cubebene	0.02	Sesquiterpene
Eugenol	75.02	Phenylpropanoid
Hydrocinnamyl acetate	0.10	Phenylpropanoid ester
α-Copaene	0.53	Sesquiterpene
cis-β-Elemene	0.02	Sesquiterpene
β-Cubebene	0.03	Sesquiterpene
β-Elemene	0.02	Sesquiterpene
Methyleugenol	0.04	Phenylpropanoid
β-Caryophyllene	2.98	Sesquiterpene
(*E*)-Cinnamyl acetate	1.45	Phenylpropanoid ester
(*E*)-Isoeugenol	0.03	Phenylpropanoid
α-Humulene	0.49	Sesquiterpene
allo-Aromadendrene	0.03	Sesquiterpene
γ-Gurjunene	0.01	Sesquiterpene
trans-Cadina-1(6),4-diene	0.02	Sesquiterpene
γ-Muurolene	0.02	Sesquiterpene
Unknown	0.02	Sesquiterpene
Bicyclogermacrene	0.04	Sesquiterpene
Viridiflorene	0.06	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
γ-Cadinene	0.04	Sesquiterpene
δ-Cadinene	0.07	Sesquiterpene
trans-Calamenene	0.03	Sesquiterpene
Eugenyl acetate	2.46	Phenylpropanoid ester
trans-Cadina-1,4-diene	0.02	Sesquiterpene
α-Calacorene	0.02	Sesquiterpene
(*E*)-ortho-Methoxycinnamal	0.01	Phenylpropanoid
β-Calacorene	0.01	Sesquiterpene
Caryophyllenyl alcohol	0.01	Sesquiterpenic alcohol
Spathulenol	0.06	Sesquiterpenic alcohol
Caryophyllene oxide	0.41	Sesquiterpenic ether
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Humulene epoxide II	0.08	Sesquiterpenic ether
1,10-diepi-Cubenol	0.02	Sesquiterpenic alcohol
Caryophylladienol I	0.02	Sesquiterpenic alcohol
Caryophylladienol II	0.03	Sesquiterpenic alcohol
τ-Muurolol	0.03	Sesquiterpenic alcohol
Unknown	0.02	Sesquiterpenic alcohol
α-Cadinol	0.01	Sesquiterpenic alcohol
(*E*)-Coniferyl alcohol	0.04	Phenylpropanoid
Benzyl benzoate	3.33	Phenolic ester
Phenylethyl benzoate	0.03	Phenolic ester

Unknown	0.07	Unknown
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Unknown	0.01	Unknown
Unknown	0.08	Lignan
Unknown	0.02	Lignan
Unknown	0.06	Unknown
Unknown	0.02	Unknown
Consolidated total	**98.43%**	

