Date : November 2, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20D16-PTH01
Customer identification : Cinnamon Cassia - China - CA01050203R
Type : Essential oil
Source : *Cinnamomum cassia*
Customer : Plant Therapy

Analysis

Method: PC-MAT-007 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Fanny Charlier, B. Sc.
Analysis date : April 28, 2020

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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 April 28, 2020 to indicatively present comparison to a standard.

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Physicochemical data

Physical aspect: Yellow liquid
Refractive index: 1.6079 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 3216:1997 - Oil of cassia

Compound	Min. %	Max. %	Observed %	Complies?
(Z)-Cinnamal	0	0.7	0.3	Yes
Benzeneacetaldehyde	0	0.7	ND	Yes
Styrene	0	0.15	0.14	Yes
(E)-Cinnamyl alcohol	0	1	0	Yes
(E)-Cinnamyl acetate	0	6	3	Yes
Phenylethyl alcohol	0	0.5	0.7	No
Salicylaldehyde	0.2	1.0	0.3	Yes
Acetophenone	0	0.1	0	Yes
Benzaldehyde	0.5	2.0	0.7	Yes
(E)-ortho-Methoxycinnamyl acetate	0	2	0	Yes
(E)-ortho-Methoxycinnamal	3	15	9	Yes
Coumarin	1.5	4.0	2.1	Yes
Eugenol	0	0.5	0	Yes
(E)-Cinnamal	70	88	75	Yes
Refractive index	1.6000	1.6140	1.6079	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	%	Classe
Ethanol	0.01	Aliphatic alcohol
Isovaleral	tr	Aliphatic aldehyde
(2*E*)-Hexenal	tr	Aliphatic aldehyde
Styrene	0.14	Simple phenolic
α-Pinene	0.06	Monoterpene
Camphene	0.04	Monoterpene
α-Fenchene	tr	Monoterpene
Benzaldehyde	0.70	Simple phenolic
Sabinene	0.01	Monoterpene
β-Pinene	0.02	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	0.01	Monoterpene
Octanal	0.01	Aliphatic aldehyde
Δ3-Carene	0.01	Monoterpene
α-Terpinene	0.01	Monoterpene
para-Cymene	0.03	Monoterpene
Limonene	0.04	Monoterpene
1,8-Cineole	0.02	Monoterpenic ether
Salicylaldehyde	0.29	Simple phenolic
Acetophenone	0.05	Simple phenolic
Linalool	0.02	Monoterpenic alcohol
Phenylethyl alcohol	0.70	Simple phenolic
ortho-Vinylanisole	0.06	Simple phenolic
trans-Pinocarveol	0.01	Monoterpenic alcohol
2-Methylbenzofuran	0.01	Phenylpropanoid
Hydrocinnamal	0.61	Phenylpropanoid
Borneol	0.17	Monoterpenic alcohol
3-Methylbenzofuran?	0.09	Phenylpropanoid
Terpinen-4-ol	0.04	Monoterpenic alcohol
para-Cymen-8-ol	tr	Monoterpenic alcohol
α-Terpineol	0.04	Monoterpenic alcohol
Methyl salicylate	tr	Phenolic ester
(*Z*)-Cinnamal	0.31	Phenylpropanoid
Hydrocinnamyl alcohol	0.13	Phenylpropanoid
ortho-Anisaldehyde	0.53	Simple phenolic
Phenylethyl acetate	0.04	Phenolic ester
(*E*)-Cinnamal	75.48	Phenylpropanoid
(*E*)-Cinnamyl alcohol	0.18	Phenylpropanoid
Eugenol	0.04	Phenylpropanoid
Cyclosativene I	0.04	Sesquiterpene
Cyclosativene II	0.01	Sesquiterpene
ortho-Methoxyhydrocinnamal?	0.27	Phenylpropanoid
α-Copaene	0.31	Sesquiterpene
β-Elemene	0.02	Sesquiterpene
β-Caryophyllene	0.01	Sesquiterpene
cis-α-Bergamotene	0.02	Sesquiterpene
Coumarin	2.06	Coumarin

