

**Date :** February 25, 2022

**CERTIFICATE OF ANALYSIS – GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 22B11-PTH05

**Customer identification :** Coriander Seed - CK01082111R

**Type :** Essential oil

**Source :** *Coriandrum sativum*

**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 :** Sylvain Mercier, M. Sc., Chimiste 2014-005

**Analysis date :** February 14, 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:** Clear liquid

**Refractive index:**  $1.4641 \pm 0.0003$  (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
Methyl 2-methylbutyrate	0.01	Aliphatic ester
Hexanol	0.01	Aliphatic alcohol
Nonane	0.01	Alkane
Tricyclene	0.03	Monoterpene
$\alpha$ -Thujene	0.05	Monoterpene
$\alpha$ -Pinene	5.94	Monoterpene
Camphene	0.93	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
$\beta$ -Pinene	0.54	Monoterpene
Sabinene	0.30	Monoterpene
6-Methyl-5-hepten-2-one	0.03	Aliphatic ketone
Myrcene	0.78	Monoterpene
6-Methyl-5-hepten-2-ol	0.05	Aliphatic alcohol
Pseudolimonene	0.01	Monoterpene
$\alpha$ -Phellandrene	0.02	Monoterpene
$\Delta^3$ -Carene	0.01	Monoterpene
$\alpha$ -Terpinene	0.03	Monoterpene
para-Cymene	1.46	Monoterpene
1,8-Cineole	0.13*	Monoterpenic ether
$\beta$ -Phellandrene	0.13*	Monoterpene
Limonene	2.33	Monoterpene
(Z)- $\beta$ -Ocimene	0.01	Monoterpene
(E)- $\beta$ -Ocimene	0.02	Monoterpene
$\gamma$ -Terpinene	3.75	Monoterpene
cis-Sabinene hydrate	0.07	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.17	Monoterpenic alcohol
Terpinolene	0.50	Monoterpene
para-Cymenene	0.01	Monoterpene
trans-Linalool oxide (fur.)	0.13	Monoterpenic alcohol
Linalool	72.21	Monoterpenic alcohol
Camphor	4.32	Monoterpenic ketone
Isopulegol	0.04	Monoterpenic alcohol
Citronellal	0.03	Monoterpenic aldehyde
Borneol	0.16	Monoterpenic alcohol
Terpinen-4-ol	0.11	Monoterpenic alcohol
trans-Linalool oxide (pyr.)	0.02	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
$\alpha$ -Terpineol	0.24	Monoterpenic alcohol
Myrtenal	tr	Monoterpenic aldehyde
Myrtenol	0.02	Monoterpenic alcohol
Verbenone	0.02	Monoterpenic ketone
Decanal	0.01	Aliphatic aldehyde
Octyl acetate	0.02	Aliphatic ester
Nerol	0.03	Monoterpenic alcohol
Citronellol	0.05	Monoterpenic alcohol

Neral	0.04	Monoterpenic aldehyde
(Z)-Isogeraniol	0.01	Monoterpenic alcohol
(2E)-Decenal	0.01	Aliphatic aldehyde
Geraniol	1.36	Monoterpenic alcohol
Geranial	0.03	Monoterpenic aldehyde
Decanol	0.02	Aliphatic alcohol
Undecanal	0.01	Aliphatic aldehyde
Myrtenyl acetate	0.10	Monoterpenic ester
Citronellyl acetate	0.02	Monoterpenic ester
Neryl acetate	0.04	Monoterpenic ester
<i>trans</i> -Myrtanyl acetate	0.01	Monoterpenic ester
Geranyl acetate	3.30	Monoterpenic ester
$\beta$ -Caryophyllene	0.07	Sesquiterpene
$\alpha$ -Humulene	0.01	Sesquiterpene
(2E)-Dodecenal	0.01	Aliphatic aldehyde
Germacrene D	0.01	Sesquiterpene
Caryophyllene oxide	0.01	Sesquiterpenic ether
(2E)-Tetradecenal	0.01	Aliphatic aldehyde
<b>Consolidated total</b>	<b>99.70%</b>	