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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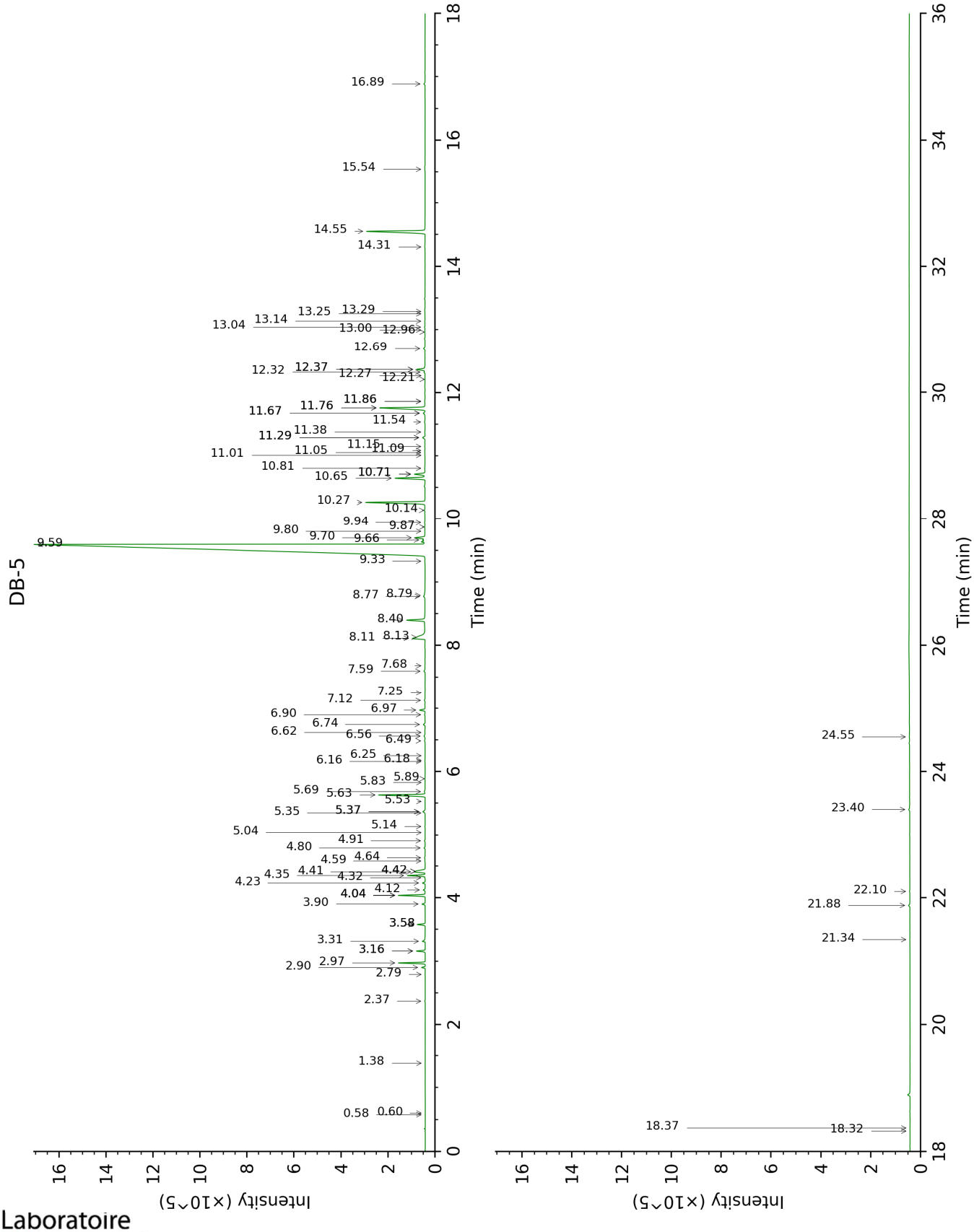
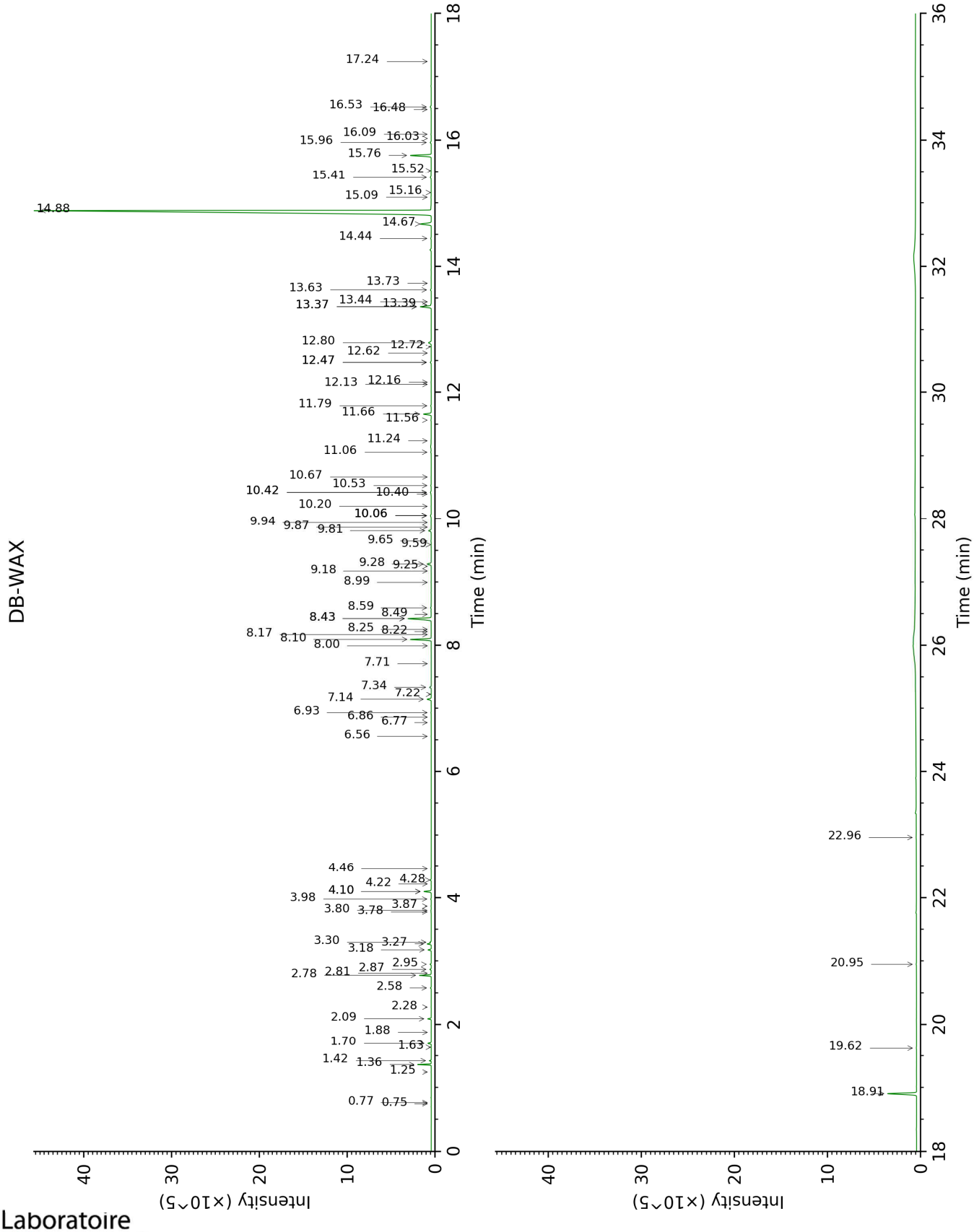

