

Date : 2024-02-27

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24B09-NPA03

Customer Identification : Coriander - Bulgaria - NPS00131 - Lot# NP0313

Type : Essential Oil

Source : *Coriandrum sativum*

Customer : Nature Packaged

Checked and approved by:



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

Notes: 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 from the first version issued on 2024-02-22 to format it for online publication.

GAS CHROMATOGRAPHIC ANALYSIS

Method : PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID

***ISO**

Results : See analysis summary (next page)

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

Date : 2024-02-19

PHYSICOCHEMICAL DATA

Refractive index : 1.4633 ± 0.0003 (20 °C)

Method : PC-MAT-016 - Measure of the refractive index of a liquid.

Analyst : Cindy Caron B. Sc.

Date : 2024-02-12

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
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Methyl 2-methylbutyrate	0.01	Aliphatic ester
Hexanal	tr	Aliphatic aldehyde
Octane	tr	Alkane
Hexanol	0.01	Aliphatic alcohol
Heptanal	0.01	Aliphatic aldehyde
Nonane	0.01	Alkane
Tricyclene	0.03	Monoterpene
α -Thujene	0.04	Monoterpene
α -Pinene	4.31	Monoterpene
Camphene	0.79	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
β -Pinene	0.35	Monoterpene
Sabinene	0.23	Monoterpene
6-Methyl-5-hepten-2-one	0.03	Aliphatic ketone
Myrcene	0.81	Monoterpene
6-Methyl-5-hepten-2-ol	0.03	Aliphatic alcohol
Pseudolimonene	0.01	Monoterpene
α -Phellandrene	0.02	Monoterpene
Octanal	0.02	Aliphatic aldehyde
Δ^3 -Carene	0.02	Monoterpene
α -Terpinene	0.05	Monoterpene
<i>para</i> -Cymene	0.94	Monoterpene
Limonene	2.09	Monoterpene
β -Phellandrene	0.10	Monoterpene
1,8-Cineole	0.03	Monoterpenic ether
(<i>Z</i>)- β -Ocimene	0.02	Monoterpene
(<i>E</i>)- β -Ocimene	0.02	Monoterpene
γ -Terpinene	4.25	Monoterpene
<i>cis</i> -Sabinene hydrate	0.05	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (fur.)	0.10	Monoterpenic alcohol
Isoterpinolene	0.02	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	0.07	Monoterpenic alcohol
Terpinolene	0.52	Monoterpene
<i>para</i> -Cymenene	0.01	Monoterpene
2-Hexylfuran	0.01	Furan
Linalool	73.52	Monoterpenic alcohol

Camphor	4.61	Monoterpenic ketone
Isopulegol	0.03	Monoterpenic alcohol
Citronellal	0.03	Monoterpenic aldehyde
Isoborneol	0.01	Monoterpenic alcohol
(2E)-Nonenal	0.01	Aliphatic aldehyde
Pinocarvone	0.01	Monoterpenic ketone
Borneol	0.17	Monoterpenic alcohol
<i>cis</i> -Linalool oxide (pyr.)	0.01	Monoterpenic alcohol
Terpinen-4-ol	0.15	Monoterpenic alcohol
<i>trans</i> -Linalool oxide (pyr.)	0.01	Monoterpenic alcohol
<i>para</i> -Cymen-8-ol	0.02	Monoterpenic alcohol
Myrtenal	tr	Monoterpenic aldehyde
α -Terpineol	0.30	Monoterpenic alcohol
Myrtenol	0.04	Monoterpenic alcohol
Hodiendiol (2,6-dimethylocta-3,7-diene-2,6-diol)	0.02	Monoterpenic alcohol
Verbenone	0.03	Monoterpenic ketone
Decanal	0.04	Aliphatic aldehyde
Octyl acetate	0.01	Aliphatic ester
Nerol	0.03	Monoterpenic alcohol
Citronellol	0.08	Monoterpenic alcohol
Neral	0.03	Monoterpenic aldehyde
Geraniol	2.26	Monoterpenic alcohol
(2E)-Decenal	0.04	Aliphatic aldehyde
Geranial	0.05	Monoterpenic aldehyde
(2E)-Decenol	0.02	Aliphatic alcohol
Decanol	0.06	Aliphatic alcohol
Undecanal	0.02	Aliphatic aldehyde
Myrtenyl acetate	0.09	Monoterpenic ester
Citronellyl acetate	0.01	Monoterpenic ester
Neryl acetate	0.03	Monoterpenic ester
<i>trans</i> -Myrtenyl acetate	0.02	Monoterpenic ester
Geranyl acetate	2.89	Monoterpenic ester
Dodecanal	0.01	Aliphatic aldehyde
β -Caryophyllene	0.06	Sesquiterpene
α -Humulene	0.01	Sesquiterpene
(2E)-Dodecenal	0.03	Aliphatic aldehyde
Germacrene D	0.02	Sesquiterpene
Caryophyllene oxide	0.02	Sesquiterpenic ether
(2E)-Tetradecenal	0.01	Aliphatic aldehyde
Phytone	0.02	Terpenic ketone
Consolidated total	99.83	