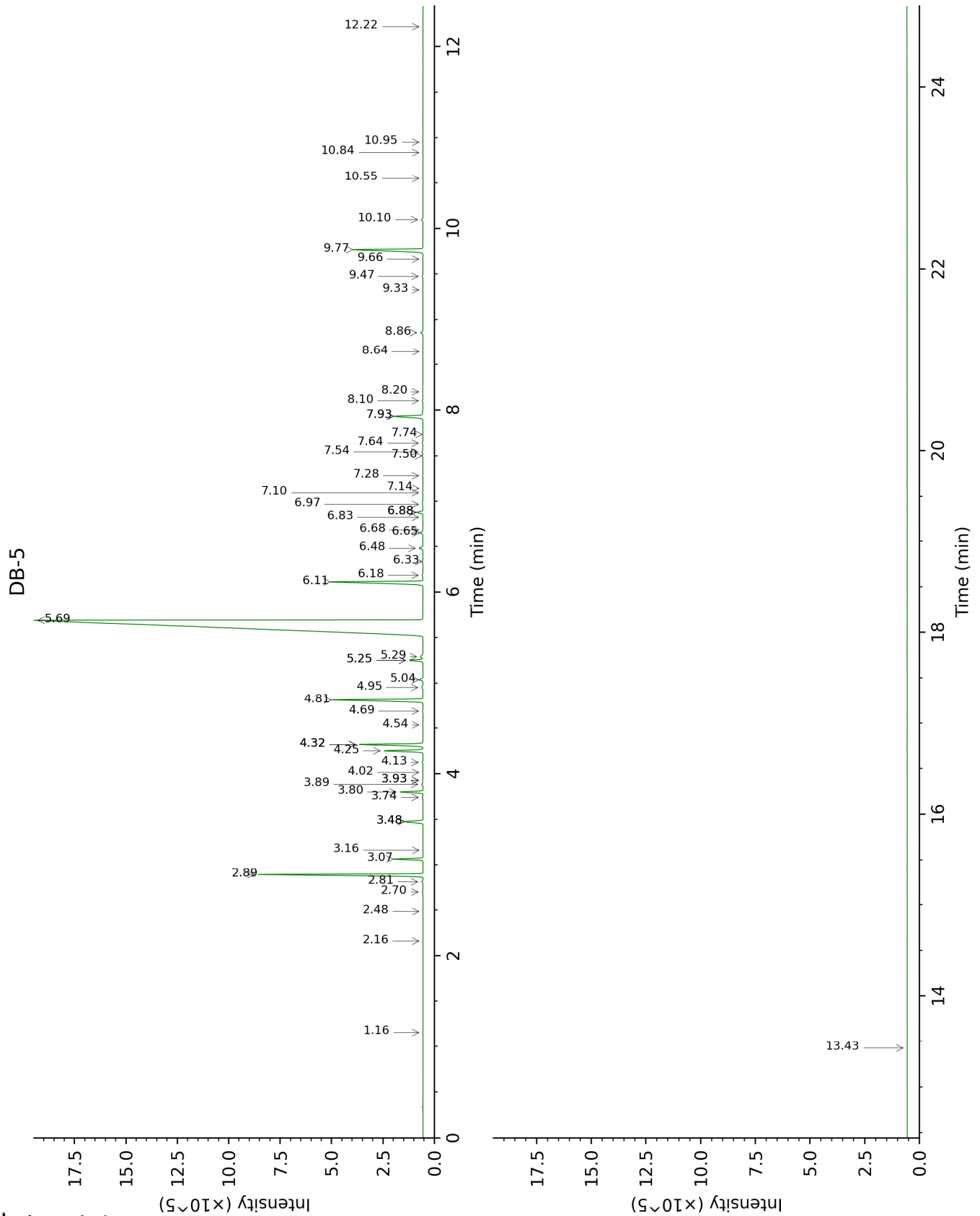
\*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered  
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total  
tr: The compound has been detected below 0.005% of total signal.