DB-5
Time (min)
Intensity (×10^5)
16.89
15.54
14.55
14.31
13.04
13.14
13.25
13.29
13.00
12.96
12.69
12.32
12.37
12.27
12.21
11.67
11.76
11.86
11.54
11.29
11.38
11.01
11.05
11.15
11.09
10.81
10.65
10.71
10.27
10.14
9.80
9.94
9.87
9.70
9.66
9.59
9.33
8.77
8.79
8.40
8.11
8.13
7.59
7.68
7.12
7.25
6.90
6.97
6.74
6.62
6.56
6.49
6.16
6.25
6.18
5.83
5.89
5.69
5.63
5.53
5.35
5.37
5.14
5.04
4.91
4.80
4.59
4.64
4.42
4.35
4.41
4.32
4.23
4.12
4.04
3.90
3.58
3.31
3.16
2.90
2.97
2.79
2.37
1.38
0.58
0.60
24.55
23.40
22.10
21.88
21.34
18.37
18.32


DB-WAX
Time (min)
Intensity (×10^5)
17.24
16.53
16.48
16.09
16.03
15.96
15.76
15.52
15.41
15.16
15.09
14.88
14.67
14.44
13.73
13.63
13.44
13.39
13.37
12.80
12.72
12.62
12.47
12.16
12.13
11.79
11.66
11.56
11.24
11.06
10.67
10.53
10.42
10.40
10.20
10.06
9.94
9.87
9.81
9.65
9.59
9.28
9.25
9.18
8.99
8.59
8.49
8.43
8.25
8.22
8.17
8.10
8.00
7.71
7.34
7.22
7.14
6.93
6.86
6.77
6.56
4.46
4.28
4.22
4.10
3.98
3.87
3.80
3.78
3.30
3.27
3.18
2.95
2.87
2.81
2.78
2.58
2.28
2.09
1.88
1.70
1.63
1.42
1.36
1.25
0.77
0.75
22.96
20.95
19.62
18.91

