

Date : August 11, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22H04-PTH02

Customer identification : Orange Sweet - Brazil - O20112R

Type : Essential oil

Source : *Citrus sinensis*

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 : Amélie Simard, Analyste

Analysis date : August 08, 2022

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Bright yellow liquid

Refractive index: 1.4731 ± 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
Hexanal	tr	Aliphatic aldehyde
Heptanal	tr	Aliphatic aldehyde
α -Thujene	tr	Monoterpene
α -Pinene	0.54	Monoterpene
Camphene	0.01	Monoterpene
Sabinene	0.26	Monoterpene
β -Pinene	0.02	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	1.88	Monoterpene
Octanal	0.31	Aliphatic aldehyde
α -Phellandrene	0.04	Monoterpene
Δ^3 -Carene	0.18	Monoterpene
Limonene	94.29	Monoterpene
β -Phellandrene	0.26	Monoterpene
(Z)- β -Ocimene	0.01	Monoterpene
(E)- β -Ocimene	0.02	Monoterpene
γ -Terpinene	0.01	Monoterpene
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
Octanol	0.04	Aliphatic alcohol
Isoterpinolene	0.01	Monoterpene
Terpinolene	0.03	Monoterpene
Linalool	0.32	Monoterpenic alcohol
Nonanal	0.06	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.02	Monoterpenic alcohol
cis-Limonene oxide	0.03	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
trans-Limonene oxide	0.02	Monoterpenic ether
Citronellal	0.06	Monoterpenic aldehyde
Terpinen-4-ol	0.01	Monoterpenic alcohol
α -Terpineol	0.04	Monoterpenic alcohol
Decanal	0.24	Aliphatic aldehyde
Octyl acetate	0.01	Aliphatic ester
trans-Carveol	0.01	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
cis-Carveol	0.01	Monoterpenic alcohol
Citronellol	0.01	Monoterpenic alcohol
Neral	0.06	Monoterpenic aldehyde
(E)-Isogeraniol?	0.01	Monoterpenic alcohol
Geraniol	0.01	Monoterpenic alcohol
Perillaldehyde	0.03	Monoterpenic aldehyde
Geranial	0.08	Monoterpenic aldehyde
Decanol	0.01	Aliphatic alcohol
Limonen-10-ol	0.02	Monoterpenic alcohol
Undecanal	0.02	Aliphatic aldehyde
Limonene trans-glycol	0.01	Monoterpenic alcohol

Neryl acetate	0.02	Monoterpenic ester
α -Copaene	0.03	Sesquiterpene
Geranyl acetate	tr	Monoterpenic ester
β -Elemene	0.02	Sesquiterpene
Dodecanal	0.05	Aliphatic aldehyde
β -Caryophyllene	0.03	Sesquiterpene
β -Copaene	0.03	Sesquiterpene
α -Humulene	0.01	Sesquiterpene
(<i>E</i>)- β -Farnesene	0.01	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
Unknown	0.01	Sesquiterpene
β -Selinene	0.02	Sesquiterpene
Valencene	0.01	Sesquiterpene
α -Selinene	0.03	Sesquiterpene
α -Muurolene	0.01	Sesquiterpene
γ -Cadinene	0.01	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	0.01	Sesquiterpene
δ -Cadinene	0.04	Sesquiterpene
α -Elemol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
γ -Eudesmol	0.01	Sesquiterpenic alcohol
β -Sinensal	0.02	Sesquiterpenic aldehyde
α -Sinensal	0.02	Sesquiterpenic aldehyde
Nootkatone	0.01	Sesquiterpenic ketone
meta-Camphorene	0.01	Diterpene
Palmitic acid	0.01	Aliphatic acid
Oleic acid	0.01	Aliphatic acid
<i>cis</i> -Vaccenic acid?	0.01	Aliphatic acid
Tetramethoxyflavone isomer	0.01	Flavonoid
Tangeretin	0.02	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.03	Flavonoid
Nobiletin	0.02	Flavonoid
Consolidated total	99.63%	

