

Date : May 04, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

**Internal code** : 21D20-ORA04

**Customer identification** : Eucalyptus - Australia - 3 years - B406022

**Type** : Essential oil

**Source** : *Eucalyptus radiata*

**Customer** : Organic Aromas Inc.

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** : Sylvain Mercier, M. Sc., Chimiste

**Analysis date** : May 03, 2021

Checked and approved by :

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

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*PHYSICOCHEMICAL DATA*

**Physical aspect:** Clear liquid

**Refractive index:**  $1.4635 \pm 0.0003$  (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
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
(2E)-Hexenal	0.02	Aliphatic aldehyde
(3Z)-Hexenol	0.08	Aliphatic alcohol
(2E)-Hexenol	0.03	Aliphatic alcohol
Hexanol	0.03	Aliphatic alcohol
$\alpha$ -Thujene	0.20	Monoterpene
$\alpha$ -Pinene	2.19	Monoterpene
$\alpha$ -Fenchene	0.01	Monoterpene
Camphene	0.02	Monoterpene
$\beta$ -Pinene	0.66	Monoterpene
Sabinene	1.81	Monoterpene
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
Myrcene	1.31	Monoterpene
$\alpha$ -Phellandrene	0.51	Monoterpene
Pseudolimonene	0.02	Monoterpene
$\alpha$ -Terpinene	0.16	Monoterpene
para-Cymene	0.42	Monoterpene
Limonene	5.76	Monoterpene
1,8-Cineole	68.75	Monoterpenic ether
(Z)- $\beta$ -Ocimene	0.02	Monoterpene
(E)- $\beta$ -Ocimene	0.18	Monoterpene
$\gamma$ -Terpinene	0.26	Monoterpene
cis-Sabinene hydrate	0.03	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
Terpinolene	0.12	Monoterpene
trans-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
$\alpha$ -Pinene oxide	0.01	Monoterpenic ether
trans-Sabinene hydrate	0.02	Monoterpenic alcohol
Linalool	0.44	Monoterpenic alcohol
Unknown	0.01	Unknown
endo-Fenchol	0.01	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.25	Monoterpenic alcohol
trans-Pinocarveol	0.01	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.17	Monoterpenic alcohol
Isopulegol	0.02	Monoterpenic alcohol
Citronellal	0.04	Monoterpenic aldehyde
Borneol	0.01	Monoterpenic alcohol
$\delta$ -Terpineol	0.20	Monoterpenic alcohol
Terpinen-4-ol	0.93	Monoterpenic alcohol
Cryptone	0.03	Normoterpenic ketone
para-Cymen-8-ol	0.02	Monoterpenic alcohol
$\alpha$ -Terpineol	10.44	Monoterpenic alcohol

<i>cis</i> - $\alpha$ -Phellandrene epoxide (IPP vs Me)	0.02	Monoterpenic ether
<i>trans</i> -Piperitol	0.11	Monoterpenic alcohol
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
exo-2-Hydroxycineole	0.01	Monoterpenic alcohol
Nerol	0.06	Monoterpenic alcohol
Citronellol	0.05	Monoterpenic alcohol
Neral	0.13	Monoterpenic aldehyde
Carvone	0.01	Monoterpenic ketone
Piperitone	0.09	Monoterpenic ketone
Unknown	0.02	Unknown
Geraniol	1.28	Monoterpenic alcohol
<i>trans</i> -Ascaridole glycol	0.02	Monoterpenic alcohol
Geranial	0.20	Monoterpenic aldehyde
<i>cis</i> -Ascaridole glycol	0.01	Monoterpenic alcohol
Unknown	0.01	Unknown
<i>trans</i> -Pinocarvyl acetate	0.02	Monoterpenic ester
Unknown	0.01	Oxygenated monoterpene
para-Menth-5-en-1,2-diol isomer III	0.03	Monoterpenic alcohol
Unknown	0.02	Monoterpenic alcohol
Unknown	0.01	Unknown
exo-2-Hydroxycineole acetate	0.01	Monoterpenic ester
$\alpha$ -Terpinyl acetate	1.20	Monoterpenic ester
Unknown	0.03	Unknown
Geranyl acetate	0.04	Monoterpenic ester
Unknown	0.02	Sesquiterpene
Unknown	0.02	Unknown
$\beta$ -Caryophyllene	0.13	Sesquiterpene
Aromadendrene	0.01	Sesquiterpene
$\alpha$ -Humulene	0.02	Sesquiterpene
Phenylethyl isovalerate	0.01	Phenolic ester
Bicyclogermacrene	0.18	Sesquiterpene
Viridiflorene	0.02	Sesquiterpene
$\alpha$ -Elemol	0.04	Sesquiterpenic alcohol
Spathulenol	0.03	Sesquiterpenic alcohol
Globulol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
Cubeban-11-ol	0.01	Sesquiterpenic alcohol
Eudesm-5-en-11-ol analog	0.01	Sesquiterpenic alcohol
$\gamma$ -Eudesmol	0.02	Sesquiterpenic alcohol
Isospathulenol	0.02	Sesquiterpenic alcohol
$\beta$ -Eudesmol	0.03	Sesquiterpenic alcohol
$\alpha$ -Eudesmol	0.03	Sesquiterpenic alcohol
<b>Consolidated total</b>	<b>99.31%</b>	