trans-α-Bergamotene	0.09	Sesquiterpene
(*E*)-Cinnamyl acetate	3.40	Phenylpropanoid ester
(*E*)-Cinnamic acid	0.15	Phenylpropanoid
α-Humulene	0.11	Sesquiterpene
(*Z*)-ortho-Methoxycinnamal	0.08	Phenylpropanoid
allo-Aromadendrene	0.04	Sesquiterpene
(*E*)-β-Farnesene	0.01	Sesquiterpene
γ-Muurolene	0.11	Sesquiterpene
α-Amorphene	0.02	Sesquiterpene
ar-Curcumene	0.09	Sesquiterpene
α-Muurolene	0.08	Sesquiterpene
(3-Phenyloxiran-2-yl)methyl acetate	0.04	Aliphatic alcohol
β-Bisabolene	0.03	Sesquiterpene
γ-Cadinene	0.12	Sesquiterpene
trans-Calamenene	0.04	Sesquiterpene
δ-Cadinene	0.05	Sesquiterpene
(*E*)-ortho-Methoxycinnamal	9.07	Phenylpropanoid
α-Calacorene	0.05	Sesquiterpene
(*E*)-α-Bisabolene	0.06	Sesquiterpene
(*E*)-Nerolidol	0.17	Sesquiterpenic alcohol
Spathulenol	0.12	Sesquiterpenic alcohol
Caryophyllene oxide	0.06	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Humulene epoxide II	0.03	Sesquiterpenic ether
Tetradecanal	0.04	Aliphatic aldehyde
1-epi-Cubenol	0.03	Sesquiterpenic alcohol
Caryophylladienol II	0.03	Sesquiterpenic alcohol
τ-Cadinol	0.06	Sesquiterpenic alcohol
τ-Muurolol	0.02	Sesquiterpenic alcohol
α-Cadinol	0.04	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.03	Sesquiterpenic alcohol
Cadalene	0.01	Sesquiterpene
(*E*)-ortho-Methoxycinnamyl acetate	0.01	Phenylpropanoid ester
α-Bisabolol	0.07	Sesquiterpenic alcohol
Benzyl benzoate	0.06	Phenolic ester
Phenylethyl benzoate	0.04	Phenolic ester
Unknown	0.03	Unknown
Benzyl salicylate	0.01	Phenolic ester
Dolabradiene	0.09	Diterpene
Kaurene?	0.02	Diterpene
Phenylethyl (*E*)-cinnamate	0.10	Phenylpropanoid ester
Consolidated total	**97.39%**	

