PLANT THERAPY
100% PURE ESSENTIAL OILS

GC/MS BATCH NUMBER: CA0103

ESSENTIAL OIL: CINNAMON CASSIA
BOTANICAL NAME: CINNAMOMUM CASSIA
ORIGIN: CHINA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF CINNAOMON CASSIA OIL	%
(E)-CINNAMAL	75.3
(E)-ORTHO-METHOXYCINNAMAL	9.1
(E)-CINNAMYL ACETATE	3.2
COUMARIN	2.0

Comments from Robert Tisserand: Sweet, powdery-spicy odor quality. Eleven of 12 key ISO constituents are within range, with phenylethanol very slightly high.

Date : June 07, 2018

Certificate of Analysis – GC Profiling

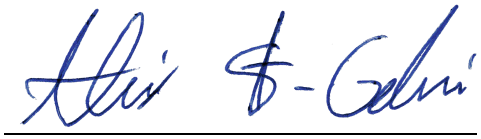
Sample identification

Internal code : 18F06-PTH7-1-CC
Customer identification : Cinnamon Cassia - China - CA010365R
Type : Essential oil
Source : *Cinnamomum cassia*
Customer : Plant Therapy

Analysis

Method: PC-PA-014-17J19 - 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 : June 07, 2018

Checked and approved by :



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

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PHYSICOCHEMICAL DATA

Physical aspect: Yellow liquid
Refractive index: 1.6050 ± 0.0003 (20 °C)

COMPLIANCE WITH ISO 3216:1997 (CASSIA – CHINA)

Compounds	China		Observed %	Satisfied?
	% min	% max		
(E)-Cinnamaldehyde	70	88	75.3	Yes
Eugenol		0.5	0.04	Yes
Coumarin	1.5	4	2.0	Yes
(E)-*o*-Methoxycinnamal	3	15	9.2	Yes
(E)-*o*-Methoxycinnamyl acetate		2	0.4	Yes
Benzaldehyde	0.5	2	0.9	Yes
Acetophenone		0.1	0.04	Yes
Salicylaldehyde	0.2	1	0.2	Yes
Phenylethyl alcohol		0.5	0.7	No
(E)-Cinnamyl acetate		6	3.2	Yes
(E)-Cinnamyl alcohol		1	0.2	Yes
Styrene		0.15	0.14	Yes
Phenylethyl aldehyde		0.7	N.D	Yes
(Z)-Cinnamal		0.7	0.3	Yes
Refractive index	1.600	1.614	1.6050	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with the ISO standard for cassia oil.