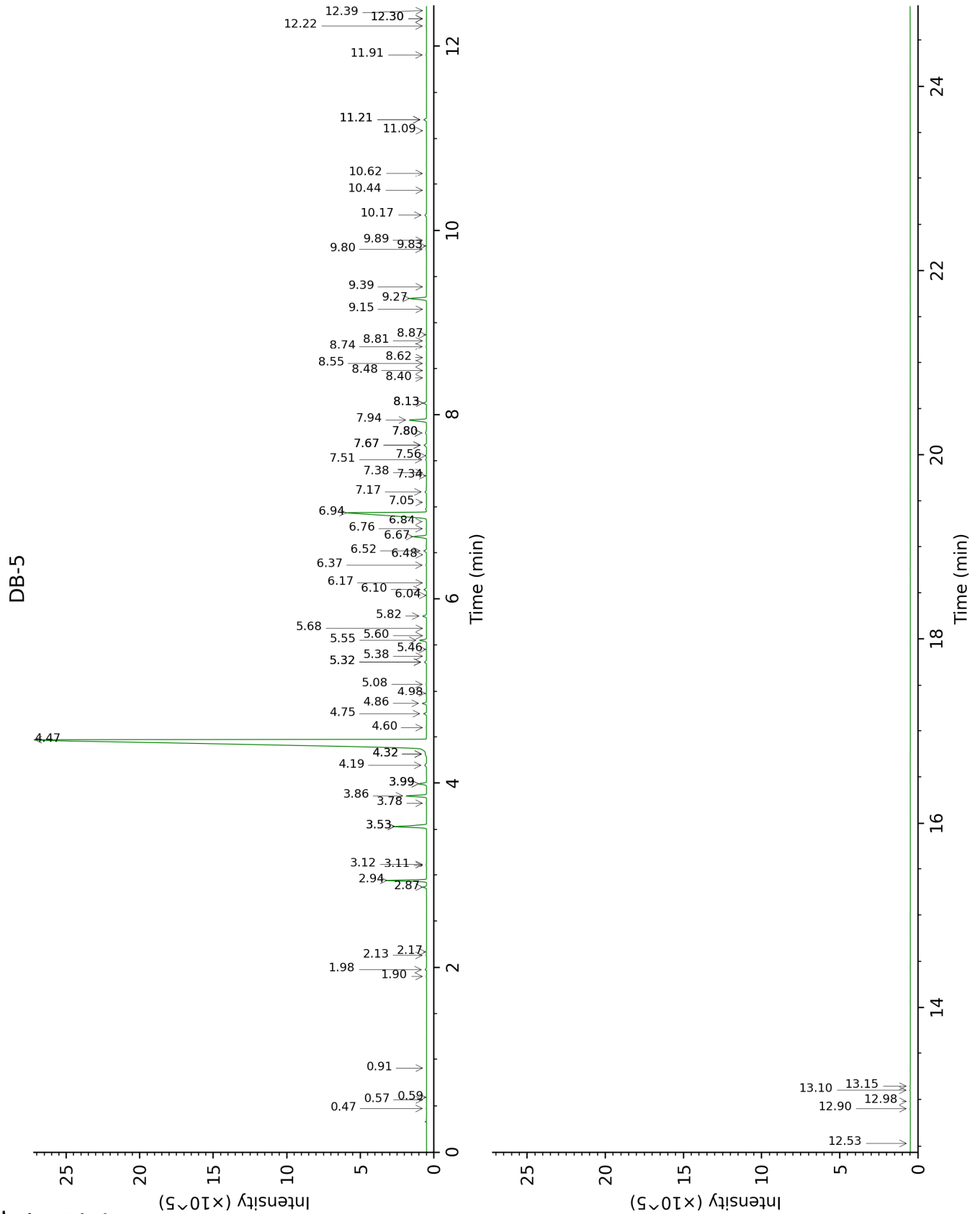
tr: The compound has been detected below 0.005% of total signal.

