CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23J20-PTH01
Customer Identification : Orange Essence - U.S.A - OQ0107R
Type : Essential Oil
Source : *Citrus sinensis*
Customer : Plant Therapy

Checked an approved by:

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

MÉTHODE CERTIFIÉE
✳ISO 17025:2017
CERTIFIED METHOD

Laboratoire PhytoChemia

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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 : Benoit Roger, Ph. D.

Date : 2023-10-27

PHYSICOCHEMICAL DATA

Refractive index : 1.4724 ± 0.0003 (20 ℃)

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

Analyst : Cindy Caron B. Sc.

Date : 2023-10-23

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

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ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Diethyl acetal	0.01	Aliphatic acetal
Hexanal	0.01	Aliphatic aldehyde
Ethyl butyrate	0.06	Aliphatic ester
(2*E*)-Hexenal	0.01	Aliphatic aldehyde
Hexanol	tr	Aliphatic alcohol
α-Thujene	0.01	Monoterpene
α-Pinene	0.45	Monoterpene
Sabinene	0.36	Monoterpene
β-Pinene	0.02	Monoterpene
Myrcene	1.66	Monoterpene
Octanal	0.24	Aliphatic aldehyde
α-Phellandrene	0.02	Monoterpene
Pseudolimonene	tr	Monoterpene
Δ3-Carene	0.14	Monoterpene
Limonene	94.51	Monoterpene
(*Z*)-β-Ocimene	tr	Monoterpene
(*E*)-β-Ocimene	0.03	Monoterpene
γ-Terpinene	0.01	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.16	Aliphatic alcohol
Terpinolene	0.02	Monoterpene
Linalool	0.50	Monoterpenic alcohol
Nonanal	0.03	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.03	Monoterpenic alcohol
cis-Limonene oxide	0.06	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
trans-Limonene oxide	0.04	Monoterpenic ether
Citronellal	0.02	Monoterpenic aldehyde
Terpinen-4-ol	0.02	Monoterpenic alcohol
α-Terpineol	0.12	Monoterpenic alcohol
cis-Piperitol	0.01	Monoterpenic alcohol
Decanal	0.20	Aliphatic aldehyde
Octyl acetate	0.01	Aliphatic ester
trans-Carveol	0.03	Monoterpenic alcohol
Nerol	0.03	Monoterpenic alcohol
cis-Carveol	0.03	Monoterpenic alcohol
Neral	0.09	Monoterpenic aldehyde
Geraniol	0.02	Monoterpenic alcohol
Geranial	0.07	Monoterpenic aldehyde
Decanol	0.05	Aliphatic alcohol

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Limonen-10-ol	0.01	Monoterpenic alcohol
Undecanal	0.01	Aliphatic aldehyde
α-Copaene	0.03	Sesquiterpene
Geranyl acetate	0.02	Monoterpenic ester
β-Elemene	0.01	Sesquiterpene
Dodecanal	0.03	Aliphatic aldehyde
β-Caryophyllene	0.04	Sesquiterpene
β-Copaene	0.02	Sesquiterpene
α-Humulene	tr	Sesquiterpene
(*E*)-β-Farnesene	0.01	Sesquiterpene
γ-Muurolene	0.01	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
Valencene	0.30	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
Caryophyllene oxide	0.01	Sesquiterpenic ether
β-Sinensal	0.01	Sesquiterpenic aldehyde
α-Sinensal	0.01	Sesquiterpenic aldehyde
Myristic acid	0.01	Aliphatic acid
Nootkatone	0.01	Sesquiterpenic ketone
Consolidated total	**99.78**	