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Acetic acid	0.01	tr	Aliphatic acid
Isovaleral	tr	tr	Aliphatic aldehyde
2-Methylbutyral	tr	tr	Aliphatic aldehyde
2-Methylbutanol	tr	tr	Aliphatic alcohol
Hexanal	0.01	0.01	Aliphatic aldehyde
Furfural	0.01	0.01	Aliphatic alcohol
(2*E*)-Hexenal	tr	tr	Aliphatic aldehyde
Ethylbenzene	0.04	0.04*	Simple phenolic
Styrene	0.14	0.14	Simple phenolic
α-Thujene	tr	tr	Monoterpene
α-Pinene	0.05	0.05	Monoterpene
Camphene	0.04*	0.04	Monoterpene
α-Fenchene	[0.04]*	tr	Monoterpene
Thuja-2,4(10)-diene	tr	[0.04]*	Monoterpene
Benzaldehyde	0.94	0.96	Simple phenolic
β-Pinene	0.02*	0.02	Monoterpene
Sabinene	[0.02]*	[0.04]*	Monoterpene
6-Methyl-5-hepten-2-one	0.01	0.01	Aliphatic ketone
Benzofuran	tr		Simple phenolic
Myrcene	0.01		Monoterpene
α-Phellandrene	tr	tr	Monoterpene
Octanal	tr	tr	Aliphatic aldehyde
Δ3-Carene	tr	tr	Monoterpene
para-Cymene	0.03	0.03	Monoterpene
Limonene	0.04*	0.03	Monoterpene
1,8-Cineole	[0.04]*	0.01	Monoterpenic ether
β-Phellandrene	[0.04]*	[0.01]	Monoterpene
Salicylaldehyde	0.21*	0.22	Simple phenolic
Benzyl alcohol	[0.21]*	0.25*	Simple phenolic
(*Z*)-β-Ocimene	0.01	tr	Monoterpene
(*E*)-β-Ocimene	tr	tr	Monoterpene
γ-Terpinene	tr	tr	Monoterpene
Acetophenone	0.04	0.02	Simple phenolic
ortho-Guaiacol	0.04*	0.04	Simple phenolic
Terpinolene	[0.04]*	tr	Monoterpene
Linalool	0.01	0.01	Monoterpenic alcohol
Nonanal	tr	tr	Aliphatic aldehyde
Phenylethyl alcohol	0.74	0.80*	Simple phenolic
ortho-Vinylanisole	0.04	0.04	Simple phenolic
trans-Pinocarveol	0.02*	0.01	Monoterpenic alcohol
2-Methylbenzofuran	[0.02]*	0.06*	Phenylpropanoid
Hydrocinnamal	0.81*	0.79*	Phenylpropanoid
Unknown	[0.81]*	tr	Phenylpropanoid
Borneol	0.13	0.13*	Monoterpenic alcohol
3-Methylbenzofuran?	0.04	0.15*	Phenylpropanoid
Terpinen-4-ol	0.02	0.04	Monoterpenic alcohol
para-Cymen-8-ol	0.01	tr	Monoterpenic alcohol
α-Terpineol	0.04	[0.13]*	Monoterpenic alcohol

Methyl salicylate	0.01	[0.79]*	Phenolic ester
(*Z*)-Cinnamal	0.25	[0.25]*	Phenylpropanoid
Hydrocinnamyl alcohol	0.23	0.34	Phenylpropanoid
ortho-Anisaldehyde	0.62	0.54*	Simple phenolic
Phenylethyl acetate	0.05	0.05	Phenolic ester