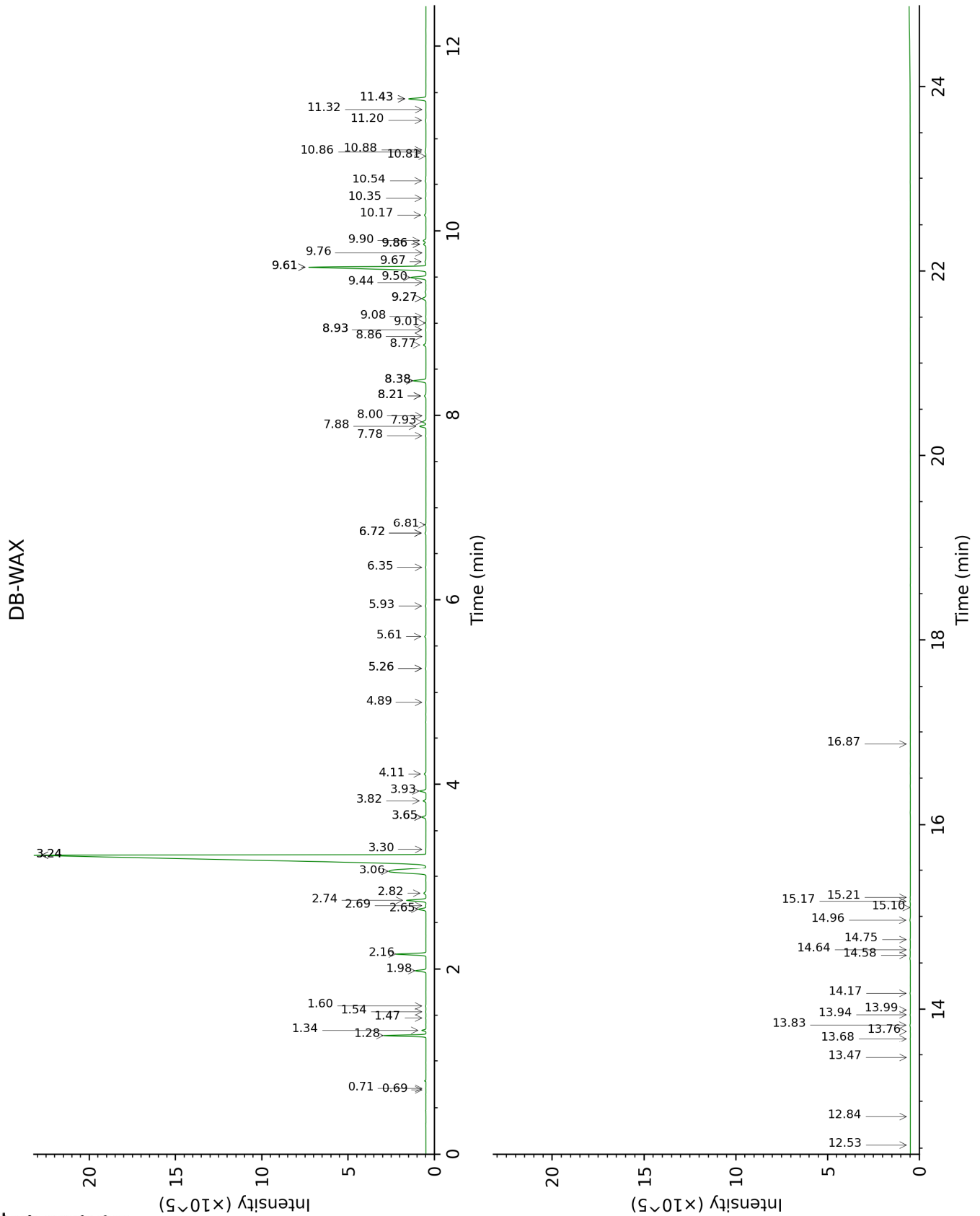
Note: no correction factor was applied

**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	%
2-Methyl-3-buten-2-ol	0.47	600	0.01	1.47	1014	0.01
Isovaleral	0.57	640	tr	0.71	887	tr
2-Methylbutyral	0.59	650	tr	0.69	880	tr
Isoamyl alcohol	0.91	732	tr	3.30	1178	0.01
(2E)-Hexenal	1.90	850	0.02	3.24*	1173	68.77
(3Z)-Hexenol	1.98	856	0.08	5.60	1347	0.09
(2E)-Hexenol	2.13	869	0.03	5.94	1371	0.04
Hexanol	2.17	873	0.03	5.26*	1322	0.04
α-Thujene	2.87	927	0.20	1.34	1001	0.20
α-Pinene	2.94	932	2.19	1.28	992	2.19
α-Fenchene	3.11	943	0.01	1.54	1021	0.01
Camphene	3.12	944	0.02	1.60	1027	0.02
β-Pinene	3.53*	972	2.47	1.98	1066	0.66
Sabinene	3.53*	972	[2.47]	2.16	1084	1.81
6-Methyl-5-hepten-2-one	3.78	989	0.02	4.89	1298	0.02
Myrcene	3.86	994	1.31	2.74	1134	1.31
α-Phellandrene	3.99*	1003	0.52	2.65	1126	0.51
Pseudolimonene	3.99*	1003	[0.52]	2.68	1129	0.02
α-Terpinene	4.19	1016	0.16	2.82	1140	0.16
