

Date : May 31, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19E21-PTH09-1-SCC

Customer identification : Orange Blood Organic - Italy - OH010194R

Type : Essential oil

Source : *Citrus sinensis* cv. Sanguinelli

Customer : Plant Therapy

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 : Lindsay Girard, B. Sc.

Analysis date : May 28, 2019

Checked and approved by :

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

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This report is digitally signed, it is only considered valid if the digital signature is intact.

PHYSICOCHEMICAL DATA

Physical aspect: Bright orange liquid

Refractive index: 1.4732 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Heptane	tr		Alkane
α -Thujene	0.01	0.01	Monoterpene
α -Pinene	0.51	0.51	Monoterpene
Camphene	0.01		Monoterpene
Thuja-2,4(10)-diene	0.02	0.02	Monoterpene
β -Pinene	0.43*	0.11	Monoterpene
Sabinene	[0.43]*	0.33	Monoterpene
Myrcene	1.75	1.75	Monoterpene
α -Phellandrene	0.36*	0.03	Monoterpene
Octanal	[0.36]*	0.31	Aliphatic aldehyde
Δ^3 -Carene	0.12	0.12	Monoterpene
α -Terpinene	0.01	0.01	Monoterpene
ortho-Cymene	0.01	0.05*	Monoterpene
para-Cymene	0.03	[0.05]*	Monoterpene
β -Phellandrene	93.73*	93.92*	Monoterpene
1,8-Cineole	[93.73]*	[93.92]*	Monoterpenic ether
Limonene	[93.73]*	[93.92]*	Monoterpene
(Z)- β -Ocimene	0.01	0.01	Monoterpene
(E)- β -Ocimene	0.02	0.02	Monoterpene
γ -Terpinene	0.07	0.07	Monoterpene
cis-Sabinene hydrate	0.01	0.01	Monoterpenic alcohol
Octanol	0.03	0.03	Aliphatic alcohol
Terpinolene	0.03	0.03	Monoterpene
Linalool	0.36	0.38	Monoterpenic alcohol
Nonanal	0.05	0.04	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.02	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.01	0.01	Monoterpenic ether
trans-Limonene oxide	0.02	0.02	Monoterpenic ether
Citronellal	0.04	0.04	Monoterpenic aldehyde
Terpinen-4-ol	0.01	0.01	Monoterpenic alcohol
α -Terpineol	0.06	0.07*	Monoterpenic alcohol
cis-Piperitol	0.01	0.01	Monoterpenic alcohol
trans-Isopiperitenol	0.01	0.01	Monoterpenic alcohol
Decanal	0.25	0.23	Aliphatic aldehyde
trans-Carveol	0.02	0.02	Monoterpenic alcohol
Nerol	0.02	0.01	Monoterpenic alcohol
cis-Carveol	0.01	0.01	Monoterpenic alcohol
Neral	0.05	0.05	Monoterpenic aldehyde
Geraniol	0.01	0.01	Monoterpenic alcohol
Perillaldehyde	0.02	0.03*	Monoterpenic aldehyde
Geranial	0.07	0.07*	Monoterpenic aldehyde
Decanol	0.01	[0.03]*	Aliphatic alcohol
Limonen-10-ol	0.01	0.01	Monoterpenic alcohol
Undecanal	0.01	0.01	Aliphatic aldehyde
Neryl acetate	0.01	[0.07]*	Monoterpenic ester
α -Copaene	0.02	0.02	Sesquiterpene
Geranyl acetate	0.01	0.01	Monoterpenic ester
β -Elemene	0.02	0.03	Sesquiterpene

Dodecanal	0.05	0.04*	Aliphatic aldehyde
β-Caryophyllene	0.05	0.03*	Sesquiterpene
β-Copaene	0.07	[0.03]*	Sesquiterpene
α-Humulene	0.02		Sesquiterpene
(E)-β-Farnesene	0.01	0.01	Sesquiterpene
Germacrene D	0.03	[0.07]*	Sesquiterpene
Valencene	0.04	0.05	Sesquiterpene
α-Muurolene	0.01	[0.04]*	Sesquiterpene
γ-Cadinene	0.03	0.03	Sesquiterpene
δ-Cadinene	0.04	0.01	Sesquiterpene
α-Elemol	0.02	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.01		Sesquiterpenic ether
β-Sinensal	0.02	0.02	Sesquiterpenic aldehyde
α-Sinensal	0.01	0.01	Sesquiterpenic aldehyde
Myristic acid	0.02		Aliphatic acid
Palmitic acid	0.08	0.10	Aliphatic acid
Stearic acid	0.32	0.54	Aliphatic acid
Tetramethoxyflavone isomer	0.01		Flavonoid
Total identified	99.08%	99.30%	