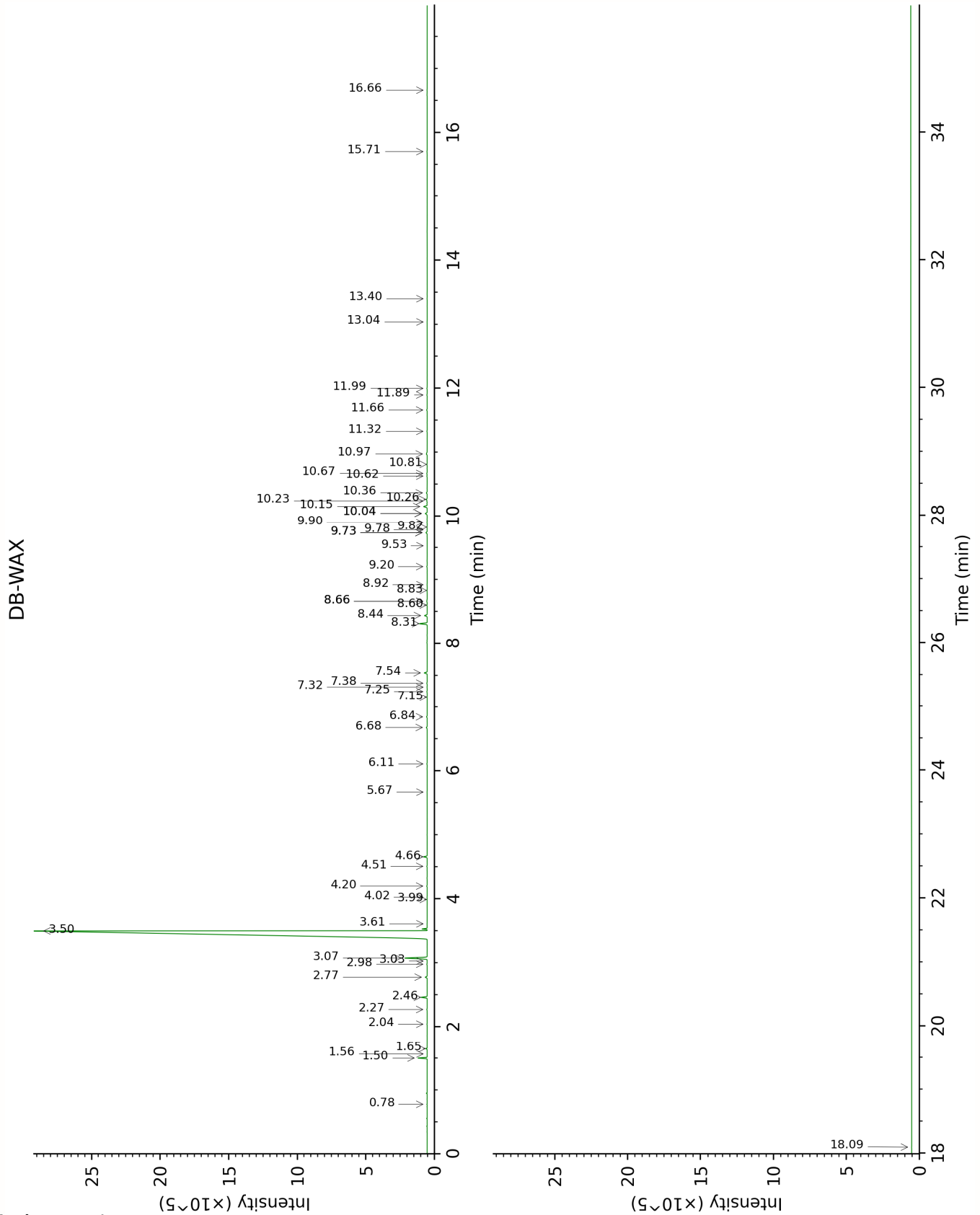tr: The compound has been detected below 0.005% of the total signal