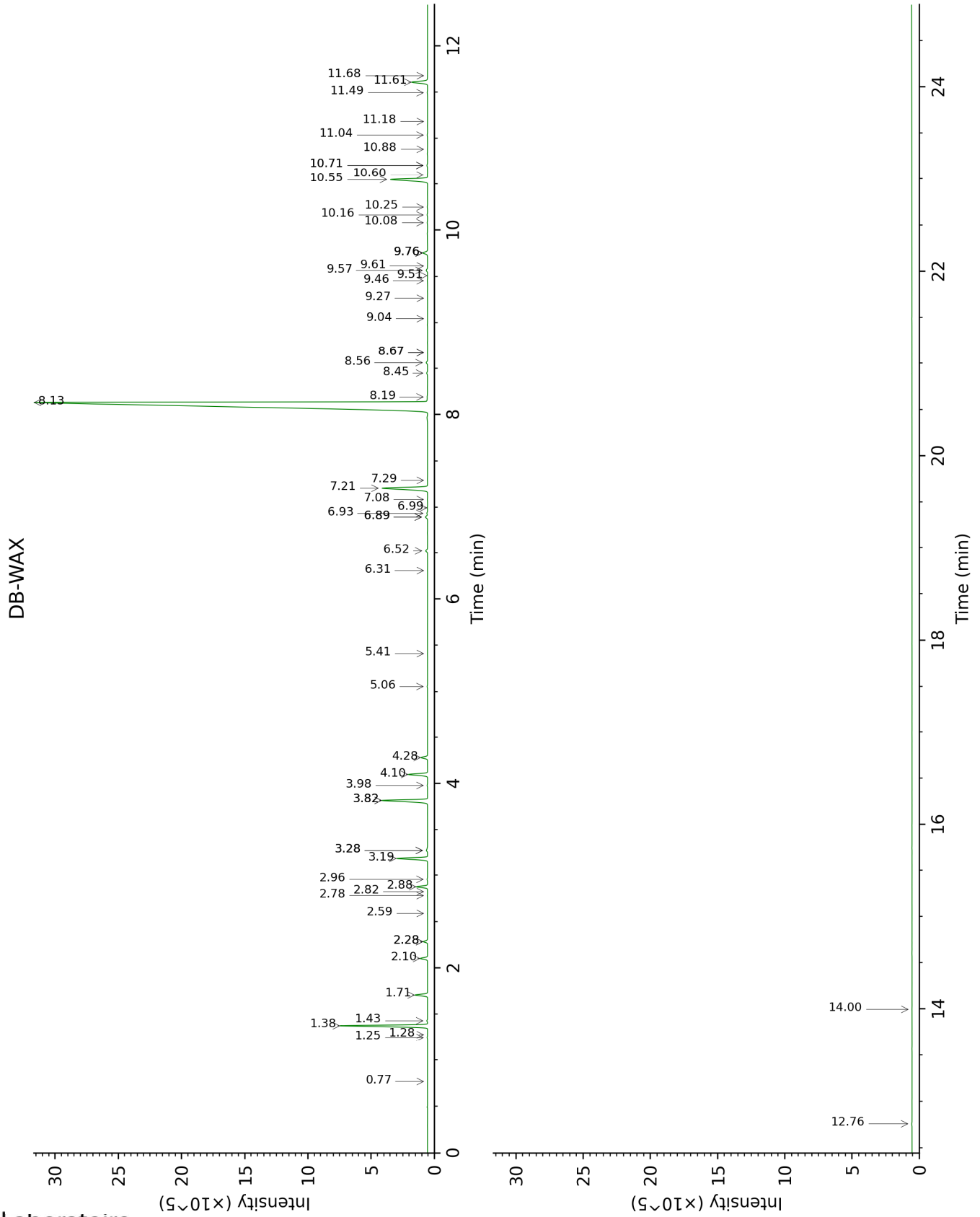
Note: no correction factor was applied

**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	%
Methyl 2-methylbutyrate	1.16	774	0.01	1.28	975	tr
Hexanol	2.16	875	0.01	5.41	1319	0.01
Nonane	2.48	903	0.01	0.77	889	tr
Tricyclene	2.70	918	0.03	1.25	970	0.02
$\alpha$ -Thujene	2.81	926	0.05	1.43	998	0.05
$\alpha$ -Pinene	2.89	931	5.94	1.38	991	5.87
Camphene	3.07	943	0.93	1.71	1025	0.92
Thuja-2,4(10)-diene	3.16	950	0.01	2.28*	1082	0.30
$\beta$ -Pinene	3.48*	971	0.84	2.10	1064	0.54
Sabinene	3.48*	971	[0.84]	2.28*	1082	[0.30]
6-Methyl-5-hepten-2-one	3.74	989	0.03	5.06	1298	0.03
Myrcene	3.80	993	0.78	2.88	1132	0.78
6-Methyl-5-hepten-2-ol	3.89	999	0.05	6.93	1430	0.05
Pseudolimonene	3.93*	1002	0.02	2.82	1128	0.01
$\alpha$ -Phellandrene	3.93*	1002	[0.02]	2.78	1124	0.02
$\Delta^3$ -Carene	4.02	1007	0.01	2.59	1109	0.01
$\alpha$ -Terpinene	4.13	1014	0.03	2.96	1138	0.04
para-Cymene	4.25	1022	1.46	4.10	1227	1.46
1,8-Cineole	4.32*	1027	2.46	3.28*	1164	0.12
$\beta$ -Phellandrene	4.32*	1027	[2.46]	3.28*	1164	[0.12]
Limonene	4.32*	1027	[2.46]	3.19	1157	2.33
(Z)- $\beta$ -Ocimene	4.54	1040	0.01	3.82*	1206	3.75
(E)- $\beta$ -Ocimene	4.69	1050	0.02	3.98	1218	0.03
$\gamma$ -Terpinene	4.81	1058	3.75	3.82*	1206	[3.75]
cis-Sabinene hydrate	4.95	1067	0.07	6.89*	1427	0.19
cis-Linalool oxide (fur.)	5.04	1072	0.17	6.52	1399	0.16
Terpinolene	5.25*†	1086	0.66	4.28	1240	0.50
para-Cymenene	5.25*†	1086	[0.66]	6.31	1384	0.01
trans-Linalool oxide (fur.)	5.29†	1088	[0.66]	6.89*	1427	[0.19]
Linalool	5.69	1114	72.21	8.13	1520	72.08
Camphor	6.11	1141	4.32	7.21	1450	4.28
