

Date : February 23, 2018

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18B20-PLG6-1-CC

Customer identification : Sweet Orange

Type : Essential oil

Source : *Citrus sinensis*

Customer : Plant Guru

ANALYSIS

Method: PC-PA-014-17J19 - Analysis of the composition of an essential oil, or other volatile liquid, by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Alexis St-Gelais, M. Sc., chimiste

Analysis date : February 23, 2018

Checked and approved by :

Alexis St-Gelais, M. Sc., chimiste 2013-174

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PHYSICOCHEMICAL DATA

Physical aspect: Bright yellow liquid

Refractive index: 1.4723 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Hexanal	tr	tr	Aliphatic aldehyde
Heptanal	tr	tr	Aliphatic aldehyde
α -Thujene	tr	tr	Monoterpene
α -Pinene	0.48	0.49	Monoterpene
Camphene	0.01	tr	Monoterpene
Sabinene	0.33*	0.32	Monoterpene
β -Pinene	[0.33]*	0.02	Monoterpene
Myrcene	1.79	1.80	Monoterpene
α -Phellandrene	0.03	0.03	Monoterpene
Octanal	0.25	0.25	Aliphatic aldehyde
Δ^3 -Carene	0.13	0.12	Monoterpene
β -Phellandrene	93.82*	0.27	Monoterpene
Limonene	[93.82]*	93.82	Monoterpene
(Z)- β -Ocimene	[93.82]*	0.01	Monoterpene
(E)- β -Ocimene	0.02	0.02	Monoterpene
γ -Terpinene	tr	0.01	Monoterpene
<i>cis</i> -Sabinene hydrate	0.01	0.01	Monoterpenic alcohol
Octanol	0.06	0.06	Aliphatic alcohol
Terpinolene	0.02	0.02	Monoterpene
Linalool	0.45	0.47	Monoterpenic alcohol
Nonanal	0.06	0.05	Aliphatic aldehyde
<i>trans</i> -para-Mentha-2,8-dien-1-ol	0.01	0.02	Monoterpenic alcohol
<i>cis</i> -Limonene oxide	0.03	0.04	Monoterpenic ether
<i>cis</i> -para-Mentha-2,8-dien-1-ol	0.04*	0.01*	Monoterpenic alcohol
<i>trans</i> -Limonene oxide	[0.04]*	0.03	Monoterpenic ether
Citronellal	0.05	0.05	Monoterpenic aldehyde
Terpinen-4-ol	0.01	0.01	Monoterpenic alcohol
α -Terpineol	0.08	0.10*	Monoterpenic alcohol
<i>cis</i> -Piperitol	0.02	[0.01]*	Monoterpenic alcohol
Decanal	0.28	0.26	Aliphatic aldehyde
Octyl acetate	0.01	0.01	Aliphatic ester
<i>trans</i> -Carveol	0.02	0.02	Monoterpenic alcohol
<i>cis</i> -Carveol	0.01	0.01	Monoterpenic alcohol
Nerol	0.02	0.01	Monoterpenic alcohol
Neral	0.07	0.07	Monoterpenic aldehyde
Geraniol	0.01	0.01	Monoterpenic alcohol
Geranial	0.11*	0.09	Monoterpenic aldehyde
Perillaldehyde	[0.11]*	0.03	Monoterpenic aldehyde
Limonen-10-ol	0.02	0.02	Monoterpenic alcohol
Undecanal	0.02	0.01	Aliphatic aldehyde
α -Cubebene	tr	tr	Sesquiterpene
Neryl acetate	0.03*	0.01	Monoterpenic ester
α -Copaene	[0.03]*	0.02	Sesquiterpene
Geranyl acetate	0.04	0.03	Monoterpenic ester
Dodecanal	0.06	0.04	Aliphatic aldehyde
β -Caryophyllene	0.03	0.03	Sesquiterpene
β -Copaene	0.03	0.03	Sesquiterpene
α -Humulene	0.01	0.01	Sesquiterpene

(E)- β -Farnesene	0.01	[0.01]*	Sesquiterpene
γ -Muurolene	0.01	0.01	Sesquiterpene
Germacrene D	0.03	[0.10]*	Sesquiterpene
Valencene	0.04	0.04	Sesquiterpene
Bicyclogermacrene	0.01	0.01	Sesquiterpene
α -Muurolene	0.01	0.01	Sesquiterpene
γ -Cadinene	0.02	0.02	Sesquiterpene
δ -Cadinene	0.03	0.03	Sesquiterpene
Caryophyllene oxide	0.01	0.01	Sesquiterpenic ether
β -Sinensal	0.03	0.03	Sesquiterpenic aldehyde
α -Sinensal	0.02	0.02	Sesquiterpenic aldehyde
Myristic acid	0.05	0.05	Aliphatic acid
Palmitic acid	0.09	0.10	Aliphatic acid
Linoleic acid	0.05	0.05	Aliphatic acid
Oleic acid	0.03		Aliphatic acid
<i>cis</i> -Vaccenic acid?	0.03	0.09*	Aliphatic acid
Stearic acid	0.09	[0.09]*	Aliphatic acid
Tetramethoxyflavone isomer	0.04		Flavonoid
Tangeretin	0.05		Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.10		Flavonoid
Nobiletin	0.10		Flavonoid
Total identified	99.36%	99.22%	