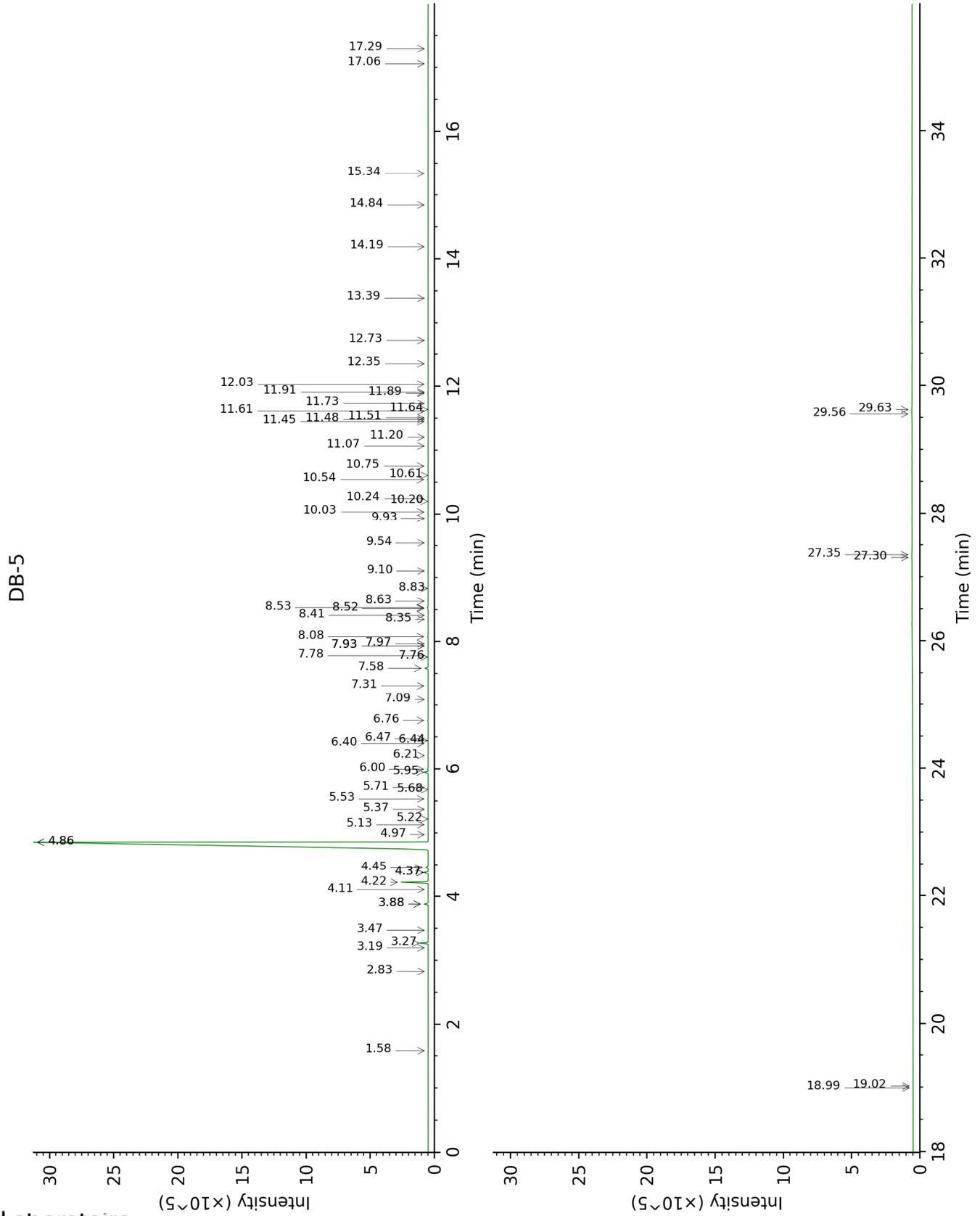
tr: The compound has been detected below 0.005% of total signal.

