CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code **:** 22C01-PTH02
Customer identification : Orange Essence - OQ0105221R
Type : Essential oil
Source : *Citrus sinensis*
Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-014 ✳ISO - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Pamela Lavoie, M.Sc., Chimiste
Analysis date : March 14, 2022

Checked and approved by :

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

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MÉTHODE CERTIFIÉE
✳ISO 17025:2017
CERTIFIED METHOD

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4723 ± 0.0003 (20 °C; method PC-MAT-016)

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
Ethyl acetate	tr	Aliphatic ester
Hexanal	0.01	Aliphatic aldehyde
Ethyl butyrate	0.06	Aliphatic ester
(2*E*)-Hexenal	0.01	Aliphatic aldehyde
Heptanal	tr	Aliphatic aldehyde
α-Thujene	0.01	Monoterpene
α-Pinene	0.51	Monoterpene
Camphene	0.01	Monoterpene
Sabinene	0.33	Monoterpene
β-Pinene	0.04	Monoterpene
Myrcene	1.72	Monoterpene
α-Phellandrene	0.04	Monoterpene
Octanal	0.27	Aliphatic aldehyde
Δ3-Carene	0.14	Monoterpene
Limonene	94.17	Monoterpene
1,8-Cineole	0.26	Monoterpenic ether
(*Z*)-β-Ocimene	0.01	Monoterpene
(*E*)-β-Ocimene	0.03	Monoterpene
γ-Terpinene	0.02	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.06	Aliphatic alcohol
Terpinolene	0.03	Monoterpene
Linalool	0.48	Monoterpenic alcohol
Nonanal	0.06	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.04	Monoterpenic alcohol
cis-Limonene oxide	0.06	Monoterpenic ether
trans-Limonene oxide	0.04	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
Citronellal	0.05	Monoterpenic aldehyde
Terpinen-4-ol	0.02	Monoterpenic alcohol
α-Terpineol	0.08	Monoterpenic alcohol
cis-Piperitol	0.03	Monoterpenic alcohol
Decanal	0.21	Aliphatic aldehyde
Octyl acetate	0.02	Aliphatic ester
trans-Carveol	0.03	Monoterpenic alcohol
Nerol	0.03	Monoterpenic alcohol
cis-Carveol	0.02	Monoterpenic alcohol
Neral	0.07	Monoterpenic aldehyde
Carvone	0.03	Monoterpenic ketone
Geraniol	0.01	Monoterpenic alcohol
Perillaldehyde	0.02	Monoterpenic aldehyde
Geranial	0.08	Monoterpenic aldehyde
Decanol	0.02	Aliphatic alcohol
Limonen-10-ol	0.02	Monoterpenic alcohol
Undecanal	0.01	Aliphatic aldehyde