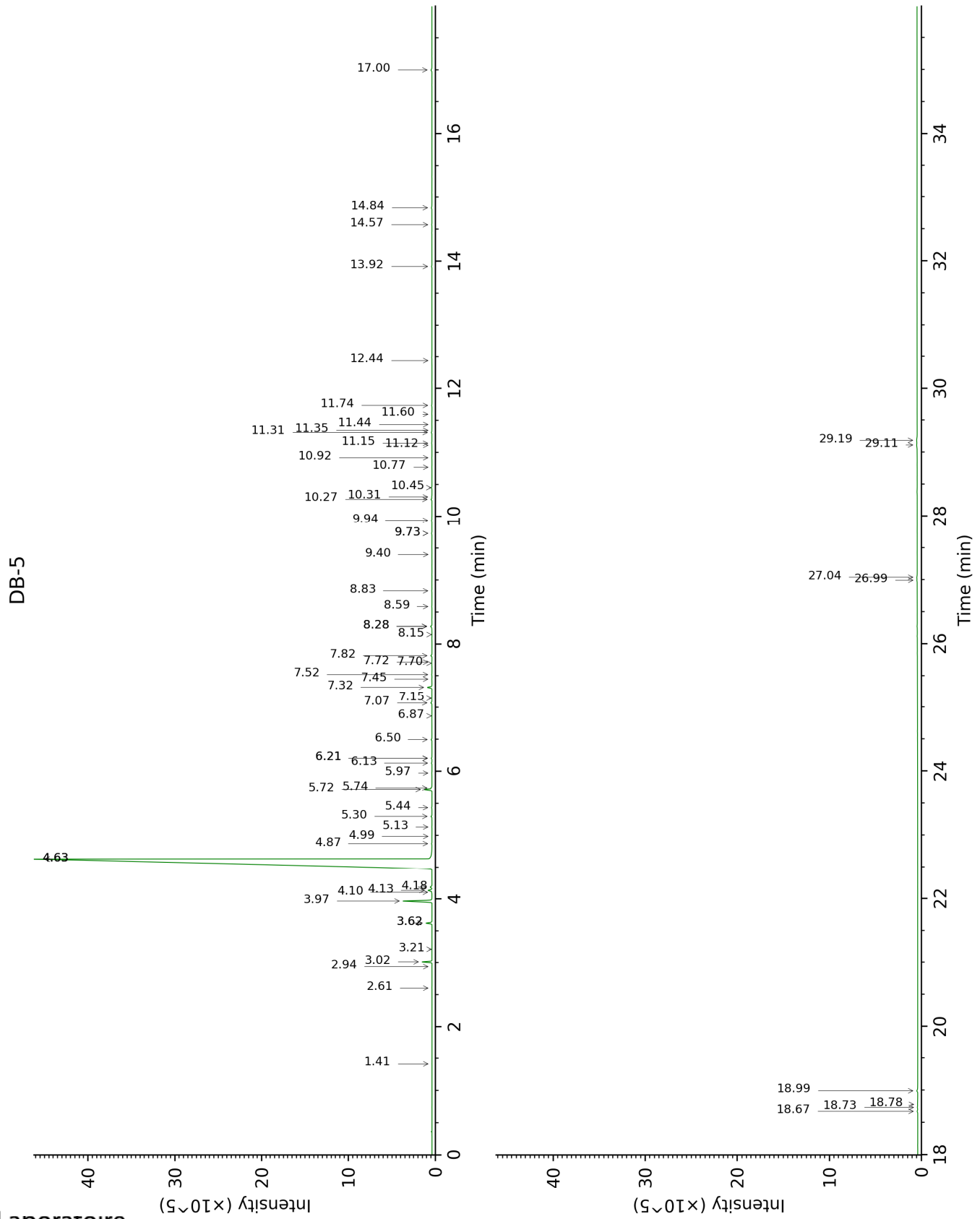
*: Two or more compounds are coeluting on this column

