

**Date :** October 14, 2022

**CERTIFICATE OF ANALYSIS – GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 22J07-PTH01

**Customer identification :** Cinnamon Bark - Sri Lanka - CC0109R

**Type :** Essential oil

**Source :** *Cinnamomum verum*

**Customer :** Plant Therapy

*ANALYSIS*

**Method:** PC-MAT-014  - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.

**Analyst :** Amélie Simard, Analyste

**Analysis date :** October 13, 2022

Checked and approved by :

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Alexis St-Gelais, Ph. D., Chimiste 2013-174

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*PHYSICOCHEMICAL DATA*

**Physical aspect:** Yellow liquid

**Refractive index:**  $1.5898 \pm 0.0003$  (20 °C; method PC-MAT-016)

*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
Hexanal	tr	Aliphatic aldehyde
Ethyl 2-methylbutyrate	tr	Aliphatic ester
Ethylbenzene	0.01	Simple phenolic
Styrene	0.03	Simple phenolic
Hashishene	tr	Monoterpene
Tricyclene	0.01	Monoterpene
$\alpha$ -Thujene	0.24	Monoterpene
$\alpha$ -Pinene	2.45	Monoterpene
Camphene	0.28	Monoterpene
$\alpha$ -Fenchene	0.02	Monoterpene
Benzaldehyde	0.17	Simple phenolic
Sabinene	0.10	Monoterpene
$\beta$ -Pinene	0.26	Monoterpene
Myrcene	0.05	Monoterpene
Pseudolimonene	0.01	Monoterpene
$\alpha$ -Phellandrene	0.86	Monoterpene
Octanal	0.02	Aliphatic aldehyde
$\Delta^3$ -Carene	0.06	Monoterpene
$\alpha$ -Terpinene	0.57	Monoterpene
meta-Cymene	0.01	Monoterpene
para-Cymene	1.04	Monoterpene
Limonene	1.35	Monoterpene
1,8-Cineole	3.39	Monoterpenic ether
(Z)- $\beta$ -Ocimene	0.04	Monoterpene
(E)- $\beta$ -Ocimene	0.03	Monoterpene
$\gamma$ -Terpinene	0.06	Monoterpene
Acetophenone	0.01	Simple phenolic
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Isoterpinolene	0.01	Monoterpene
trans-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.07	Monoterpene
para-Cymenene	0.03	Monoterpene
Linalool	2.47	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
(3E)-2,7-Dimethyl-3,6-octadien-2-ol	0.03	Monoterpenic alcohol
Phenylethyl alcohol	0.02	Simple phenolic
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
Camphor	0.11	Monoterpenic ketone
Camphene hydrate	0.01	Monoterpenic alcohol
Hydrocinnamal	0.25	Phenylpropanoid
Borneol	0.06	Monoterpenic alcohol
Benzyl acetate	0.01	Phenolic ester
3-Methylbenzofuran?	0.03	Phenylpropanoid
Terpinen-4-ol	0.23	Monoterpenic alcohol