(*E*)-Cinnamal	75.33	75.76	Phenylpropanoid
(*E*)-Cinnamyl alcohol	0.17	0.18	Phenylpropanoid
Hydrocinnamic acid	0.02	0.02	Phenylpropanoid
Eugenol	0.04	0.06	Phenylpropanoid
Cyclosativene I	0.03	0.03	Sesquiterpene
Cyclosativene II	0.01	0.01	Sesquiterpene
α-Ylangene	tr	tr	Sesquiterpene
ortho-Methoxyhydrocinnamal?	0.29	0.22	Phenylpropanoid
α-Copaene	0.35	0.33	Sesquiterpene
β-Elemene	0.02	0.16*	Sesquiterpene
β-Caryophyllene	0.12*	[0.16]*	Sesquiterpene
cis-α-Bergamotene	[0.12]*	0.03	Sesquiterpene
Coumarin	1.98	2.00	Coumarin
trans-α-Bergamotene	0.08	[0.16]	Sesquiterpene
(*E*)-Cinnamic acid	0.03	0.02	Phenylpropanoid
(*E*)-Cinnamyl acetate	3.67	3.16	Phenylpropanoid ester
(*Z*)-ortho-Methoxycinnamal	[3.67]*	0.08	Phenylpropanoid
allo-Aromadendrene	[3.67]*	[0.06]*	Sesquiterpene
γ-Muurolene	0.13	0.16	Sesquiterpene
ar-Curcumene	0.09	0.09	Sesquiterpene
Viridiflorene	0.06	0.04	Sesquiterpene
α-Muurolene	0.09	0.08	Sesquiterpene
(3-Phenyloxiran-2-yl)methyl acetate	0.01	0.03	Aliphatic alcohol
β-Bisabolene	0.20*	[0.15]*	Sesquiterpene
γ-Cadinene	[0.20]*	0.08	Sesquiterpene
δ-Cadinene	0.18*	0.14	Sesquiterpene
trans-Calamenene	[0.18]*	0.03	Sesquiterpene
(*E*)-ortho-Methoxycinnamal	9.24*	9.13	Phenylpropanoid
α-Calacorene	[9.24]*	[0.80]*	Sesquiterpene
(*E*)-Nerolidol	0.11	0.11*	Sesquiterpenic alcohol
Spathulenol	0.10	0.10	Sesquiterpenic alcohol
Caryophyllene oxide	0.05	0.01	Sesquiterpenic ether
Humulene epoxide II	0.02		Sesquiterpenic ether
Tetradecanal?	0.04	[0.54]*	Aliphatic aldehyde
1-epi-Cubenol	0.02	[0.11]*	Sesquiterpenic alcohol
Caryophylladienol II	0.03	0.03	Sesquiterpenic alcohol
τ-Cadinol	0.06*	0.02	Sesquiterpenic alcohol
τ-Muurolol	[0.06]*	0.06	Sesquiterpenic alcohol
α-Muurolol	0.03	0.04	Sesquiterpenic alcohol
α-Cadinol	0.03	0.07*	Sesquiterpenic alcohol
Cadalene	0.05	0.07	Sesquiterpene
Mustakone?	0.44*		Sesquiterpenic ketone
(*E*)-ortho-Methoxycinnamyl acetate	[0.44]*	0.39	Phenylpropanoid ester
α-Bisabolol	0.05	[0.07]*	Sesquiterpenic alcohol
Benzyl benzoate	0.10	0.09	Phenolic ester
Phenylethyl benzoate	0.09	0.09	Phenolic ester
Benzyl salicylate	0.02	0.01	Phenolic ester