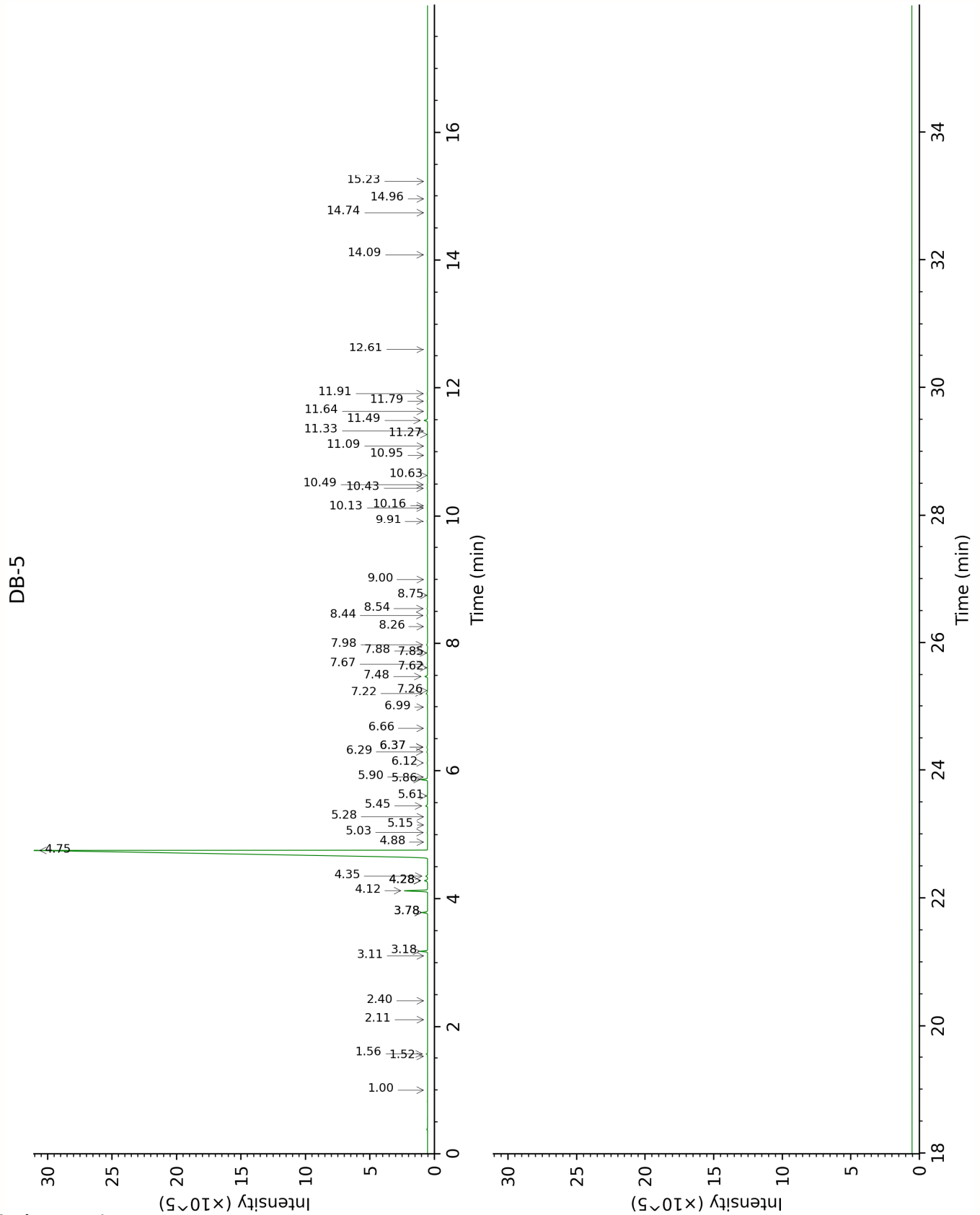
Note: no correction factor was applied