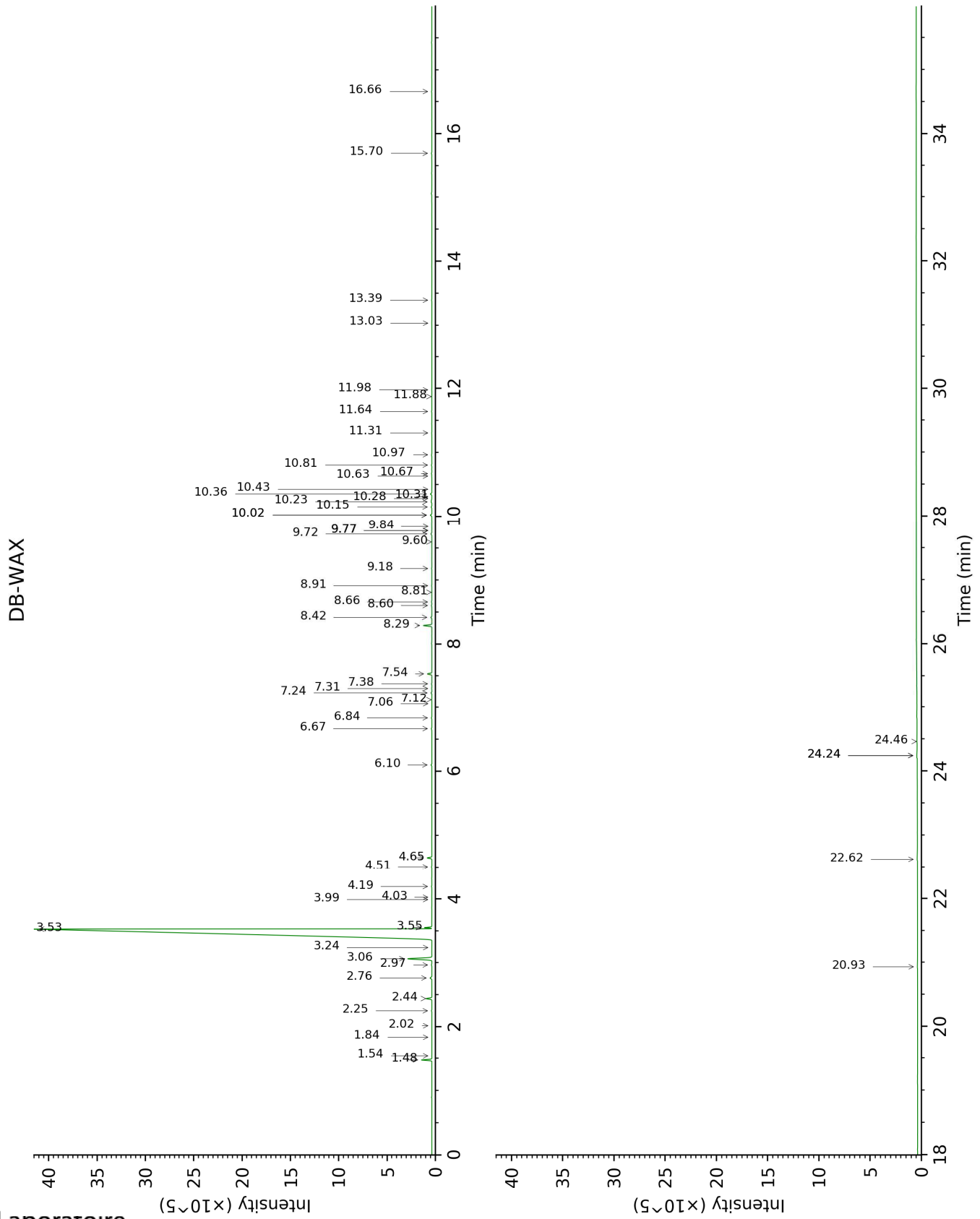
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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