tr: The compound has been detected below 0.005% of the 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

Laboratoire
PhytoChemia

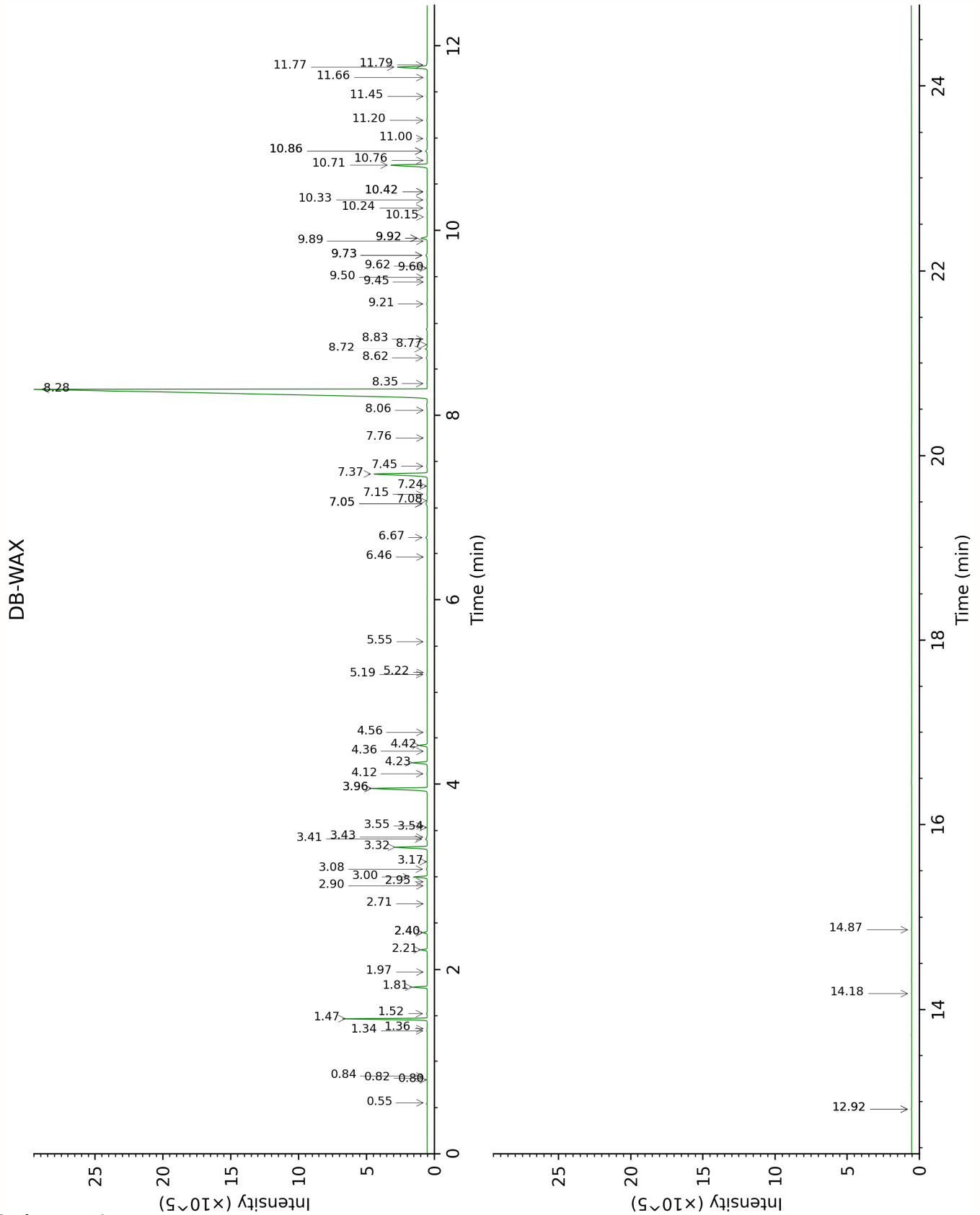
Plus que des analyses... des conseils

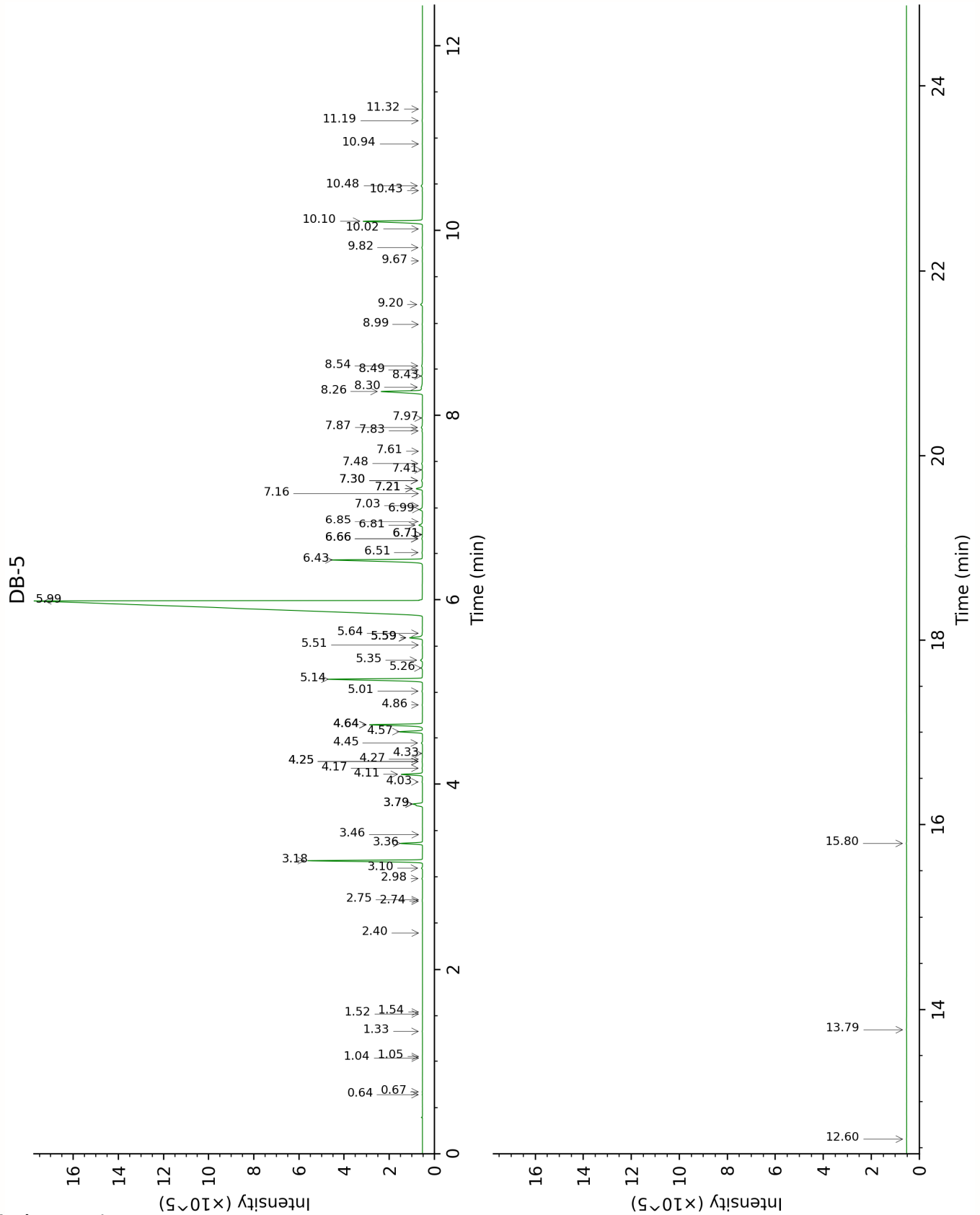
between columns, the algorithm is set to prioritize data from the most standard DB-5 column, and smallest values so as to avoid overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report 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.