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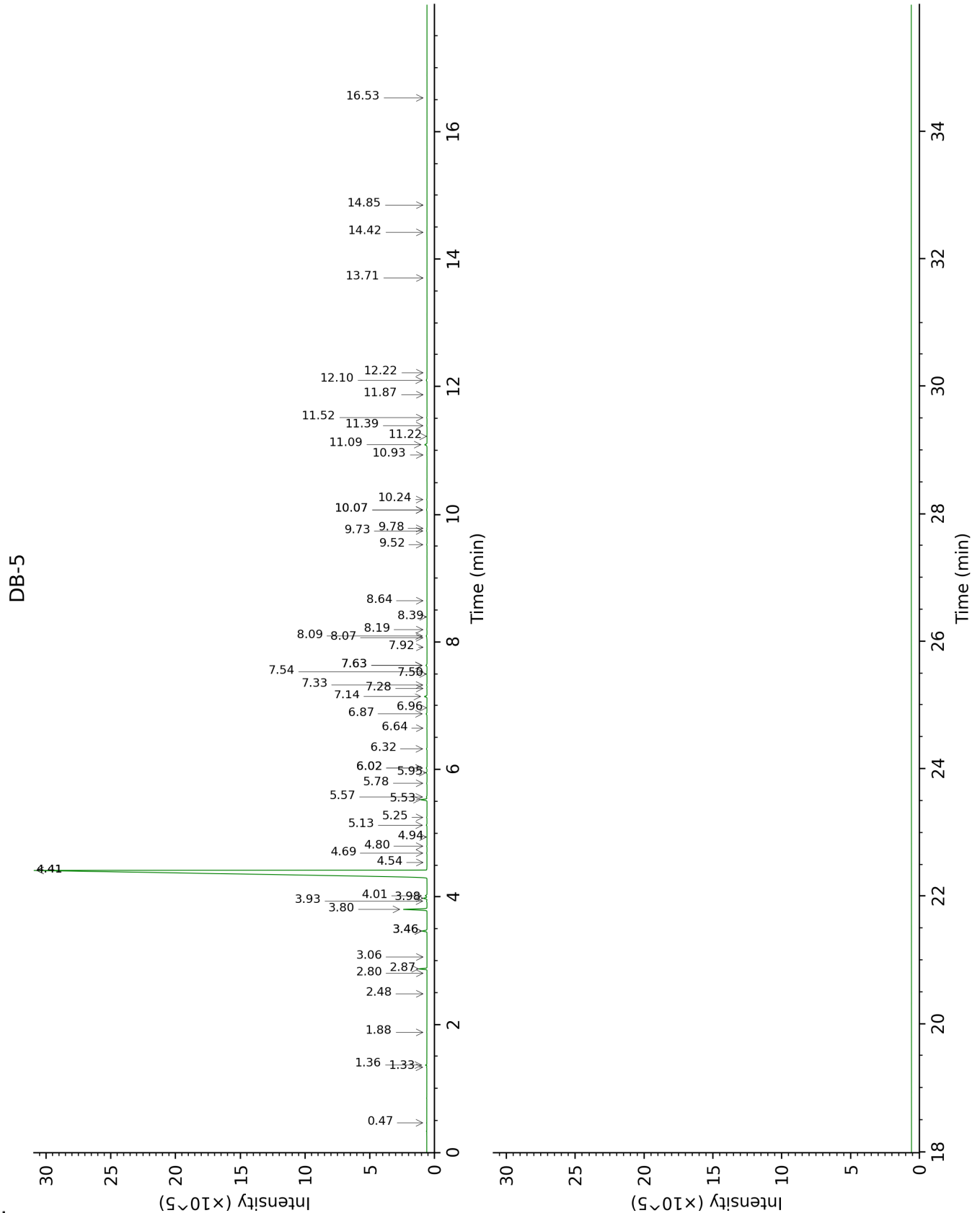|		
α-Copaene	0.03	Sesquiterpene
Geranyl acetate	0.03	Monoterpenic ester
β-Elemene	0.02	Sesquiterpene
Dodecanal	0.05	Aliphatic aldehyde
β-Caryophyllene	tr	Sesquiterpene
β-Copaene	0.02	Sesquiterpene
Germacrene D	0.01	Sesquiterpene
Valencene	0.22	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
δ-Cadinene	0.02	Sesquiterpene
α-Elemol	0.01	Sesquiterpenic alcohol
(*E*)-Nerolidol	0.09	Sesquiterpenic alcohol
Spathulenol	0.01	Sesquiterpenic alcohol
β-Sinensal	0.01	Sesquiterpenic aldehyde
α-Sinensal	0.01	Sesquiterpenic aldehyde
Nootkatone	0.01	Sesquiterpenic ketone
meta-Camphorene	0.01	Diterpene
Consolidated total	**99.79%**	