Rimuene	0.01	0.01	Diterpene
Dolabradiene	0.09	0.08	Diterpene
Manoyl oxide	0.08	0.04	Diterpenic ether
Kaurene?	0.03		Diterpene
Phenylethyl (*E*)-cinnamate	0.05	0.03	Phenylpropanoid ester
Total identified	**98.32%**	**98.01%**	

*: Two or more compounds are coeluting on this column
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

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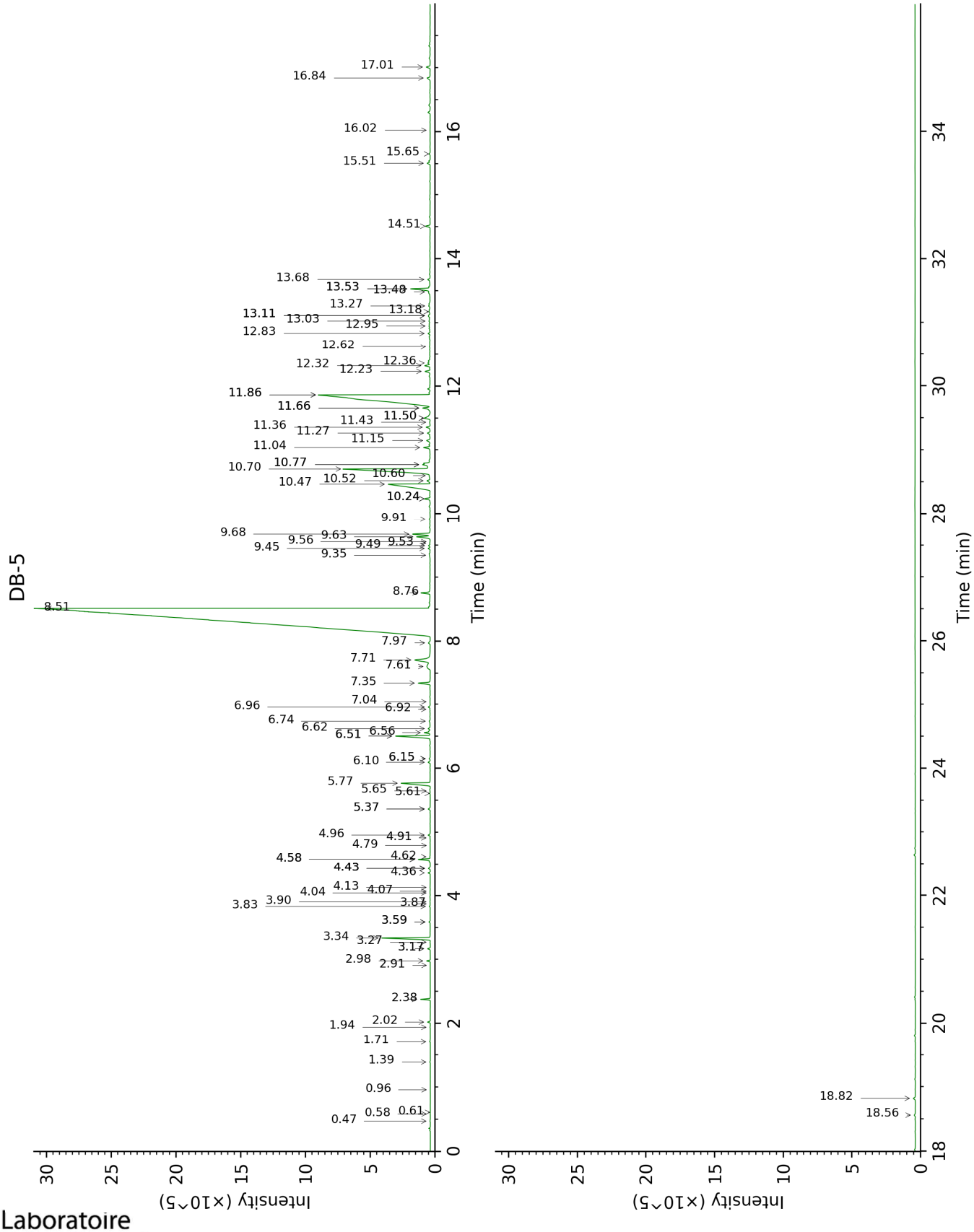
DB-5
Time (min)
Intensity (×10^5)
17.01
16.84
16.02
15.65
15.51
14.51
13.68
13.53
13.48