Isopulegol	6.18	1145	0.04	8.19	1524	0.04
Citronellal	6.34	1155	0.03	6.99	1434	0.02
Borneol	6.48	1164	0.16	9.76*	1648	0.41
Terpinen-4-ol	6.65	1175	0.11	8.56	1553	0.11
trans-Linalool oxide (pyr.)	6.68	1177	0.02	10.60	1718	0.02
para-Cymen-8-ol	6.83	1187	0.02	11.49	1793	0.03
$\alpha$ -Terpineol	6.88*	1190	0.26	9.76*	1648	[0.41]
Myrtenal	6.88*	1190	[0.26]	8.67*	1562	0.01
Myrtenol	6.97	1196	0.02	10.88	1741	0.01



Verbenone	7.10	1204	0.02	9.61	1637	0.01
Decanal	7.14	1207	0.01	7.29	1456	0.02
Octyl acetate	7.28	1216	0.02	7.08	1441	0.01
Nerol	7.50	1231	0.03	11.04	1754	0.03
Citronellol	7.54	1234	0.05	10.71*	1727	0.06
Neral	7.64	1240	0.04	9.46	1624	0.03
(Z)-Isogeraniol	7.74	1247	0.01	11.18	1767	0.01
(2E)-Decenal	7.93*	1260	1.33	9.04	1591	0.01
Geraniol	7.93*	1260	[1.33]	11.61	1803	1.36
Geranial	8.10	1272	0.03	10.08	1674	0.03
Decanol	8.20	1278	0.02	10.71*	1727	[0.06]
Undecanal	8.64	1308	0.01	8.67*	1562	[0.01]
Myrtenyl acetate	8.86	1323	0.10	9.57	1633	0.12
Citronellyl acetate	9.33	1356	0.02	9.51	1628	0.01
Neryl acetate	9.48	1367	0.04	10.16	1681	0.04
<i>trans</i> -Myrtenyl acetate	9.66	1380	0.01	10.25	1688	0.03
Geranyl acetate	9.77	1388	3.30	10.55	1713	3.30
β-Caryophyllene	10.10	1411	0.07	8.45	1544	0.07
α-Humulene	10.55	1445	0.01	9.27	1608	0.01
(2E)-Dodecenal	10.84	1467	0.01	11.68	1810	0.01
Germacrene D	10.95	1475	0.01	9.76*	1648	[0.41]
Caryophyllene oxide	12.22	1573	0.01	12.76	1906	0.04
(2E)-Tetradecenal	13.43	1672	0.01	14.00	2021	0.01
<b>Total identified</b>		<b>99.70%</b>			<b>99.44%</b>	
<b>Total reported</b>		<b>99.70%</b>			<b>99.44%</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