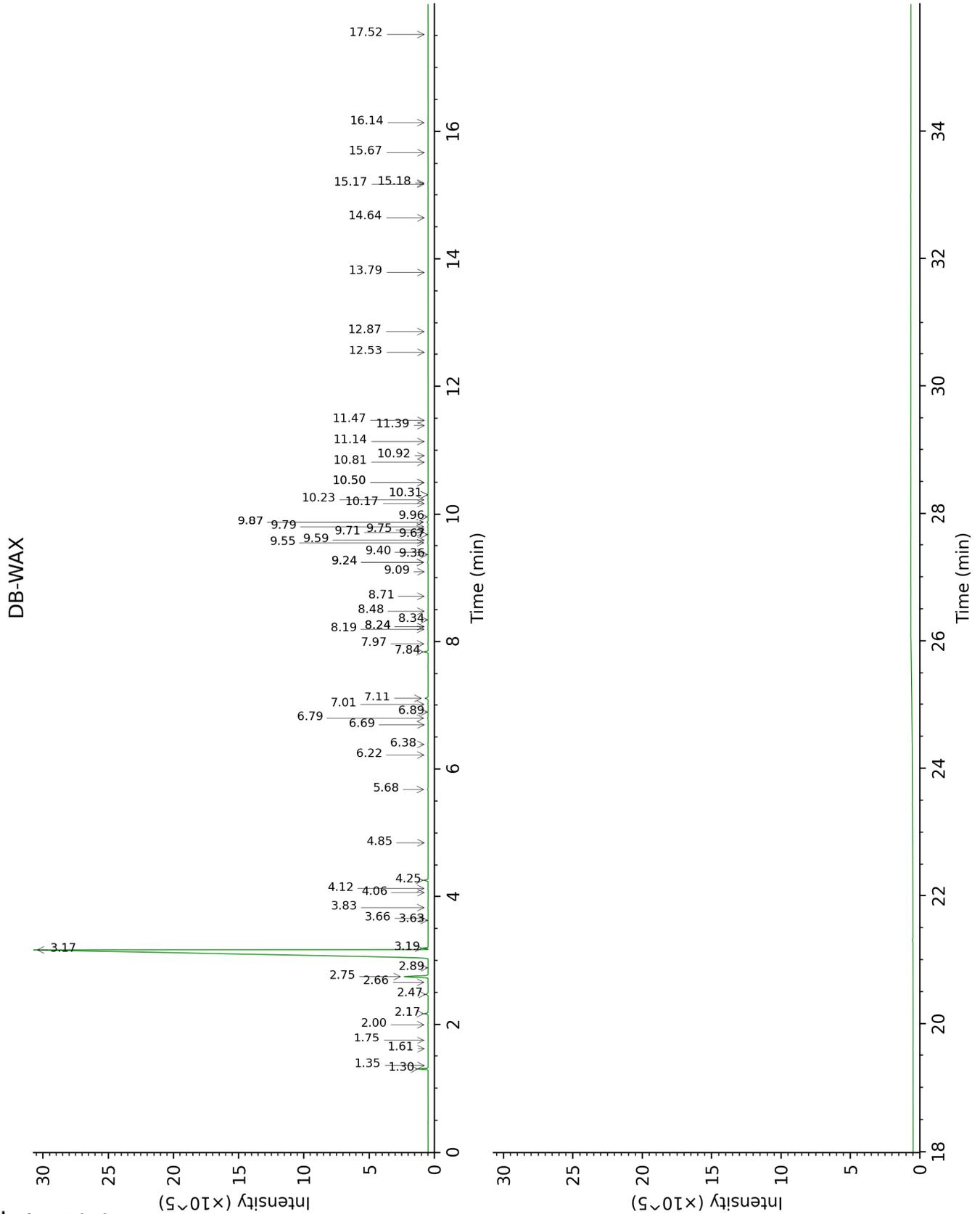
Note: no correction factor was applied

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	%
Hexanal	1.58	800	tr	1.75	1043	0.01
Heptanal	2.83	903	tr	2.89	1146	0.01
α -Thujene	3.20	927	tr	1.35	1002	tr
α -Pinene	3.27	932	0.54	1.30	994	0.53
Camphene	3.47	945	0.01	1.61	1029	tr
Sabinene	3.88*	972	0.29	2.17	1085	0.26
β -Pinene	3.88*	972	[0.29]	2.00	1068	0.02
6-Methyl-5-hepten-2-one	4.11	986	0.01	4.85	1295	0.01
Myrcene	4.22	994	1.88	2.75	1135	1.88
Octanal	4.37*	1004	0.35	4.25	1251	0.31
α -Phellandrene	4.37*	1004	[0.35]	2.66	1128	0.04
Δ 3-Carene	4.45	1009	0.18	2.47	1113	0.17
Limonene	4.86*	1034	94.46	3.16	1168	94.29
β -Phellandrene	4.86*	1034	[94.46]	3.19	1170	0.26
(Z)- β -Ocimene	4.97	1041	0.01	3.63	1204	0.01
(E)- β -Ocimene	5.13	1051	0.02	3.82	1219	0.02
γ -Terpinene	5.22	1056	0.01	3.66	1207	0.01
<i>cis</i> -Sabinene hydrate	5.37	1066	0.02	6.69	1426	0.01
Octanol	5.53	1076	0.04	7.97	1524	0.04
Isoterpinolene	5.68	1085	0.01	4.06	1237	0.01
Terpinolene	5.71	1087	0.03	4.12	1241	0.03
Linalool	5.95	1102	0.32	7.84	1514	0.32
Nonanal	6.00	1105	0.06	5.68	1352	0.05
<i>trans</i> -para-Mentha-2,8-dien-1-ol	6.21	1119	0.02	8.71	1582	0.02
<i>cis</i> -Limonene oxide	6.40	1131	0.03	6.22	1391	0.03
<i>cis</i> -para-Mentha-2,8-dien-1-ol	6.44	1134	0.01	9.24*	1625	0.07
<i>trans</i> -Limonene oxide	6.47	1135	0.02	6.38	1403	0.02
Citronellal	6.76	1154	0.06	6.80	1434	0.05
Terpinen-4-ol	7.09	1174	0.01	8.34	1553	0.01
α -Terpineol	7.31	1189	0.04	9.55	1650	0.04
Decanal	7.58	1206	0.24	7.11	1458	0.23
Octyl acetate	7.76	1218	0.01	6.89	1441	0.02
<i>trans</i> -Carveol	7.78	1219	0.01	11.14	1785	0.01
Nerol	7.93*	1230	0.02	10.81	1757	0.01
<i>cis</i> -Carveol	7.93*	1230	[0.02]	11.47	1813	0.01
Citronellol	7.97	1232	0.01	10.50*	1730	0.02
Neral	8.08	1239	0.06	9.24*	1625	[0.07]
(E)-Isogeraniol?	8.35	1257	0.01	10.92	1766	0.01
Geraniol	8.41	1261	0.01	11.39	1806	0.01