Cryptone	0.02	Normoterpenic ketone
para-Cymer-8-ol	0.02	Monoterpenic alcohol
$\alpha$ -Terpineol	0.31	Monoterpenic alcohol
<i>cis</i> -Piperitol	0.02	Monoterpenic alcohol
<i>cis</i> - $\alpha$ -Phellandrene epoxide (iPr vs Me)	0.04	Monoterpenic ether
<i>trans</i> -Piperitol	0.02	Monoterpenic alcohol
( <i>Z</i> )-Cinnamal	0.43	Phenylpropanoid
Hydrocinnamyl alcohol	0.04	Phenylpropanoid
ortho-Anisaldehyde	0.03	Simple phenolic
( <i>E</i> )-Cinnamal	73.64	Phenylpropanoid
Safrole	0.03	Phenylpropanoid
( <i>E</i> )-Cinnamyl alcohol	0.03	Phenylpropanoid
$\alpha$ -Cubebene	0.01	Sesquiterpene
Eugenol	3.41	Phenylpropanoid
ortho-Methoxyhydrocinnamal?	0.07	Phenylpropanoid
Hydrocinnamyl acetate	0.01	Phenylpropanoid ester
$\alpha$ -Copaene	0.19	Sesquiterpene
$\beta$ -Cubebene	0.02	Sesquiterpene
$\beta$ -Elemene	0.02	Sesquiterpene
Isocaryophyllene	0.02	Sesquiterpene
$\alpha$ -Gurjunene	0.02	Sesquiterpene
( <i>Z</i> )-Isoeugenol	0.01	Phenylpropanoid
$\beta$ -Caryophyllene	2.00	Sesquiterpene
( <i>E</i> )-Cinnamic acid	0.02	Phenylpropanoid
( <i>E</i> )-Cinnamyl acetate	2.77	Phenylpropanoid ester
( <i>E</i> )-Isoeugenol	0.01	Phenylpropanoid
$\alpha$ -Humulene	0.34	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
$\gamma$ -Murolene	0.01	Sesquiterpene
ar-Curcumene	0.03	Sesquiterpene
Viridiflorene	0.02	Sesquiterpene
$\alpha$ -Murolene	0.01	Sesquiterpene
2,3-Epoxycinnamyl acetate I?	0.01	Phenylpropanoid ester
$\gamma$ -Cadinene	0.01	Sesquiterpene
<i>trans</i> -Calamenene	0.03	Sesquiterpene
$\delta$ -Cadinene	0.02	Sesquiterpene
Eugenyl acetate	0.01	Phenylpropanoid ester
( <i>E</i> )-ortho-Methoxycinnamal	0.01	Phenylpropanoid
$\alpha$ -Calacorene	0.02	Sesquiterpene
Isocaryophyllene epoxide B	0.03	Sesquiterpenic ether
Caryophyllenyl alcohol	0.04	Sesquiterpenic alcohol
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.17	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Globulol	0.04	Sesquiterpenic alcohol
Humulene epoxide II	0.05	Sesquiterpenic ether
Tetradecanal	0.07	Aliphatic aldehyde
Caryophylladienol I	0.01	Sesquiterpenic alcohol
Caryophylladienol II	0.02	Sesquiterpenic alcohol
(3 <i>Z</i> )-Caryophylla-3,8(13)-dien-5 $\beta$ -ol	0.02	Sesquiterpenic alcohol
Benzyl benzoate	0.38	Phenolic ester
Unknown	0.01	Unknown

Unknown	0.09	Unknown
Unknown	0.05	Unknown
Caryophylla-4(12),8(13)-diene	0.01	Sesquiterpene
<b>Consolidated total</b>	<b>99.21%</b>	