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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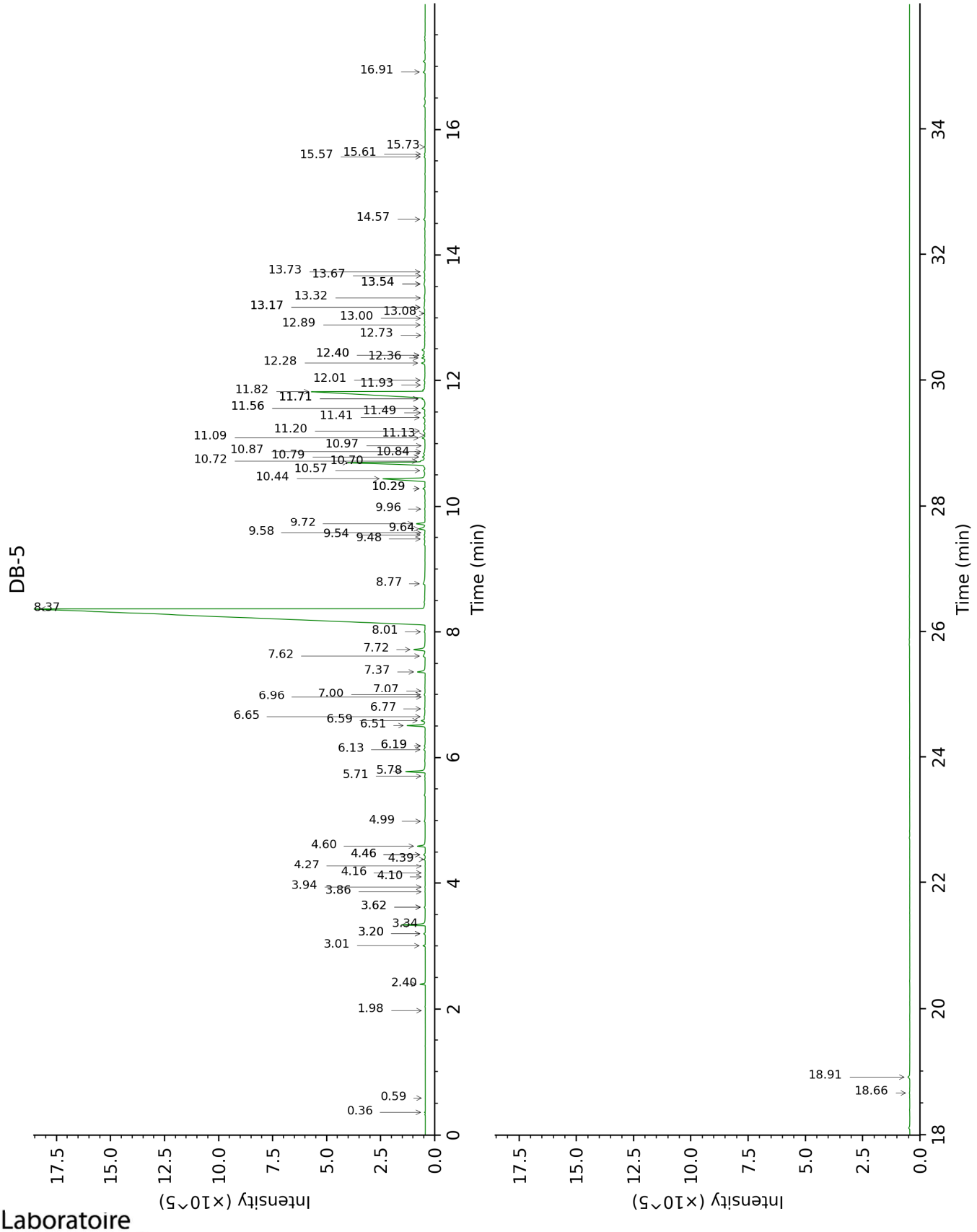
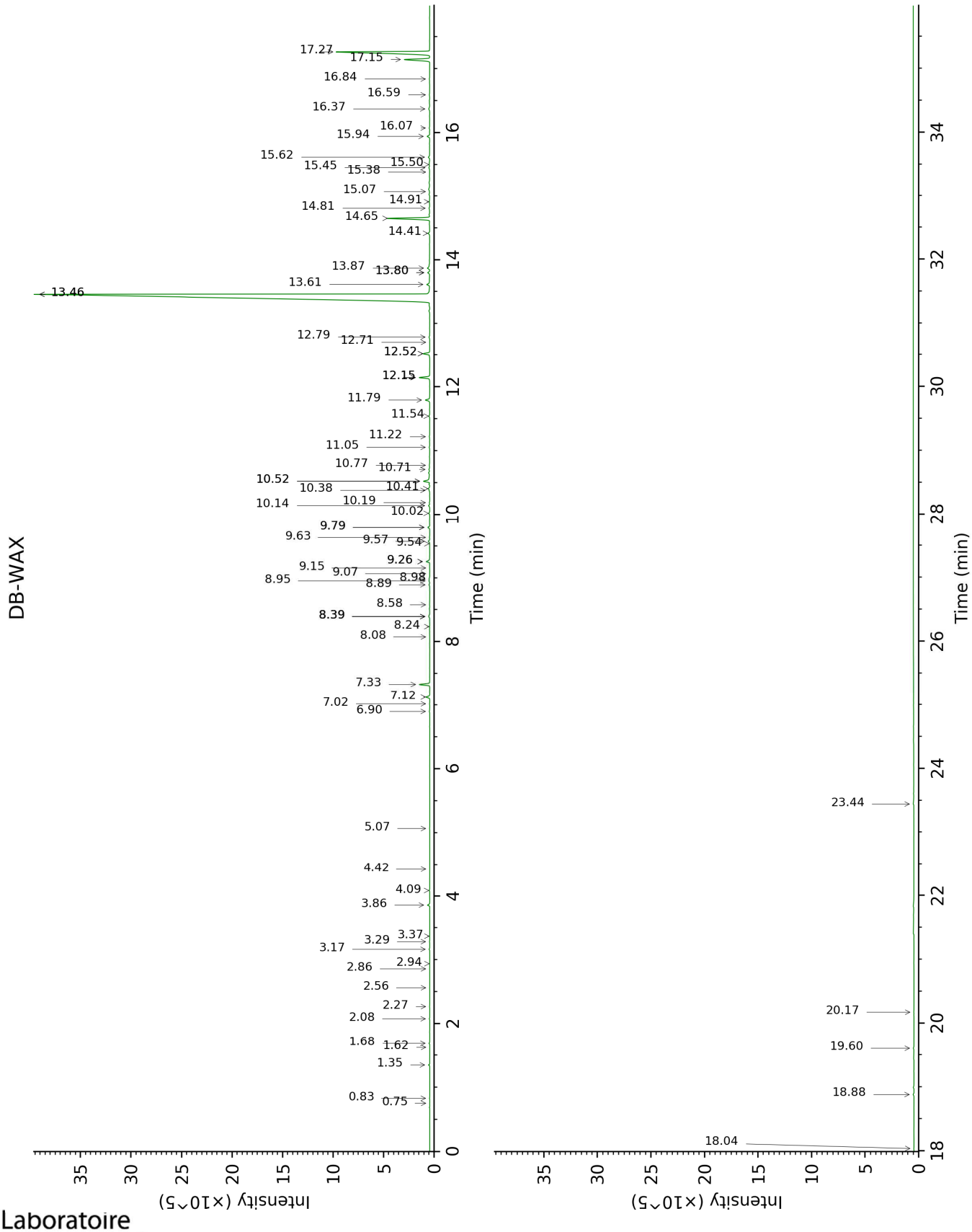