13.27
13.18
13.11
13.03
12.95
12.83
12.62
12.32
12.23
12.36
11.86
11.66
11.36
11.43
11.50
11.27
11.15
11.04
10.70
10.77
10.60
10.47
10.52
10.24
9.91
9.68
9.45
9.56
9.63
9.49
9.53
9.35
8.76
8.51
7.97
7.71
7.61
7.35
6.96
7.04
6.92
6.74
6.62
6.51
6.56
6.10
6.15
5.77
5.65
5.61
5.37
4.96
4.91
4.79
4.58
4.62
4.43
4.36
4.13
4.04
4.07
3.90
3.87
3.83
3.59
3.34
3.27
3.17
2.98
2.91
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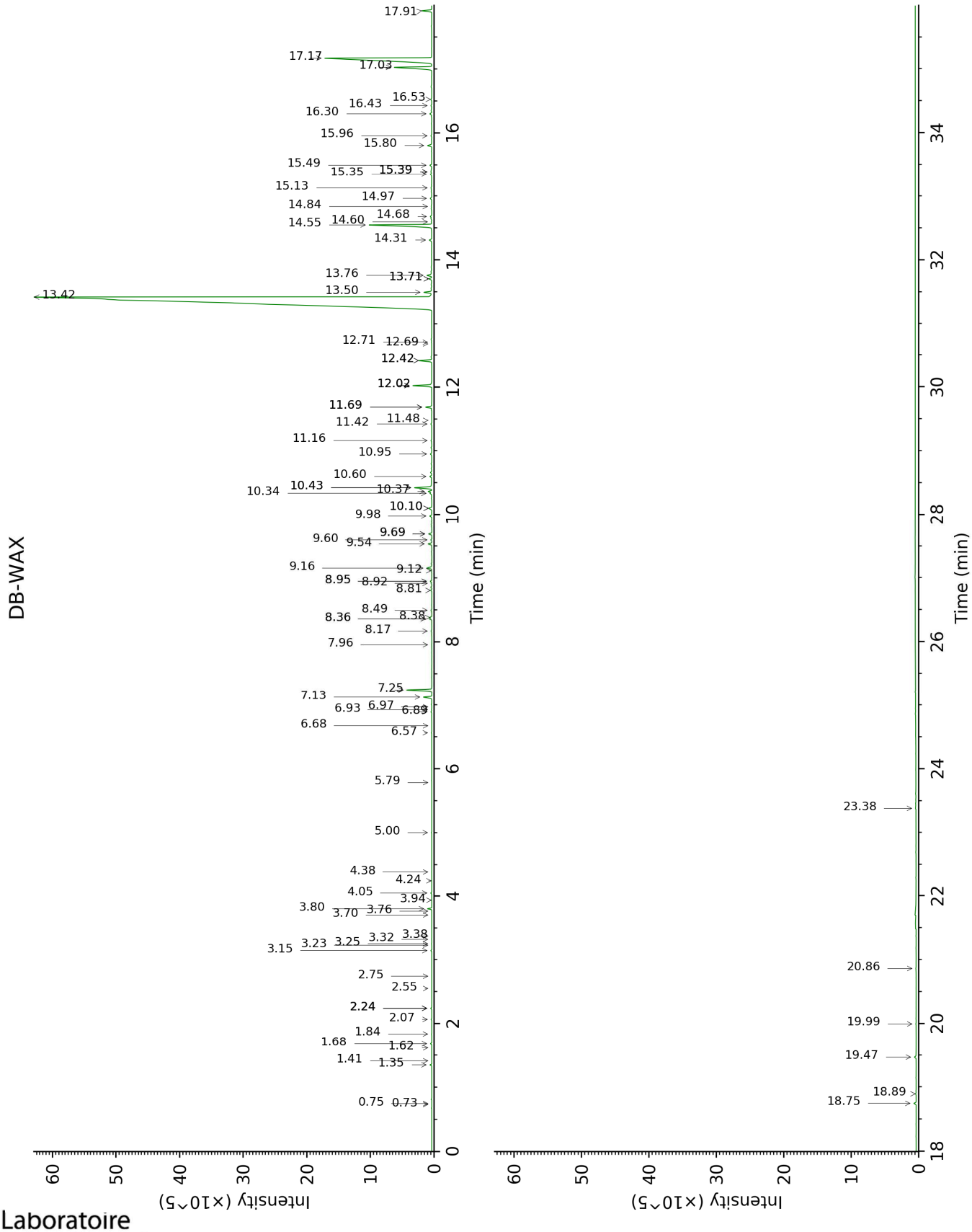
1.94
2.02
1.71
1.39
0.96
0.47
0.58
0.61
18.82
18.56