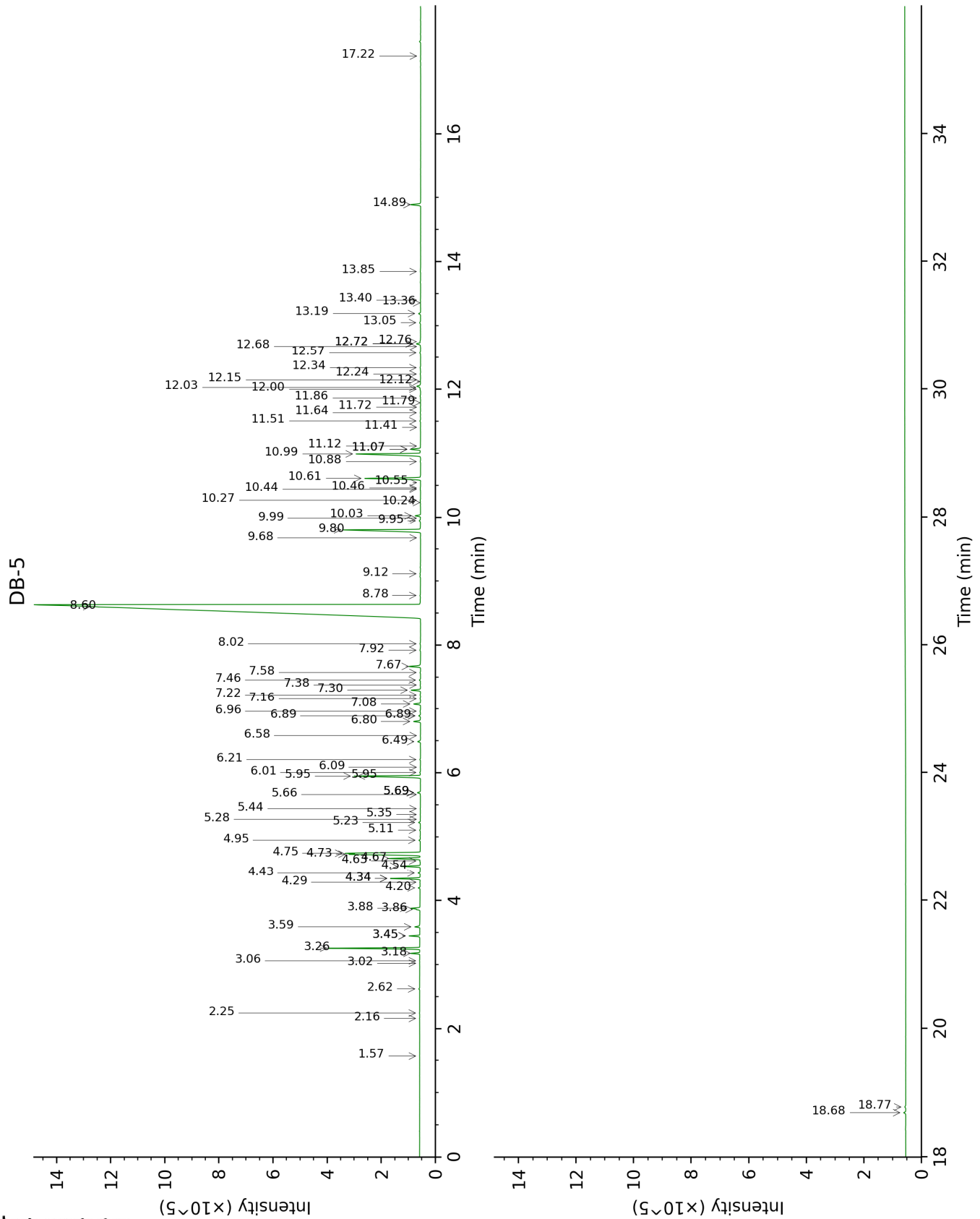
tr: The compound has been detected below 0.005% of total signal.