Note: no correction factor was applied

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Hexanal	1.41	795	tr	2.02	1047	tr
Heptanal	2.61	898	tr	3.24	1149	tr
α -Thujene	2.94	920	tr	1.54	1002	tr
α -Pinene	3.02	925	0.48	1.48	995	0.49
Camphene	3.21	938	0.01	1.84	1030	tr
Sabinene	3.62*	966	0.33	2.44	1087	0.32
β -Pinene	3.62*	966	[0.33]	2.25	1069	0.02
Myrcene	3.97	989	1.79	3.06	1135	1.80
α -Phellandrene	4.10	998	0.03	2.97	1128	0.03
Octanal	4.13	1000	0.25	4.65	1252	0.25
Δ 3-Carene	4.18	1003	0.13	2.76	1112	0.12
β -Phellandrene	4.63*	1031	93.82	3.55	1172	0.27
Limonene	4.63*	1031	[93.82]	3.53	1170	93.82
(Z)- β -Ocimene	4.63*	1031	[93.82]	4.02	1207	0.01
(E)- β -Ocimene	4.87	1046	0.02	4.19	1219	0.02
γ -Terpinene	4.99	1053	tr	3.99	1205	0.01
<i>cis</i> -Sabinene hydrate	5.13	1062	0.01	7.12	1429	0.01
Octanol	5.30	1073	0.06	8.42	1526	0.06
Terpinolene	5.44	1082	0.02	4.51	1242	0.02
Linalool	5.72	1099	0.45	8.29	1516	0.47
Nonanal	5.74	1101	0.06	6.10	1355	0.05
<i>trans</i> -para-Mentha-2,8-dien-1-ol	5.97	1116	0.01	9.18	1584	0.02
<i>cis</i> -Limonene oxide	6.13	1126	0.03	6.67	1396	0.04
<i>cis</i> -para-Mentha-2,8-dien-1-ol	6.21*	1130	0.04	9.77*	1632	0.01
<i>trans</i> -Limonene oxide	6.21*	1130	[0.04]	6.84	1408	0.03
Citronellal	6.50	1149	0.05	7.24	1437	0.05
Terpinen-4-ol	6.87	1172	0.01	8.81	1556	0.01
α -Terpineol	7.07	1186	0.08	10.02*	1652	0.10
<i>cis</i> -Piperitol	7.15	1190	0.02	9.77*	1632	[0.01]
Decanal	7.32	1202	0.28	7.54	1459	0.26
Octyl acetate	7.45	1210	0.01	7.31	1442	0.01
<i>trans</i> -Carveol	7.52	1215	0.02	11.64	1786	0.02
<i>cis</i> -Carveol	7.70	1227	0.01	11.98	1816	0.01
Nerol	7.72	1228	0.02	11.31	1758	0.01
Neral	7.82	1235	0.07	9.72	1628	0.07
Geraniol	8.15	1257	0.01	11.88	1807	0.01
Geranial	8.28*	1265	0.11	10.36	1678	0.09
Perillaldehyde	8.28*	1265	[0.11]	10.97	1730	0.03
Limonen-10-ol	8.59	1286	0.02	13.39	1942	0.02
Undecanal	8.83	1302	0.02	8.91	1564	0.01
α -Cubebene	9.40	1342	tr	7.06	1424	tr
Neryl acetate	9.73*	1366	0.03	10.43	1684	0.01
α -Copaene	9.73*	1366	[0.03]	7.38	1448	0.02
Geranyl acetate	9.94	1380	0.04	10.81	1716	0.03
Dodecanal	10.27	1404	0.06	10.23	1668	0.04
β -Caryophyllene	10.31	1407	0.03	8.66	1544	0.03

β-Copaene	10.45	1418	0.03	8.60	1540	0.03
α-Humulene	10.77	1441	0.01	9.60	1618	0.01
(E)-β-Farnesene	10.92	1452	0.01	9.77*	1632	[0.01]
γ-Murolene	11.12	1467	0.01	9.84	1637	0.01
Germacrene D	11.15	1469	0.03	10.02*	1652	[0.10]
Valencene	11.32	1482	0.04	10.15	1662	0.04
Bicyclogermacrene	11.35	1484	0.01	10.31	1675	0.01
α-Murolene	11.44	1491	0.01	10.28	1673	0.01
γ-Cadinene	11.60	1503	0.02	10.63	1702	0.02
δ-Cadinene	11.74	1514	0.03	10.67	1705	0.03
Caryophyllene oxide	12.44	1568	0.01	13.03	1910	0.01
β-Sinensal	13.92	1688	0.03	15.70	2164	0.03
α-Sinensal	14.57	1744	0.02	16.66	2263	0.02
Myristic acid	14.84	1767	0.05	20.93	2751	0.05
Palmitic acid	17.00	1964	0.09	22.62	2967	0.10
Linoleic acid	18.67	2130	0.05	24.46	3222	0.05
Oleic acid	18.73	2136	0.03			
cis-Vaccenic acid?	18.78	2141	0.03	24.24*	3190	0.09
Stearic acid	18.99	2162	0.09	24.24*	3190	[0.09]
Tetramethoxyflavone isomer	26.99	3131	0.04			
Tangeretin	27.04	3136	0.05			
3,3',4',5,6,7,8-Heptamethoxyflavone	29.12	3318	0.10			
Nobiletin	29.19	3323	0.10			
Total identified		99.36%			99.22%	
Total reported		99.36%			99.22%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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