DB-5
16.91
15.57
15.61
15.73
14.57
13.73
13.67
13.54
13.32
13.17
13.00
13.08
12.89
12.73
12.28
12.40
12.36
12.01
11.93
11.82
11.71
11.56
11.41
11.49
11.20
11.13
11.09
10.97
10.87
10.79
10.84
10.72
10.70
10.57
10.44
10.29
9.96
9.72
9.64
9.58
9.54
9.48
8.77
8.37
8.01
7.72
7.62
7.37
7.00
7.07
6.96
6.77
6.65
6.59
6.51
6.19
6.13
5.78
5.71
4.99
4.60
4.46
4.39
4.27
4.16
4.10
3.94
3.86
3.62
3.34
3.20
3.01
2.40
1.98
0.59
0.36
Time (min)
Intensity (×10^5)
18.91
18.66
Time (min)
Intensity (×10^5)


DB-WAX
17.27
17.15
16.84
16.59
16.37
16.07
15.94
15.62
15.45
15.38
15.50
15.07
14.91
14.81
14.65
14.41
13.87
13.80
13.61
13.46
12.79
12.71
12.52
12.15
11.79
11.54
11.22
11.05
10.77
10.71
10.52
10.38
10.41
10.14
10.19
10.02
9.79
9.63
9.57
9.54
9.26
9.15
9.07
8.98
8.95
8.89
8.58
8.39
8.24
8.08
7.33
7.12
7.02
6.90
5.07
4.42
4.09
3.86
3.37
3.29
3.17
2.94
2.86
2.56
2.27
2.08
1.68
1.62
1.35
0.83
0.75
23.44
20.17
19.60
18.88
18.04
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Ethanol	0.36	522	0.01	0.83	906	0.01
Isovaleral	0.59	640	tr	0.75	888	tr
(2*E*)-Hexenal	1.98	851	tr	3.37	1173	0.01
Styrene	2.40	886	0.14	3.86	1210	0.15
α-Pinene	3.01	930	0.06	1.35	991	0.05
Camphene	3.20*	942	0.04	1.68	1026	0.04
α-Fenchene	3.20*	942	[0.04]	1.62	1020	tr
Benzaldehyde	3.34	952	0.70	7.33	1461	0.74
Sabinene	3.62*	970	0.04	2.27	1084	0.01
β-Pinene	3.62*	970	[0.04]	2.08	1065	0.02
6-Methyl-5-hepten-2-one	3.86	986	0.01	5.07	1296	0.01
Myrcene	3.94	991	0.01	2.86	1133	0.01
Octanal	4.10	1002	0.01	4.42	1252	0.01
Δ3-Carene	4.16	1006	0.01	2.56	1110	tr
α-Terpinene	4.27	1013	0.01	2.94	1139	tr
para-Cymene	4.39	1020	0.03	4.09	1227	0.03
Limonene	4.46*	1025	0.05	3.17	1157	0.04
1,8-Cineole	4.46*	1025	[0.05]	3.28	1166	0.02
Salicylaldehyde	4.60	1033	0.29	9.26*	1609	0.29
Acetophenone	4.99	1058	0.05	8.95	1585	0.05
Linalool	5.71	1103	0.02	8.08	1517	0.01
Phenylethyl alcohol	5.78	1108	0.70	12.15*	1852	0.79
ortho-Vinylanisole	6.13	1131	0.06	8.89	1580	0.06
trans-Pinocarveol	6.19*	1134	0.03	9.16	1601	0.01
2-Methylbenzofuran	6.19*	1134	[0.03]	9.07	1594	0.01
Hydrocinnamal	6.51	1156	0.61	10.52*	1712	0.67
Borneol	6.59	1160	0.17	9.79*	1652	0.14
3-Methylbenzofuran?	6.65	1165	0.09	10.14	1680	0.09
Terpinen-4-ol	6.77	1173	0.04	8.58	1556	0.02
para-Cymen-8-ol	6.96	1185	tr	11.54	1798	0.07
α-Terpineol	7.00	1187	0.04	9.79*	1652	[0.14]
Methyl salicylate	7.07	1192	tr	10.52*	1712	[0.67]
(*Z*)-Cinnamal	7.37	1212	0.31	11.79	1821	0.36
Hydrocinnamyl alcohol	7.62	1230	0.13	13.61	1985	0.28
ortho-Anisaldehyde	7.72	1236	0.53	12.52*	1885	0.54
Phenylethyl acetate	8.01	1256	0.04	11.05	1757	0.05
(*E*)-Cinnamal	8.37	1281	75.48	13.46*	1971	75.26
(*E*)-Cinnamyl alcohol	8.77	1304	0.18	15.94	2213	0.20
Eugenol	9.48	1354	0.04	14.81	2099	0.07
Cyclosativene I	9.54	1358	0.04	6.90	1429	0.03
Cyclosativene II	9.58	1361	0.01	7.02	1438	0.02
ortho-Methoxyhydrocinnamal?	9.64	1365	0.27	13.87	2009	0.24
α-Copaene	9.72	1371	0.31	7.12	1445	0.29
β-Elemene	9.96	1388	0.02	8.40*	1542	0.12
β-Caryophyllene	10.29*	1411	0.08	8.40*	1542	[0.12]
cis-α-Bergamotene	10.29*	1411	[0.08]	8.24	1529	0.02