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 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.

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

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DB-WAX

16.66

15.71

13.40

13.04

11.99
11.89
11.66
11.32
10.97
10.81
10.67
10.62
10.23
10.36
10.26
10.15
10.04
9.90
9.73
9.78
9.82
9.53
9.20
8.92
8.83
8.66
8.60
8.44
8.31

7.54
7.38
7.32
7.25
7.15
6.84
6.68

6.11

5.67

4.66
4.51
4.20
4.02
3.99
3.61

3.50

3.07
3.03
2.98
2.77
2.46
2.27
2.04
1.65
1.56
1.50

0.78

18.09

Time (min)

Time (min)

Intensity (×10^5)

Intensity (×10^5)

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DB-5

Time (min)

Intensity (×10^5)

Time (min)

Intensity (×10^5)

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Diethyl acetal	0.78	865.2	0.01	1.00	728.5	0.01
Hexanal	2.04	1045.8	0.01	1.52	801.0	0.01
Ethyl butyrate	1.65	1008.9	0.06	1.56	806.0	0.06
(2*E*)-Hexenal	3.61	1174.5	0.01	2.11	850.7	0.01
Hexanol	5.67	1324.6	0.01	2.40	874.9	tr
α-Thujene	1.56	1001.1	tr	3.11	927.0	0.01
α-Pinene	1.50	993.0	0.45	3.18	931.7	0.45
Sabinene	2.46	1085.4	0.36	3.78*	971.4	[0.39]
β-Pinene	2.27	1067.5	0.02	3.78*	971.4	[0.39]
Myrcene	3.07	1134.2	1.66	4.12	993.8	1.66
Octanal	4.66	1249.9	0.24	4.28*	1004.1	[0.26]
α-Phellandrene	2.98	1126.9	0.02	4.28*	1004.1	[0.26]
Pseudolimonene	3.03	1130.6	tr	4.28*	1004.1	[0.26]
Δ3-Carene	2.78	1111.6	0.13	4.35	1008.6	0.14
Limonene	3.50	1166.1	94.07	4.75	1033.6	94.51
(*Z*)-β-Ocimene	3.99	1202.8	0.01	4.88	1041.7	tr
(*E*)-β-Ocimene	4.20	1217.6	0.03	5.03	1051.0	0.03
γ-Terpinene	4.02	1205.3	0.01	5.15	1058.4	0.01
cis-Sabinene hydrate	7.15	1430.8	0.01	5.28	1066.3	0.01
Octanol	8.44	1526.3	0.19	5.45	1077.0	0.16
Terpinolene	4.51	1239.4	0.03	5.61	1086.7	0.02
Linalool	8.31	1516.7	0.53	5.86	1102.7	0.50
Nonanal	6.11	1355.8	0.02	5.90	1105.0	0.03
trans-para-Mentha-2,8-dien-1-ol	9.20	1584.8	0.03	6.12	1119.2	0.03
cis-Limonene oxide	6.68	1396.1	0.06	6.29	1130.1	0.06
cis-para-Mentha-2,8-dien-1-ol	9.73*	1627.0	[0.09]	6.37*	1134.9	[0.07]
trans-Limonene oxide	6.84	1408.3	0.04	6.37*	1134.9	[0.07]
Citronellal	7.25	1437.8	0.02	6.66	1153.5	0.02
Terpinen-4-ol	8.83	1556.4	0.01	6.99	1174.6	0.02
α-Terpineol	10.04*	1651.8	[0.15]	7.22	1188.8	0.12
cis-Piperitol	9.78	1630.7	0.01	7.26	1191.8	0.01
Decanal	7.54	1459.4	0.20	7.48	1205.8	0.20
Octyl acetate	7.32	1442.9	0.01	7.62	1215.0	0.01
trans-Carveol	11.66	1785.7	0.04	7.67	1218.6	0.03
Nerol	11.32	1757.7	0.02	7.85	1230.4	0.03
cis-Carveol	12.00	1815.0	0.03	7.88	1232.4	0.03

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Essential Oil, *Citrus sinensis*
Internal code: 23J20-PTH01

Orange Essence - U.S.A - OQ0107R

Report prepared for:
Plant Therapy

Compound	R.T.	R.I.	%	R.T.	R.I.	%
Neral	9.73*	1627.0	[0.09]	7.98	1238.9	0.09
Geraniol	11.89	1806.0	0.02	8.26	1257.9	0.02
Geranial	10.36	1677.7	0.06	8.44	1269.4	0.07
Decanol	10.97	1728.0	0.10	8.54	1276.6	0.05
Limonen-10-ol	13.40	1940.9	0.01	8.75	1290.4	0.01
Undecanal	8.92	1563.2	0.01	9.00	1307.0	0.01
α-Copaene	7.38	1447.5	0.03	9.92	1371.6	0.03
Geranyl acetate	10.81	1714.4	0.02	10.13	1386.4	0.02
β-Elemene	8.66*	1543.3	[0.04]	10.16	1389.0	0.01
Dodecanal	10.24	1667.4	0.02	10.43	1408.4	0.03
β-Caryophyllene	8.66*	1543.3	[0.04]	10.49	1412.5	0.04
β-Copaene	8.60	1538.8	0.02	10.64	1423.3	0.02
α-Humulene	9.53	1610.5	0.01	10.95	1446.5	tr
(*E*)-β-Farnesene	9.82	1634.0	0.02	11.09	1457.3	0.01
γ-Muurolene	9.90	1640.3	0.02	11.27	1470.7	0.01
Germacrene D	10.04*	1651.8	[0.15]	11.33	1474.8	0.02
Valencene	10.15	1660.5	0.27	11.49	1487.1	0.30
α-Muurolene	10.26	1669.5	0.06	11.64	1497.6	0.02
γ-Cadinene	10.62	1699.0	0.03	11.79	1509.6	0.03
δ-Cadinene	10.67	1702.5	0.04	11.91	1519.0	0.04
Caryophyllene oxide	13.04	1907.7	0.01	12.61	1573.2	0.01
β-Sinensal	15.71	2162.0	0.02	14.09	1693.7	0.01
α-Sinensal	16.66	2260.4	0.02	14.74	1749.9	0.01
Myristic acid				14.96	1768.6	0.01
Nootkatone	18.09	2414.4	0.01	15.23	1792.0	0.01
Total reported		99.46%			99.78%	

*: 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

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