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.58	642	tr	0.77	888	tr
2-Methylbutyral	0.60	652	tr	0.75	881	tr
Hexanal	1.38	800	tr	1.88	1046	0.01
Styrene	2.37	886	0.02	3.78	1206	0.03
Tricyclene	2.79	918	0.01	1.24	973	0.01
α-Thujene	2.90	925	0.13	1.42	1000	0.12
α-Pinene	2.97	930	0.94	1.36	992	0.90
Camphene	3.16*	943	0.33	1.70	1028	0.30
α-Fenchene	3.16*	943	[0.33]	1.63	1022	0.01
Benzaldehyde	3.32	953	0.15	7.34	1462	0.19
β-Pinene	3.58*	971	0.31	2.09	1067	0.30
Sabinene	3.58*	971	[0.31]	2.28	1086	0.02
Myrcene	3.90	992	0.13	2.87	1135	0.13
Pseudolimonene	4.04*	1002	1.06	2.81	1130	0.02
α-Phellandrene	4.04*	1002	[1.06]	2.78	1128	1.01
Octanal	4.04*	1002	[1.06]	4.46	1255	0.03
Δ3-Carene	4.12	1007	0.09	2.58	1112	0.08
α-Terpinene	4.23	1014	0.11	2.95	1141	0.11
ortho-Cymene	4.32	1019	0.02	4.10*	1229	0.73
para-Cymene	4.35	1021	0.72	4.10*	1229	[0.73]
Limonene	4.41†	1025	0.81	3.18	1159	0.29
β-Phellandrene	4.42*†	1026	[0.81]	3.27	1167	0.37
1,8-Cineole	4.42*†	1026	[0.81]	3.30	1169	0.13
Benzyl alcohol	4.59	1036	0.03	11.79	1820	0.06
(*Z*)-β-Ocimene	4.64	1040	0.03	3.80	1207	0.04
(*E*)-β-Ocimene	4.80	1050	0.04	3.98	1220	0.05
γ-Terpinene	4.91	1057	0.03	3.87	1212	0.03
cis-Sabinene hydrate	5.04	1065	0.01	6.86	1426	0.01
cis-Linalool oxide (fur.)	5.14	1071	0.02	6.56	1403	0.02
Isoterpinolene	5.35	1084	0.01	4.22	1238	0.01
trans-Linalool oxide (fur.)	5.37*	1086	0.13	6.93	1431	0.03
Terpinolene	5.37*	1086	[0.13]	4.28	1242	0.09
trans-Sabinene hydrate	5.53	1096	0.01	8.00	1510	0.01
Linalool	5.63	1102	2.12	8.10	1518	2.13
(3*E*)-2,7-Dimethyl-3,6-octadien-2-ol	5.69	1106	0.02	8.25	1530	0.02
Phenylethyl alcohol	5.83	1115	0.01	12.13	1849	0.01
cis-para-Menth-2-en-1-ol	5.89	1119	0.01	8.17	1524	0.01
Camphor	6.16	1136	0.01	7.22	1452	0.01
trans-Sabinol	6.18	1137	0.01	9.87	1658	0.02
Camphene hydrate	6.25	1142	0.01	8.49	1549	0.02
Hydrocinnamal	6.48	1157	0.05	10.53	1712	0.08

Benzyl acetate	6.56	1162	0.08	10.06*	1673	0.14
3-Methylbenzofuran?	6.62	1166	0.01	10.20	1685	0.02
Terpinen-4-ol	6.74	1174	0.09	8.59	1557	0.09
para-Cymen-8-ol	6.90	1184	0.03	11.56	1800	0.04
α-Terpineol	6.97	1188	0.26	9.81	1653	0.31
cis-α-Phellandrene epoxide (IPP vs Me)	7.12	1198	0.05	11.06	1757	0.06
trans-Piperitol	7.25	1206	0.01	10.42*	1703	0.14
Hydrocinnamyl alcohol	7.59	1230	0.08	13.63	1985	0.10
ortho-Anisaldehyde	7.68	1235	0.02	12.48*	1880	0.12
Chavicol	8.11†	1264	1.32	16.53	2273	0.13
(*E*)-Cinnamal	8.13†	1266	[1.32]	13.36*	1961	1.31
Safrole	8.40	1284	0.96	11.66	1808	0.89
(*E*)-Cinnamyl alcohol	8.77	1306	0.13	15.96	2214	0.12
Carvacrol	8.79	1307	0.09	15.41	2158	0.15
α-Cubebene	9.33	1345	0.02	6.77	1420	0.02
Eugenol	9.59	1364	75.02	14.88	2105	74.15
Hydrocinnamyl acetate	9.66	1369	0.10	12.48*	1880	[0.12]
α-Copaene	9.70	1372	0.53	7.14	1447	0.46
cis-β-Elemene	9.80	1379	0.02	8.22	1528	0.01
β-Cubebene	9.87	1384	0.03	7.71	1489	0.01
β-Elemene	9.94	1389	0.02	8.42*	1544	2.97
Methyleugenol	10.14	1403	0.04	13.39	1964	0.05
β-Caryophyllene	10.27	1412	2.98	8.42*	1544	[2.97]
(*E*)-Cinnamyl acetate	10.65	1441	1.45	14.67	2085	1.50
(*E*)-Isoeugenol	10.71*	1446	0.55	16.48	2268	0.03
α-Humulene	10.71*	1446	[0.55]	9.28	1611	0.49
allo-Aromadendrene	10.81	1453	0.03	8.99	1588	0.02
γ-Gurjunene	11.01	1468	0.01	9.18	1602	0.01
trans-Cadina-1(6),4-diene	11.05	1471	0.02	9.25	1608	0.02
γ-Muurolene	11.09	1474	0.02	9.59	1635	0.02
Unknown [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	11.15	1478	0.02	9.94	1664	0.02
Bicyclogermacrene	11.29*	1489	0.14	10.06*	1673	[0.14]
Viridiflorene	11.29*	1489	[0.14]	9.65	1640	0.06
α-Muurolene	11.38	1495	0.02	10.06*	1673	[0.14]
γ-Cadinene	11.54	1508	0.04	10.40	1701	0.04
δ-Cadinene	11.67*	1518	0.10	10.42*	1703	[0.14]
trans-Calamenene	11.67*	1518	[0.10]	11.24	1772	0.03
Eugenyl acetate	11.76*	1525	2.48	15.76	2193	2.46
trans-Cadina-1,4-diene	11.76*	1525	[2.48]	10.67	1724	0.02