Bracketed value ([xx]): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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





FULL ANALYSIS DATA

Isovaleral	Column DB-WAX			Column DB-5		
	0.82	885.0	0.01	0.64	640.9	tr
2-Methylbutyral	0.80	879.0	0.01	0.67	651.3	tr
Isoamyl alcohol	3.54	1174.7	0.01	1.04	733.5	tr
2-Methylbutanol	3.55	1175.9	tr	1.05	735.9	tr
Methyl 2-methylbutyrate	1.36	977.1	0.01	1.33	774.3	0.01
Hexanal	1.97	1044.4	0.01	1.52	800.1	tr
Octane	0.55	785.4	tr	1.54	803.1	tr
Hexanol	5.55	1319.6	0.01	2.40	874.1	0.01
Heptanal	3.16	1146.4	0.02	2.74	902.2	0.01
Nonane	0.84	892.7	0.01	2.76	903.6	0.01
Tricyclene	1.34	973.5	0.02	2.98	919.0	0.03
α -Thujene	1.52	1001.4	0.03	3.10	926.4	0.04
α -Pinene	1.47	993.3	4.29	3.18	931.7	4.31
Camphene	1.81	1029.1	0.78	3.36	944.0	0.79
Thuja-2,4(10)-diene	2.40*	1084.6	[0.23]	3.46	950.2	0.01
β -Pinene	2.21	1067.1	0.35	3.79*	972.0	[0.58]
Sabinene	2.40*	1084.6	[0.23]	3.79*	972.0	[0.58]
6-Methyl-5-hepten-2-one	5.19	1295.6	0.03	4.03	987.7	0.03
Myrcene	3.00	1133.9	0.79	4.11	993.1	0.81
6-Methyl-5-hepten-2-ol	7.08	1430.9	0.02	4.18	997.4	0.03
Pseudolimonene	2.95	1129.9	0.01	4.25*	1002.2	[0.02]
α -Phellandrene	2.90	1126.6	0.02	4.25*	1002.2	[0.02]
Octanal	4.56	1250.1	0.02	4.27	1003.9	0.02
Δ^3 -Carene	2.71	1111.8	0.01	4.33	1007.8	0.02
α -Terpinene	3.08	1140.3	0.05	4.45	1014.9	0.05
<i>para</i> -Cymene	4.23	1226.5	0.95	4.57	1022.5	0.94
Limonene	3.32	1158.4	2.09	4.64*	1027.2	[2.22]
β -Phellandrene	3.41	1165.0	0.10	4.64*	1027.2	[2.22]
1,8-Cineole	3.43	1166.7	0.03	4.64*	1027.2	[2.22]
(<i>Z</i>)- β -Ocimene	3.96*	1206.6	[4.25]	4.86	1040.6	0.02
(<i>E</i>)- β -Ocimene	4.12	1218.0	0.03	5.02	1050.4	0.02
γ -Terpinene	3.96*	1206.6	[4.25]	5.14	1058.4	4.25
<i>cis</i> -Sabinene hydrate	7.05*	1428.4	[0.12]	5.26	1066.0	0.05
<i>cis</i> -Linalool oxide (fur.)	6.67	1400.7	0.09	5.35	1071.3	0.10
Isoterpinolene	4.36	1235.4	tr	5.51	1081.5	0.02
<i>trans</i> -Linalool oxide (fur.)	7.05*	1428.4	[0.12]	5.59*	1086.4	[0.59]