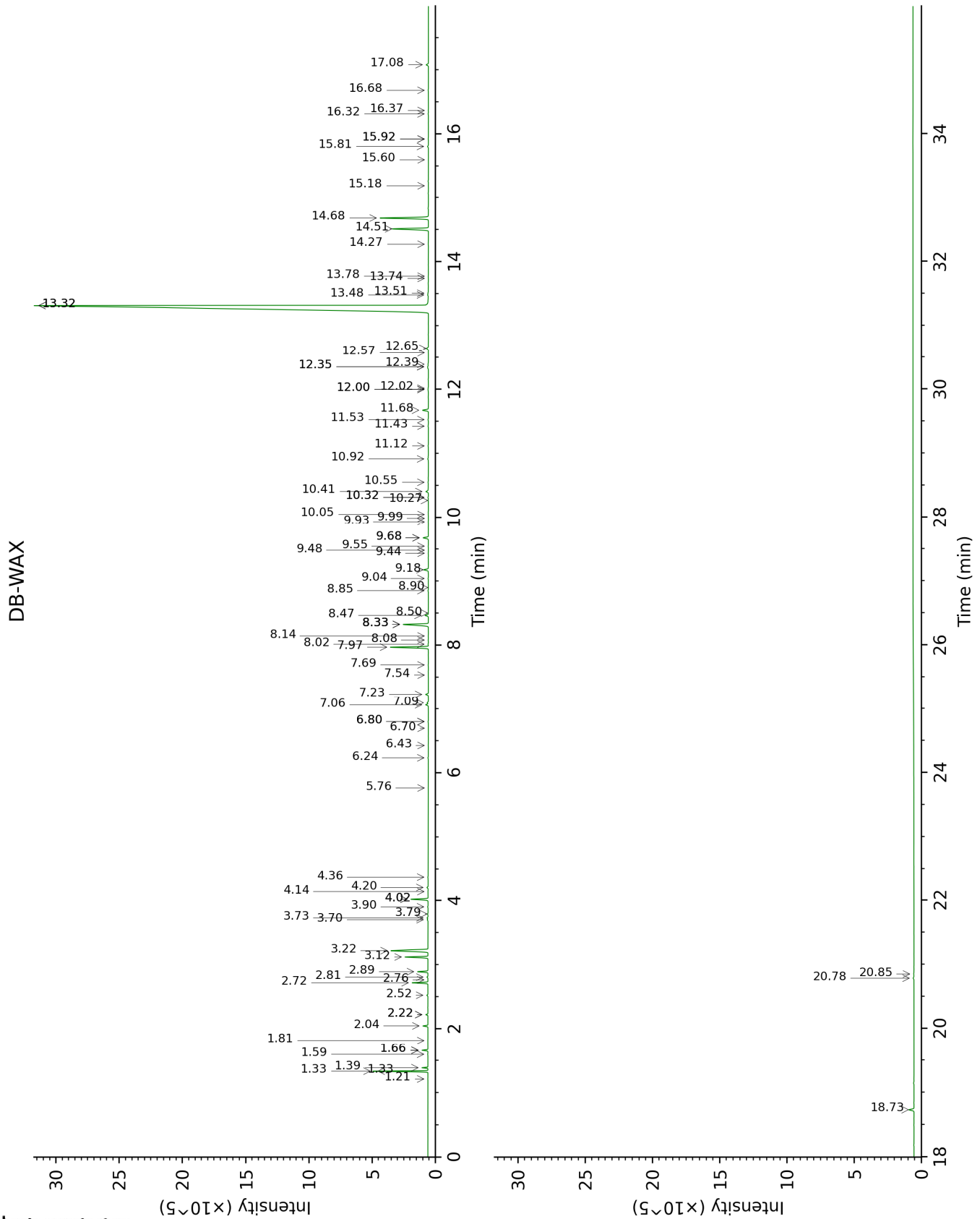
Note: no correction factor was applied

**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.

This page was intentionally left blank. The following pages present the complete data of the analysis.







FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Hexanal	1.57	799	tr	1.82	1043	tr
Ethyl 2-methylbutyrate	2.16	849	tr	1.66*	1027	0.28
Ethylbenzene	2.25	856	0.01	2.22*	1084	0.11
Styrene	2.62	886	0.03	3.79	1208	0.03
Hashishene	3.02	916	tr	1.33*	993	2.44
Tricyclene	3.06	919	0.01	1.21	972	tr
$\alpha$ -Thujene	3.18	926	0.24	1.39	999	0.24
$\alpha$ -Pinene	3.26	932	2.45	1.33*	993	[2.44]
Camphene	3.45*	944	0.29	1.66*	1027	[0.28]
$\alpha$ -Fenchene	3.45*	944	[0.29]	1.59	1020	0.02
Benzaldehyde	3.59	953	0.17	7.23	1460	0.18
Sabinene	3.86†	971	0.36	2.22*	1084	[0.11]
$\beta$ -Pinene	3.88†	972	[0.36]	2.04	1066	0.26
Myrcene	4.20	993	0.05	2.81	1132	0.05
Pseudolimonene	4.29	999	0.01	2.76	1129	0.01
$\alpha$ -Phellandrene	4.34*	1003	0.86	2.72	1125	0.86
Octanal	4.34*	1003	[0.86]	4.36	1250	0.02
$\Delta^3$ -Carene	4.43	1008	0.06	2.52	1110	0.07
$\alpha$ -Terpinene	4.54	1015	0.57	2.89	1139	0.57
meta-Cymene	4.63	1021	0.01	4.02*	1225	1.05
para-Cymene	4.67	1023	1.04	4.02*	1225	[1.05]
Limonene	4.73†	1027	4.74	3.12	1157	1.35
1,8-Cineole	4.75†	1028	[4.74]	3.22	1165	3.39
(Z)- $\beta$ -Ocimene	4.95	1041	0.04	3.70	1202	0.05
(E)- $\beta$ -Ocimene	5.11	1051	0.03	3.90	1217	0.03
$\gamma$ -Terpinene	5.23	1058	0.06	3.73	1204	0.06
Acetophenone	5.28	1061	0.01	8.85	1584	0.03
cis-Sabinene hydrate	5.35	1066	0.01	6.80*	1428	0.02
cis-Linalool oxide (fur.)	5.44	1072	0.01	6.43	1400	0.01
Isoterpinolene	5.66	1085	0.01	4.14	1234	0.01
trans-Linalool oxide (fur.)	5.69*	1087	0.11	6.80*	1428	[0.02]
Terpinolene	5.69*	1087	[0.11]	4.20	1238	0.07
para-Cymenene	5.69*	1087	[0.11]	6.24	1386	0.03
Linalool	5.95*	1103	2.46	7.97	1516	2.47
Nonanal	5.95*	1103	[2.46]	5.76	1352	0.01
(3E)-2,7-Dimethyl-3,6-octadien-2-ol	6.01	1107	0.03	8.14	1529	0.01
Phenylethyl alcohol	6.09	1112	0.02	12.02	1850	0.02
cis-para-Menth-2-en-1-ol	6.21	1120	0.02	8.02	1519	0.02
Camphor	6.49	1138	0.11	7.10	1450	0.08
Camphene hydrate	6.58	1144	0.01	8.33*	1543	2.01
Hydrocinnamal	6.80	1158	0.25	10.41	1711	0.23
Borneol	6.89*	1163	0.07	9.68*	1651	0.39
Benzyl acetate	6.89*	1163	[0.07]	9.93	1671	0.01
3-Methylbenzofuran?	6.96	1168	0.03	10.05	1681	0.01
Terpinen-4-ol	7.08	1175	0.23	8.47	1554	0.23
Cryptone	7.16	1180	0.02	9.04	1599	0.02
para-Cymen-8-ol	7.22	1185	0.02	11.43	1798	0.02