DB-WAX
Intensity (×10^5)
Time (min)
17.91
17.17
17.03
16.53
16.43
16.30
15.96
15.80
15.49
15.39
15.35
15.13
14.97
14.84
14.68
14.60
14.55
14.31
13.76
13.71
13.50
13.42
12.71
12.69
12.42
12.02
11.69
11.48
11.42
11.16
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10.60
10.43
10.37
10.34
10.10
9.98
9.69
9.60
9.54
9.16
9.12
8.95
8.92
8.81
8.49
8.38
8.36
8.17
7.96
7.25
7.13
6.97
6.93
6.89
6.68
6.57
5.79
5.00
4.38
4.24
4.05
3.94
3.80
3.76
3.70
3.38
3.32
3.25
3.23
3.15
2.75
2.55
2.24
2.07
1.84
1.68
1.62
1.41
1.35
0.75
0.73
23.38
20.86
19.99
19.47
18.89
18.75

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Acetic acid	0.47	598	0.01	6.68	1418	tr
Isovaleral	0.58	641	tr	0.75	885	tr
2-Methylbutyral	0.61	650	tr	0.73	880	tr
2-Methylbutanol	0.96	733	tr	3.38	1178	tr
Hexanal	1.39	797	0.01	1.84	1046	0.01
Furfural	1.71	827	0.01	6.57	1409	0.01
(2*E*)-Hexenal	1.94	847	tr	3.32	1173	tr
Ethylbenzene	2.02	854	0.04	2.24*	1086	0.04
Styrene	2.38	885	0.14	3.80	1210	0.14
α-Thujene	2.91	924	tr	1.41	1004	tr
α-Pinene	2.98	929	0.05	1.35	994	0.05
Camphene	3.17*	942	0.04	1.68	1030	0.04
α-Fenchene	3.17*	942	[0.04]	1.62	1024	tr
Thuja-2,4(10)-diene	3.27	949	tr	2.24*	1086	[0.04]
Benzaldehyde	3.34	953	0.94	7.25	1460	0.96
β-Pinene	3.59*	970	0.02	2.07	1068	0.02
Sabinene	3.59*	970	[0.02]	2.24*	1086	[0.04]
6-Methyl-5-hepten-2-one	3.83	987	0.01	5.00	1297	0.01
Benzofuran	3.87	989	tr			
Myrcene	3.90	992	0.01			
α-Phellandrene	4.04	1001	tr	2.74	1129	tr
Octanal	4.07	1003	tr	4.38	1252	tr
Δ3-Carene	4.13	1006	tr	2.55	1114	tr
para-Cymene	4.36	1021	0.03	4.05	1228	0.03
Limonene	4.43*	1025	0.04	3.15	1160	0.03
1,8-Cineole	4.43*	1025	[0.04]	3.26†	1168	0.01
β-Phellandrene	4.43*	1025	[0.04]	3.23†	1166	[0.01]
Salicylaldehyde	4.58*	1035	0.21	9.16	1607	0.22
Benzyl alcohol	4.58*	1035	[0.21]	11.69*	1819	0.25
(*Z*)-β-Ocimene	4.62	1038	0.01	3.70	1203	tr
(*E*)-β-Ocimene	4.80	1049	tr	3.94	1220	tr
γ-Terpinene	4.91	1056	tr	3.76	1207	tr
Acetophenone	4.96	1059	0.04	8.92	1588	0.02
ortho-Guaiacol	5.37*	1085	0.04	11.42	1796	0.04
Terpinolene	5.37*	1085	[0.04]	4.24	1242	tr
Linalool	5.61	1100	0.01	7.96	1513	0.01
Nonanal	5.65	1103	tr	5.79	1353	tr
Phenylethyl alcohol	5.77	1110	0.74	12.02*	1849	0.80
ortho-Vinylanisole	6.10	1132	0.04	8.81	1580	0.04
trans-Pinocarveol	6.15*	1135	0.02	9.12	1604	0.01
2-Methylbenzofuran	6.15*	1135	[0.02]	8.95*	1591	0.06
Hydrocinnamal	6.51*	1158	0.81	10.43*	1711	0.79
Unknown [m/z 133, 77 (86), 105 (75), 79 (68), 134 (48)]	6.51*	1158	[0.81]	12.69	1908	tr
Borneol	6.56	1161	0.13	9.69*	1651	0.13
3-Methylbenzofuran?	6.62	1166	0.04	10.10*	1684	0.15