α-Calacorene	11.86*	1533	0.04	12.16	1852	0.02
(*E*)-ortho-Methoxycinnamal	11.86*	1533	[0.04]	17.24	2349	0.01
β-Calacorene	12.21	1560	0.01	12.62	1893	0.01
Caryophyllenyl alcohol	12.27	1565	0.01	13.73	1995	0.01
Spathulenol	12.32	1570	0.06	14.44	2063	0.07
Caryophyllene oxide	12.36*	1573	0.43	12.80	1909	0.41
Caryophyllene oxide isomer	12.36*	1573	[0.43]	12.72	1902	0.02
Humulene epoxide II	12.69	1599	0.08	13.36*	1961	[1.31]
1,10-diepi-Cubenol	12.96	1621	0.02	13.44	1968	0.01
Caryophylladienol I	13.00	1624	0.02	16.03	2221	0.01
Caryophylladienol II	13.04	1627	0.03	16.09	2228	0.03
τ-Muurolol	13.14	1635	0.03	15.09	2126	0.04
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109)40)... 204 (35), 222 (2)]	13.25	1645	0.02	15.16	2134	0.03
α-Cadinol	13.29	1648	0.01	15.52	2169	0.03
(*E*)-Coniferyl alcohol	14.31	1734	0.04	22.96	3042	0.03
Benzyl benzoate	14.55	1755	3.33	18.91	2535	3.37
Phenylethyl benzoate	15.54	1843	0.03	19.62	2618	0.03
Unknown [m/z 93, 92 (57), 136 (34), 91 (23), 77 (13), 134 (11)...]	16.89	1968	0.07			
Unknown [m/z 69, 91 (57), 41 (49), 181 (32), 169 (25), 167 (22)...]	18.32	2109	0.01	20.95	2780	0.04
Unknown [m/z 69, 91 (56), 41 (49), 169 (34), 239 (28), 93 (23)...]	18.37	2114	0.01			
Unknown [m/z 151, 93 (44), 153 (29), 92 (21), 179 (18)... 314? (10)]	21.34	2438	0.01			
Unknown [m/z 326, 148 (67), 147 (41), 117 (30), 91 (22)...]	21.88	2500	0.08			
Unknown [m/z 326, 150 (54), 161	22.10	2527	0.02			

(42), 202 (41), 201 (28)]				
Unknown [m/z 164, 165 (12), 55 (11), 81 (10), 69 (10), 95 (10)...]	23.40	2687	0.06	
Unknown [m/z 137, 166 (86), 177 (80), 138 (72), 342 (37), 178 (12)...]	24.55	2836	0.02	
Total identified		**98.26%**		**97.51%**
Total reported		**98.56%**		**97.60%**

*: 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