Perillaldehyde	8.52	1269	0.03			
Geranial	8.53	1270	0.08	9.87*	1677	0.09
Decanol	8.63	1276	0.01	10.50*	1730	[0.02]
Limonen-10-ol	8.83	1289	0.02	12.86	1940	0.02
Undecanal	9.10	1308	0.02	8.48	1564	0.02
Limonene <i>trans</i> -glycol	9.54	1339	0.01	15.67	2215	0.01

Neryl acetate	9.93	1366	0.02	9.96	1684	0.02
α -Copaene	10.03	1373	0.03	7.01	1451	0.03
Geranyl acetate	10.20	1385	tr	10.31*	1713	0.01
β -Elemene	10.24	1388	0.02	8.24*	1545	0.03
Dodecanal	10.54	1409	0.05	9.80	1671	0.04
β -Caryophyllene	10.61	1414	0.03	8.24*	1545	[0.03]
β -Copaene	10.75	1425	0.03	8.19	1542	0.03
α -Humulene	11.07	1448	0.01	9.09	1613	0.01
(<i>E</i>)- β -Farnesene	11.20	1459	0.01	9.36†	1635	0.02
Germacrene D	11.45	1477	0.02	9.59	1654	0.02
Unknown [m/z 189, 133 (75), 91 (71), 105 (69), 93 (44)... 204 (33)]	11.48	1479	0.01	9.40†	1638	[0.02]
β -Selinene	11.51	1481	0.02	9.67†	1661	0.03
Valencene	11.61†	1489	0.04	9.71†	1664	[0.03]
α -Selinene	11.64†	1491	[0.04]	9.75	1667	0.03
α -Muurolene	11.73	1498	0.01	9.87*	1677	[0.09]
γ -Cadinene	11.89	1510	0.01	10.17	1702	0.01
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	11.91	1511	0.01	10.31*	1713	[0.01]
δ -Cadinene	12.03	1521	0.04	10.23	1706	0.03
α -Elemol	12.35	1546	0.01	13.79	2027	0.01
Caryophyllene oxide	12.73	1575	0.01	12.53	1909	0.01
γ -Eudesmol	13.39	1628	0.01	14.64	2110	0.01
β -Sinensal	14.19	1695	0.02	15.18	2165	0.01
α -Sinensal	14.84	1751	0.02	16.14	2264	0.02
Nootkatone	15.34	1794	0.01	17.52	2412	0.01
meta-Camphorene	17.06	1951	0.01	15.17	2164	0.03
Palmitic acid	17.29	1974	0.01			
Oleic acid	18.99	2142	0.01			
<i>cis</i> -Vaccenic acid?	19.02	2146	0.01			
Tetramethoxyflavone isomer	27.30	3137	0.01			
Tangeretin	27.35	3142	0.02			
3,3',4',5,6,7,8-Heptamethoxyflavone	29.56	3323	0.03			
Nobiletin	29.63	3328	0.02			
Total identified		99.53%			99.41%	
Total reported		99.54%			99.41%	

*: 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