Terpinolene	4.42	1240.0	0.52	5.59*	1086.4	[0.59]
<i>para</i> -Cymenene	6.46	1385.5	0.01	5.59*	1086.4	[0.59]
2-Hexylfuran	5.22	1297.2	tr	5.64	1089.4	0.01
Linalool	8.28	1521.4	73.06	5.99	1111.4	73.52
Camphor	7.37	1452.5	4.55	6.43	1139.7	4.61
Isopulegol	8.34	1526.3	0.02	6.51	1144.7	0.03
Citronellal	7.15	1436.1	0.03	6.66*	1154.2	[0.03]
Isoborneol	9.50	1616.6	0.01	6.66*	1154.2	[0.03]
(2 <i>E</i>)-Nonenal	7.76	1481.4	0.01	6.71*	1157.1	[0.01]
Pinocarvone	8.06	1503.8	0.01	6.71*	1157.1	[0.01]
Borneol	9.92*	1650.7	[0.47]	6.81	1163.6	0.17
<i>cis</i> -Linalool oxide (pyr.)	10.42*	1691.3	[0.02]	6.85	1166.3	0.01
Terpinen-4-ol	8.72	1555.6	0.14	6.98	1174.9	0.15
<i>trans</i> -Linalool oxide (pyr.)	10.76	1720.1	0.02	7.03	1177.5	0.01
<i>para</i> -Cymen-8-ol	11.66	1796.2	0.02	7.16	1185.8	0.02
Myrtenal	8.77	1559.4	tr	7.21*	1189.3	[0.31]
α -Terpineol	9.92*	1650.7	[0.47]	7.21*	1189.3	[0.31]
Myrtenol	11.00	1740.2	0.04	7.30*	1194.8	[0.06]
Hodiendiol (2,6- dimethylocta- 3,7-diene-2,6- diol)	12.92*	1908.1	[0.03]	7.30*	1194.8	[0.06]
Verbenone	9.73*	1635.6	[0.11]	7.41	1202.2	0.03
Decanal	7.45	1458.7	0.05	7.48	1206.6	0.04
Octyl acetate	7.24	1442.7	0.01	7.61	1215.4	0.01
Nerol	11.20	1756.9	0.04	7.83	1230.1	0.03
Citronellol	10.86*	1728.7	[0.13]	7.87	1232.6	0.08
Neral	9.62	1626.2	0.03	7.97	1239.4	0.03
Geraniol	11.77	1805.9	2.26	8.26*†	1258.6	[2.12]
(2 <i>E</i>)-Decenal	9.21	1593.5	0.04	8.30*†	1261.7	[0.12]
Geranial	10.24	1677.0	0.03	8.43	1269.7	0.05
(2 <i>E</i>)-Decenol	11.45	1778.8	0.02	8.49	1274.1	0.02
Decanol	10.86*	1728.7	[0.13]	8.54	1277.1	0.06
Undecanal	8.83	1564.2	0.02	8.99	1307.6	0.02
Myrtenyl acetate	9.73*	1635.6	[0.11]	9.20	1322.7	0.09
Citronellyl acetate	9.60	1624.4	0.01	9.67	1355.7	0.01
Neryl acetate	10.33	1684.1	0.04	9.82	1365.8	0.03
<i>trans</i> -Myrtenyl acetate	10.42*	1691.3	[0.02]	10.02	1379.9	0.02
Geranyl acetate	10.71	1715.8	2.89	10.10	1385.8	2.89
Dodecanal	10.15	1669.2	0.02	10.43	1409.2	0.01
β -Caryophyllene	8.62	1547.8	0.06	10.48	1413.0	0.06

α -Humulene	9.45	1612.3	tr	10.94	1447.1	0.01
(2E)-Dodecenal	11.79	1808.0	0.05	11.19	1465.9	0.03
Germacrene D	9.89	1648.1	0.01	11.32	1475.2	0.02
Caryophyllene oxide	12.92*	1908.1	[0.03]	12.60	1573.9	0.02
(2E)-Tetradecenal	14.18	2025.3	0.02	13.79	1670.4	0.01
Phytone	14.87	2091.6	0.02	15.80	1844.9	0.02
Total reported		99.18%			99.76%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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