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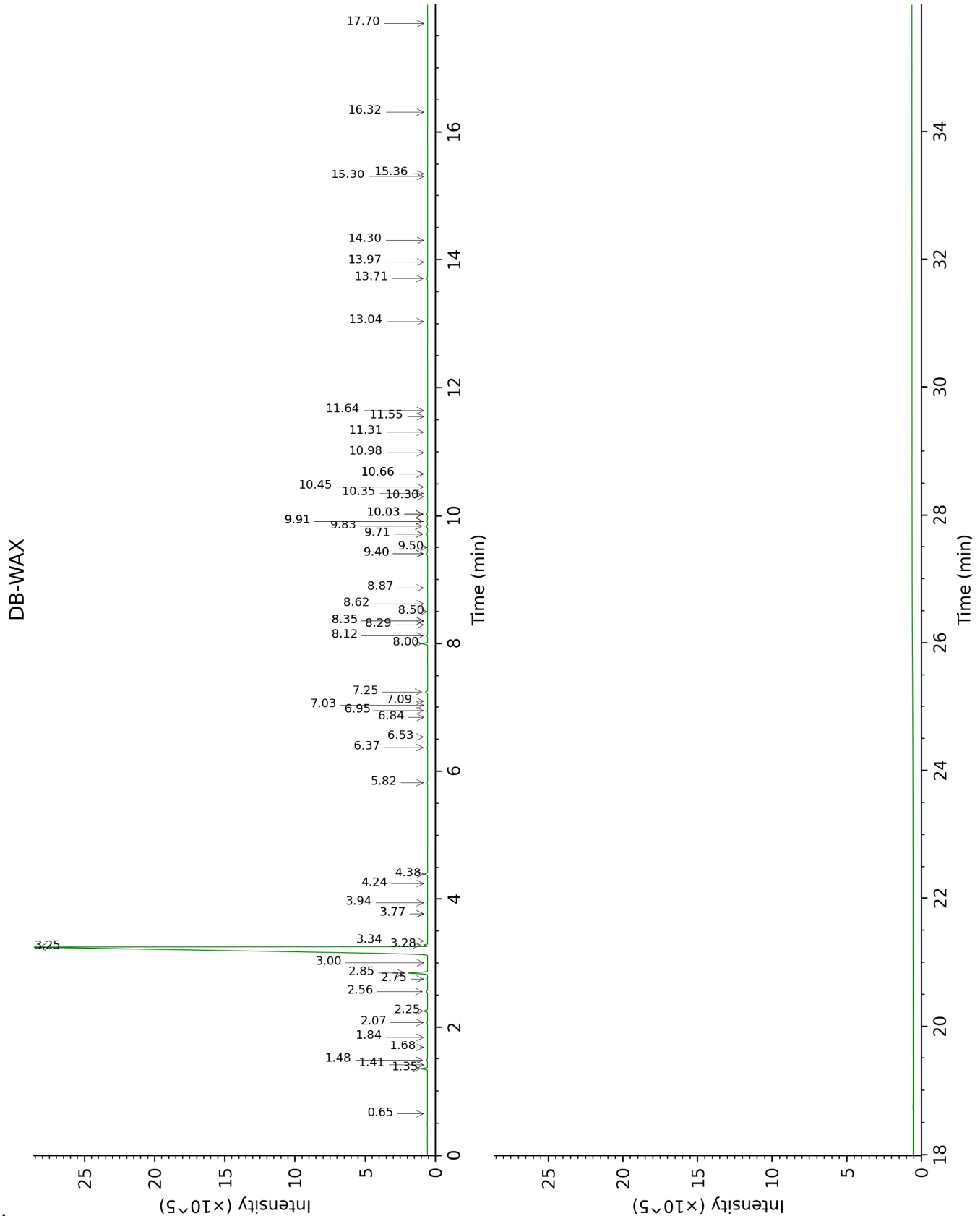
Note: no correction factor was applied

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.

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DB-5

Time (min)

Intensity (×10^5)

Time (min)

Intensity (×10^5)