para-Cymene	4.32*†	1024	75.11	3.93	1227	0.42
Limonene	4.32*†	1024	[75.11]	3.06	1159	5.76
1,8-Cineole	4.47†	1033	[75.11]	3.24*	1173	[68.77]
(Z)-β-Ocimene	4.60	1042	0.02	3.65*	1206	0.29
(E)-β-Ocimene	4.75	1051	0.18	3.82	1219	0.19
γ-Terpinene	4.86	1058	0.26	3.65*	1206	[0.29]
cis-Sabinene hydrate	4.98	1065	0.03	6.72*	1429	0.07
cis-Linalool oxide (fur.)	5.08	1072	0.03	6.35	1401	0.03
Terpinolene	5.32*	1087	0.15	4.11	1240	0.12
trans-Linalool oxide (fur.)	5.32*	1087	[0.15]	6.72*	1429	[0.07]
α-Pinene oxide	5.38	1091	0.01	5.26*	1322	[0.04]
trans-Sabinene hydrate	5.46	1096	0.02	7.78	1509	0.02
Linalool	5.55	1102	0.44	7.88	1517	0.44
Unknown [m/z 43, 59 (37), 79 (33), 91 (32), 119 (31)...]	5.60	1105	0.01	8.86	1593	0.01
endo-Fenchol	5.68	1110	0.01	8.21*	1542	0.13
cis-para-Menth-2-en-1-ol	5.82	1119	0.25	7.93	1520	0.27
trans-Pinocarveol	6.04	1133	0.01	9.01	1604	0.02
trans-para-Menth-2-en-1-ol	6.10	1137	0.17	8.77	1586	0.20
Isopulegol	6.17	1142	0.02	8.00	1526	0.01