Terpinen-4-ol	6.74	1173	0.02	8.50	1555	0.04
para-Cymen-8-ol	6.92	1185	0.01	11.48	1801	tr
α-Terpineol	6.96	1187	0.04	9.69*	1651	[0.13]
Methyl salicylate	7.04	1192	0.01	10.43*	1711	[0.79]
(*Z*)-Cinnamal	7.35	1212	0.25	11.69*	1819	[0.25]
Hydrocinnamyl alcohol	7.60	1230	0.23	13.50	1984	0.34
ortho-Anisaldehyde	7.71	1237	0.62	12.42*	1884	0.54
Phenylethyl acetate	7.98	1255	0.05	10.95	1756	0.05
(*E*)-Cinnamal	8.51	1291	75.33	13.42	1977	75.76
(*E*)-Cinnamyl alcohol	8.76	1307	0.17	15.80	2211	0.18
Hydrocinnamic acid	9.34	1349	0.02	18.90	2550	0.02
Eugenol	9.45	1356	0.04	14.68	2098	0.06
Cyclosativene I	9.50	1360	0.03	6.90	1434	0.03
Cyclosativene II	9.53	1362	0.01	6.93	1436	0.01
α-Ylangene	9.56	1364	tr	6.97	1440	tr
ortho-Methoxyhydrocinnamal?	9.63	1370	0.29	13.76	2008	0.22
α-Copaene	9.68	1372	0.35	7.13	1451	0.33
β-Elemene	9.92	1389	0.02	8.36*†	1545	0.16
β-Caryophyllene	10.24*	1413	0.12	8.36*†	1545	[0.16]
cis-α-Bergamotene	10.24*	1413	[0.12]	8.17	1530	0.03
Coumarin	10.47	1430	1.98	17.03	2340	2.00
trans-α-Bergamotene	10.52	1434	0.08	8.38†	1547	[0.16]
(*E*)-Cinnamic acid	10.60	1440	0.03	20.86	2788	0.02
(*E*)-Cinnamyl acetate	10.70†	1448	3.67	14.55	2085	3.16
(*Z*)-ortho-Methoxycinnamal	10.77*†	1453	[3.67]	15.50	2179	0.08
allo-Aromadendrene	10.77*†	1453	[3.67]	8.95*	1591	[0.06]
γ-Muurolene	11.04	1473	0.13	9.54	1638	0.16
ar-Curcumene	11.15	1481	0.09	10.60	1726	0.09
Viridiflorene	11.27	1490	0.06	9.60	1643	0.04
α-Muurolene	11.36	1496	0.09	9.98	1674	0.08
(3-Phenyloxiran-2-yl)methyl acetate	11.43	1502	0.01	16.43	2276	0.03
β-Bisabolene	11.50*	1507	0.20	10.10*	1684	[0.15]
γ-Cadinene	11.50*	1507	[0.20]	10.34	1703	0.08
δ-Cadinene	11.66*	1520	0.18	10.37	1706	0.14
trans-Calamenene	11.66*	1520	[0.18]	11.16	1774	0.03
(*E*)-ortho-Methoxycinnamal	11.86*	1536	9.24	17.17	2356	9.13
α-Calacorene	11.86*	1536	[9.24]	12.02*	1849	[0.80]
(*E*)-Nerolidol	12.23	1565	0.11	13.71*	2003	0.11
Spathulenol	12.32	1572	0.10	14.31	2062	0.10
Caryophyllene oxide	12.36	1575	0.05	12.71	1911	0.01
Humulene epoxide II	12.62	1595	0.02			
Tetradecanal?	12.83	1613	0.04	12.42*	1884	[0.54]
1-epi-Cubenol	12.95	1622	0.02	13.71*	2003	[0.11]
Caryophylladienol II	13.03	1629	0.03	15.96	2227	0.03
τ-Cadinol	13.11*	1636	0.06	14.84	2113	0.02
τ-Muurolol	13.11*	1636	[0.06]	14.97	2126	0.06
α-Muurolol	13.18	1641	0.03	15.13	2143	0.04
α-Cadinol	13.26	1648	0.03	15.39*	2169	0.07

Cadalene	13.48	1667	0.05	15.35	2165	0.07
Mustakone?	13.53*	1671	0.44			
(*E*)-ortho-Methoxycinnamyl acetate	13.53*	1671	[0.44]	17.91	2438	0.39
α-Bisabolol	13.68	1683	0.05	15.39*	2169	[0.07]
Benzyl benzoate	14.51	1754	0.10	18.75	2533	0.09
Phenylethyl benzoate	15.51	1843	0.09	19.47	2617	0.09
Benzyl salicylate	15.65	1856	0.02	19.99	2681	0.01
Rimuene	16.02	1890	0.01	14.60	2090	0.01
Dolabradiene	16.84	1967	0.09	16.30	2263	0.08
Manoyl oxide	17.01	1983	0.08	16.53	2286	0.04
Kaurene?	18.56	2138	0.03			
Phenylethyl (*E*)-cinnamate	18.82	2165	0.05	23.38	3123	0.03
Total identified		**98.32%**			**98.01%**	
Total reported		**98.32%**			**98.01%**	

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