DB-WAX

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Ethyl acetate	0.46	607	tr	0.65	852	0.01
Hexanal	1.33	800	0.01	1.84	1043	0.02
Ethyl butyrate	1.36	804	0.06	1.48	1008	0.06
(2*E*)-Hexenal	1.88	850	0.01	3.34	1173	0.02
Heptanal	2.48	902	tr	3.00	1146	tr
α-Thujene	2.80	924	0.01	1.41	1001	0.01
α-Pinene	2.87	929	0.51	1.35	991	0.50
Camphene	3.06	942	0.01	1.68	1027	tr
Sabinene	3.46*	969	0.37	2.25	1084	0.33
β-Pinene	3.46*	969	[0.37]	2.07	1066	0.04
Myrcene	3.80	992	1.72	2.85	1134	1.71
α-Phellandrene	3.93	1001	0.04	2.75	1126	0.03
Octanal	3.98	1004	0.27	4.38	1252	0.28
Δ3-Carene	4.01	1006	0.14	2.56	1111	0.13
Limonene	4.41*	1031	94.52	3.25	1166	94.17
1,8-Cineole	4.41*	1031	[94.52]	3.28	1168	0.26
(*Z*)-β-Ocimene	4.54	1040	0.01	3.77*†	1206	0.04
(*E*)-β-Ocimene	4.69	1049	0.03	3.94	1219	0.03
γ-Terpinene	4.80	1056	0.02	3.77*†	1206	[0.04]
cis-Sabinene hydrate	4.94	1065	0.01	6.84	1429	0.01
Octanol	5.13	1077	0.06	8.12	1525	0.06
Terpinolene	5.25	1084	0.03	4.24	1241	0.03
Linalool	5.53	1102	0.48	8.00	1516	0.48
Nonanal	5.57	1105	0.06	5.82	1355	0.05
trans-para-Mentha-2,8-dien-1-ol	5.78	1118	0.04	8.87	1583	0.03
cis-Limonene oxide	5.95	1129	0.06	6.37	1395	0.06
trans-Limonene oxide	6.02*	1134	0.06	6.53	1407	0.04
cis-para-Mentha-2,8-dien-1-ol	6.02*	1134	[0.06]	9.40*	1626	0.09
Citronellal	6.32	1153	0.05	6.95	1437	0.04
Terpinen-4-ol	6.64	1174	0.02	8.50	1555	0.01
α-Terpineol	6.87	1188	0.08	9.71*	1651	0.09
cis-Piperitol	6.96	1194	0.03	9.50	1634	0.02
Decanal	7.14	1206	0.21	7.24	1459	0.20
Octyl acetate	7.28	1215	0.02	7.03	1443	0.02
trans-Carveol	7.33	1218	0.03	11.31	1784	0.03
Nerol	7.50	1230	0.03	10.98	1757	0.01
cis-Carveol	7.54	1232	0.02	11.64	1814	0.02
Neral	7.64*	1239	0.10	9.40*	1626	[0.09]
Carvone	7.64*	1239	[0.10]	9.91*	1667	0.08
Geraniol	7.92	1258	0.01	11.55	1805	0.01
Perillaldehyde	8.07	1268	0.02	10.66*	1729	0.03

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Geranial	8.09	1270	0.08	10.03*	1677	0.08
Decanol	8.19	1276	0.02	10.66*	1729	[0.03]
Limonen-10-ol	8.39	1290	0.02	13.04	1940	0.02
Undecanal	8.64	1307	0.01	8.62	1564	0.01
α-Copaene	9.52	1369	0.03	7.09	1448	0.03
Geranyl acetate	9.74	1384	0.03	10.45	1712	0.03
β-Elemene	9.78	1387	0.02	8.35*	1543	0.02
Dodecanal	10.07*	1408	0.05	9.91*	1667	[0.08]
β-Caryophyllene	10.07*	1408	[0.05]	8.35*	1543	[0.02]
β-Copaene	10.24	1420	0.02	8.29	1539	0.02
Germacrene D	10.93	1472	0.01	9.71*	1651	[0.09]
Valencene	11.09	1484	0.22	9.83	1660	0.19
α-Muurolene	11.22	1494	0.01	10.03*	1677	[0.08]
γ-Cadinene	11.39	1507	0.02	10.30	1699	0.03
δ-Cadinene	11.52	1517	0.02	10.35	1703	0.02
α-Elemol	11.87	1545	0.01	13.97	2027	0.01
(*E*)-Nerolidol	12.10	1563	0.09	13.71	2002	0.08
Spathulenol	12.22	1572	0.01	14.30	2060	0.01
β-Sinensal	13.71	1694	0.01	15.36	2165	0.01
α-Sinensal	14.42	1755	0.01	16.32	2264	0.01
Nootkatone	14.85	1792	0.01	17.70	2414	0.01
meta-Camphorene	16.53	1947	0.01	15.30	2159	0.01
Total identified	**99.89%**			**99.65%**		
Total reported	**99.89%**			**99.65%**		

*: 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

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