Citronellal	6.37	1154	0.04	6.81	1436	0.03
Borneol	6.48	1161	0.01	9.61*	1654	10.52
δ-Terpineol	6.52	1164	0.20	9.27*	1626	0.34
Terpinen-4-ol	6.68	1174	0.93	8.38*	1555	0.93
Cryptone	6.76	1180	0.03	8.93*	1599	0.04
para-Cymen-8-ol	6.84	1185	0.02	11.32	1798	0.01
α-Terpineol	6.94	1191	10.44	9.61*	1654	[10.52]
<i>cis</i> -α-Phellandrene epoxide (IPP vs Me)	7.05	1198	0.02	10.82	1755	0.01
<i>trans</i> -Piperitol	7.17	1206	0.11	10.17	1700	0.11
<i>trans</i> -Carveol	7.34	1217	0.01	11.20	1788	0.04
exo-2- Hydroxycineole	7.38	1220	0.01	11.43*	1808	1.29
Nerol	7.51	1229	0.06	10.86	1759	0.07
Citronellol	7.56	1232	0.05	10.54	1731	0.05
Neral	7.67*	1240	0.19	9.27*	1626	[0.34]
Carvone	7.67*	1240	[0.19]	9.76	1666	0.01
Piperitone	7.80*	1248	0.09	9.67	1659	0.09
Unknown [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]	7.80*	1248	[0.09]	10.88	1761	0.02
Geraniol	7.94	1258	1.28	11.43*	1808	[1.29]
<i>trans</i> -Ascaridole glycol	8.13*	1270	0.21	13.94	2039	0.02
Geranial	8.13*	1270	[0.21]	9.90	1677	0.20
<i>cis</i> -Ascaridole glycol	8.40	1288	0.01	14.58	2101	0.01
Unknown [m/z 95, 110 (95), 67 (31), 43 (29), 122 (18), 41 (14)...]	8.48	1294	0.01			
<i>trans</i> -Pinocarvyl acetate	8.56	1299	0.02	8.93*	1599	[0.04]
Unknown [m/z 59, 94 (99), 79 (68), 43 (32), 97 (17)... 137 (8)...]	8.62	1303	0.01			
para-Menth-5-en- 1,2-diol isomer III	8.74	1312	0.03	14.96	2139	0.04
Unknown [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	8.81	1316	0.02	14.75	2118	0.02
Unknown [m/z 69, 41 (58), 114 (29), 43 (25), 83 (24), 123 (20)...]	8.87	1321	0.01			
exo-2- Hydroxycineole acetate	9.15	1341	0.01	9.86*	1674	0.20

α-Terpinyl acetate	9.27	1349	1.20	9.50	1645	1.19
Unknown [m/z 43, 95 (62), 107 (45), 110 (41), 55 (28), 67 (25)...]	9.39	1358	0.03	13.76	2021	0.01
Geranyl acetate	9.80	1386	0.04	10.35	1715	0.03
Unknown [m/z 93, 122 (98), 161 (98), 107 (86), 95 (46), 105 (72)... 204 (34)]	9.83	1389	0.02			
Unknown [m/z 71, 100 (92), 111 (79), 69 (46), 109 (45)...]	9.90	1394	0.02	16.87	2338	0.02
β-Caryophyllene	10.17	1413	0.13	8.21*	1542	[0.13]
Aromadendrene	10.44	1433	0.01	8.38*	1555	[0.93]
α-Humulene	10.62	1447	0.02	9.08	1610	0.02
Phenylethyl isovalerate	11.09	1482	0.01	12.84	1935	0.01
Bicyclogermacrene	11.21*	1491	0.20	9.86*	1674	[0.20]
Viridiflorene	11.21*	1491	[0.20]	9.44	1640	0.02
α-Elemol	11.91	1545	0.04	13.83	2028	0.04
Spathulenol	12.22	1570	0.03	14.17	2061	0.03
Globulol	12.30*	1576	0.03	13.68	2013	0.02
Caryophyllene oxide	12.30*	1576	[0.03]	12.53	1906	0.01
Cubeban-11-ol	12.39	1583	0.01	13.47	1994	0.01
Eudesm-5-en-11-ol analog	12.53	1594	0.01	13.99	2044	0.01
γ-Eudesmol	12.90	1625	0.02	14.64	2107	0.03
Isospathulenol	12.98	1631	0.02	15.21	2164	0.02
β-Eudesmol	13.10	1641	0.03	15.17	2160	0.03
α-Eudesmol	13.15	1645	0.03	15.10	2153	0.02
<b>Total identified</b>		<b>99.38%</b>			<b>99.32%</b>	
<b>Total reported</b>		<b>99.50%</b>			<b>99.41%</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