$\alpha$ -Terpineol	7.30	1190	0.31	9.68*	1651	[0.39]
<i>cis</i> -Piperitol	7.38	1195	0.02	9.44	1631	0.01
<i>cis</i> - $\alpha$ -Phellandrene epoxide (iPr vs Me)	7.46	1200	0.04	10.92	1754	0.05
<i>trans</i> -Piperitol	7.58	1207	0.02	10.27	1699	0.02
( <i>Z</i> )-Cinnamal	7.67	1214	0.43	11.68	1820	0.44
Hydrocinnamyl alcohol	7.92	1230	0.04	13.48	1983	0.06
ortho-Anisaldehyde	8.02	1237	0.03	12.35*	1880	0.05
( <i>E</i> )-Cinnamal	8.60	1276	73.64	13.32*	1968	73.35
Safrole	8.78	1287	0.03	11.53	1807	0.03
( <i>E</i> )-Cinnamyl alcohol	9.12	1308	0.03	15.81	2209	0.07
$\alpha$ -Cubebene	9.68	1348	0.01	6.70	1420	0.01
Eugenol	9.80	1356	3.41	14.68	2097	3.45
ortho-Methoxyhydrocinnamal?	9.95	1367	0.07	13.74	2007	0.01
Hydrocinnamyl acetate	9.99	1370	0.01	12.35*	1880	[0.05]
$\alpha$ -Copaene	10.03	1373	0.19	7.06	1447	0.19
$\beta$ -Cubebene	10.24	1387	0.02	7.69	1494	0.01
$\beta$ -Elemene	10.27	1390	0.02	8.33*	1543	[2.01]
Isocaryophyllene	10.44	1402	0.02	8.08	1524	0.01
$\alpha$ -Gurjunene	10.46	1403	0.02	7.54	1482	0.01
( <i>Z</i> )-Isoeugenol	10.55	1410	0.01	15.18	2147	0.01
$\beta$ -Caryophyllene	10.61	1414	2.00	8.33*	1543	[2.01]
( <i>E</i> )-Cinnamic acid	10.88	1434	0.02	20.85	2784	0.04
( <i>E</i> )-Cinnamyl acetate	10.99	1443	2.77	14.51	2081	2.76
( <i>E</i> )-Isoeugenol	11.07*	1448	0.37	16.37	2267	0.01
$\alpha$ -Humulene	11.07*	1448	[0.37]	9.18	1610	0.34
allo-Aromadendrene	11.12	1452	0.01	8.90	1588	0.01
$\gamma$ -Murolene	11.41	1474	0.01	9.48	1635	0.01
ar-Curcumene	11.51	1481	0.03	10.55	1723	0.04
Viridiflorene	11.64	1491	0.02	9.55	1640	0.01
$\alpha$ -Murolene	11.72	1497	0.01	9.99	1676	0.01
2,3-Epoxy-cinnamyl acetate I?	11.79	1502	0.01	16.32	2262	0.02
$\gamma$ -Cadinene	11.86	1508	0.01	10.32*	1703	0.03
<i>trans</i> -Calamenene	12.00	1519	0.03	11.12	1771	0.03
$\delta$ -Cadinene	12.03	1521	0.02	10.32*	1703	[0.03]
Eugenyl acetate	12.12	1528	0.01	15.60	2188	0.01
( <i>E</i> )-ortho-Methoxycinnamal	12.15	1530	0.01	17.08	2343	0.17
$\alpha$ -Calacorene	12.24	1537	0.02	12.00*	1848	0.04
Isocaryophyllene epoxide B	12.34	1545	0.03	12.00*	1848	[0.04]
Caryophyllenyl alcohol	12.57	1563	0.04	13.51	1986	0.05
Spathulenol	12.68	1572	0.01	14.27	2058	0.02
Caryophyllene oxide	12.72*	1575	0.17	12.65	1908	0.17
Caryophyllene oxide isomer	12.72*	1575	[0.17]	12.57	1901	0.01
Globulol	12.76	1578	0.04	13.78	2011	0.02
Humulene epoxide II	13.05	1601	0.05	13.32*	1968	[73.35]
Tetradecanal	13.19	1612	0.07	12.39	1883	0.04
Caryophylladienol I	13.36	1626	0.01	15.92*	2221	0.02

Caryophylladienol II	13.40	1630	0.02	15.92*	2221	[0.02]
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.85	1666	0.02	16.68	2300	0.02
Benzyl benzoate	14.89	1755	0.38	18.73	2527	0.39
Unknown [m/z 93, 92 (57), 136 (34), 91 (23), 77 (13), 134 (11)...]	17.22	1966	0.01			
Unknown [m/z 69, 91 (57), 41 (49), 181 (32), 169 (25), 167 (22)...]	18.68	2109	0.09	20.78	2776	0.08
Unknown [m/z 69, 91 (56), 41 (49), 169 (34), 239 (28), 93 (23)...]	18.77	2118	0.05			
Caryophylla-4(12),8(13)-diene				8.50	1557	0.01
<b>Total identified</b>		<b>99.03%</b>			<b>98.82%</b>	
<b>Total reported</b>		<b>99.17%</b>			<b>98.91%</b>	

\*: 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