Coumarin	10.44	1423	2.06	17.15	2340	2.12
trans-α-Bergamotene	10.57	1433	0.09	8.40*	1542	[0.12]
(*E*)-Cinnamyl acetate	10.70	1442	3.40	14.65	2084	3.19
(*E*)-Cinnamic acid	10.72	1444	0.15			
α-Humulene	10.79	1449	0.11	9.26*	1609	[0.29]
(*Z*)-ortho-Methoxycinnamal	10.84	1453	0.08	15.62	2180	0.12
allo-Aromadendrene	10.87	1455	0.04	8.98	1587	0.07
(*E*)-β-Farnesene	10.97	1462	0.01	9.54	1632	0.01
γ-Muurolene	11.09	1471	0.11	9.57	1634	0.11
α-Amorphene	11.13	1475	0.02	9.63	1639	0.03
ar-Curcumene	11.20	1480	0.09	10.71	1728	0.08
α-Muurolene	11.41	1495	0.08	10.02	1671	0.08
(3-Phenyloxiran-2-yl)methyl acetate	11.49	1501	0.04	16.59	2280	0.03
β-Bisabolene	11.56*	1506	0.14	10.19	1684	0.03
γ-Cadinene	11.56*	1506	[0.14]	10.41	1702	0.12
trans-Calamenene	11.71*	1518	0.09	11.22	1771	0.04
δ-Cadinene	11.71*	1518	[0.09]	10.38	1700	0.05
(*E*)-ortho-Methoxycinnamal	11.82	1527	9.07	17.26	2352	9.05
α-Calacorene	11.93	1536	0.05	12.15*	1852	[0.79]
(*E*)-α-Bisabolene	12.00	1541	0.06	10.77	1733	0.05
(*E*)-Nerolidol	12.28	1563	0.17	13.80*	2002	0.17
Spathulenol	12.36	1569	0.12	14.42	2062	0.13
Caryophyllene oxide	12.40*	1573	0.10	12.79	1909	0.06
Caryophyllene oxide isomer	12.40*	1573	[0.10]	12.71	1902	0.01
Humulene epoxide II	12.73	1598	0.03	13.46*	1971	[75.26]
Tetradecanal	12.89	1612	0.04	12.52*	1885	[0.54]
1-epi-Cubenol	13.00	1620	0.03	13.80*	2002	[0.17]
Caryophylladienol II	13.08	1627	0.03	16.07	2227	0.03
τ-Cadinol	13.17*	1635	0.09	14.91	2110	0.06
τ-Muurolol	13.17*	1635	[0.09]	15.07	2125	0.02
α-Cadinol	13.32	1647	0.04	15.50	2168	0.04
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.54*	1665	0.12	16.84	2307	0.03
Cadalene	13.54*	1665	[0.12]	15.38	2157	0.01
(*E*)-ortho-Methoxycinnamyl acetate	13.67	1676	0.01	18.04	2437	0.01
α-Bisabolol	13.73	1681	0.07	15.45	2164	0.07
Benzyl benzoate	14.57	1752	0.06	18.88	2532	0.06
Phenylethyl benzoate	15.57	1841	0.04	19.60	2616	0.05
Unknown [m/z 69, 43 (73), 41 (41), 81 (39), 58 (38), 93 (30), 68 (26)...]	15.61	1845	0.03			
Benzyl salicylate	15.73	1855	0.01	20.17	2684	0.02
Dolabradiene	16.91	1966	0.09	16.37	2258	0.10
Kaurene?	18.66	2140	0.02			
Phenylethyl (*E*)-cinnamate	18.91	2166	0.10	23.44	3105	0.10

Total identified	**97.54%**	**97.02%**
Total reported	**97.57%**	**97.02%**

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