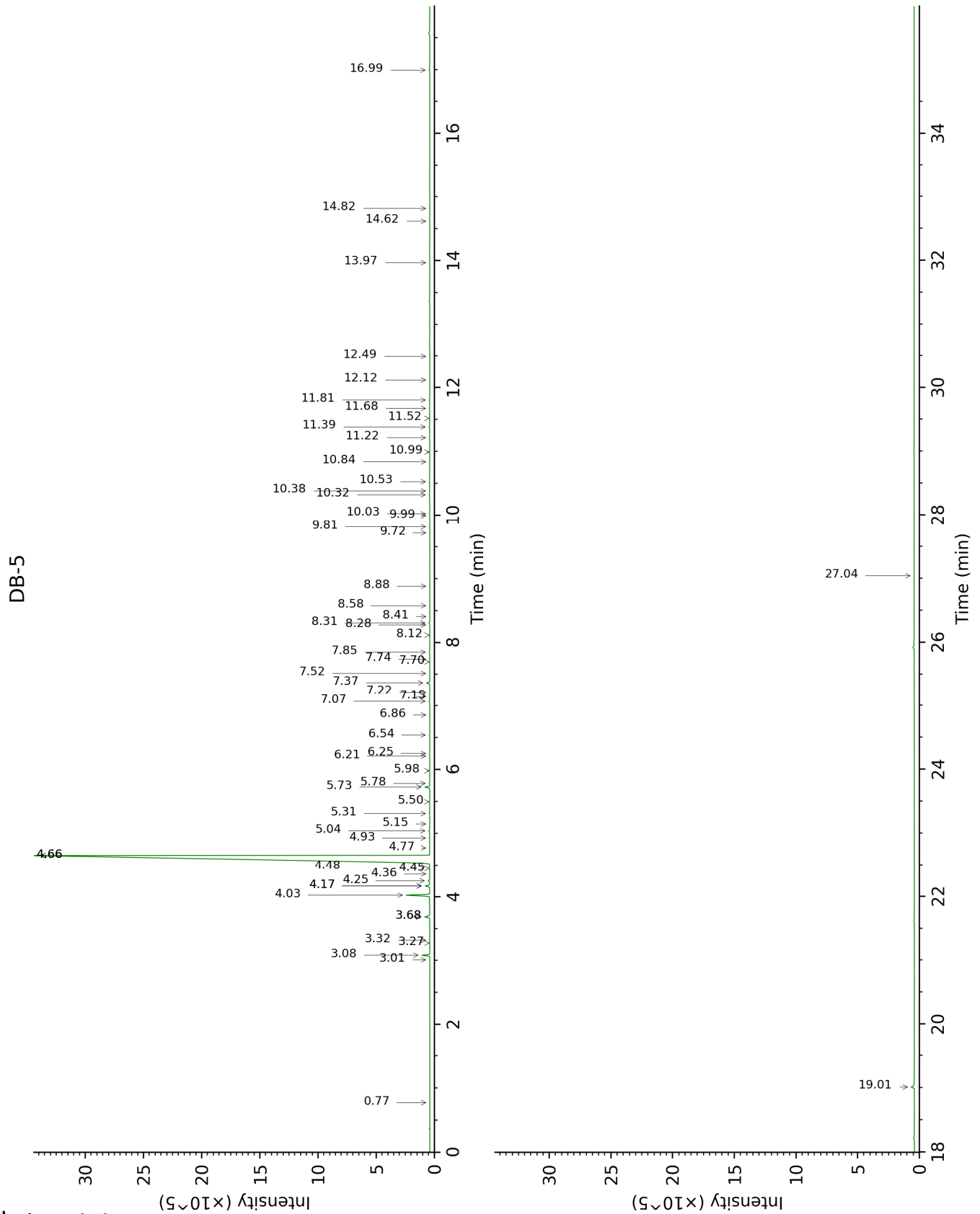
*: Two or more compounds are coeluting on this column

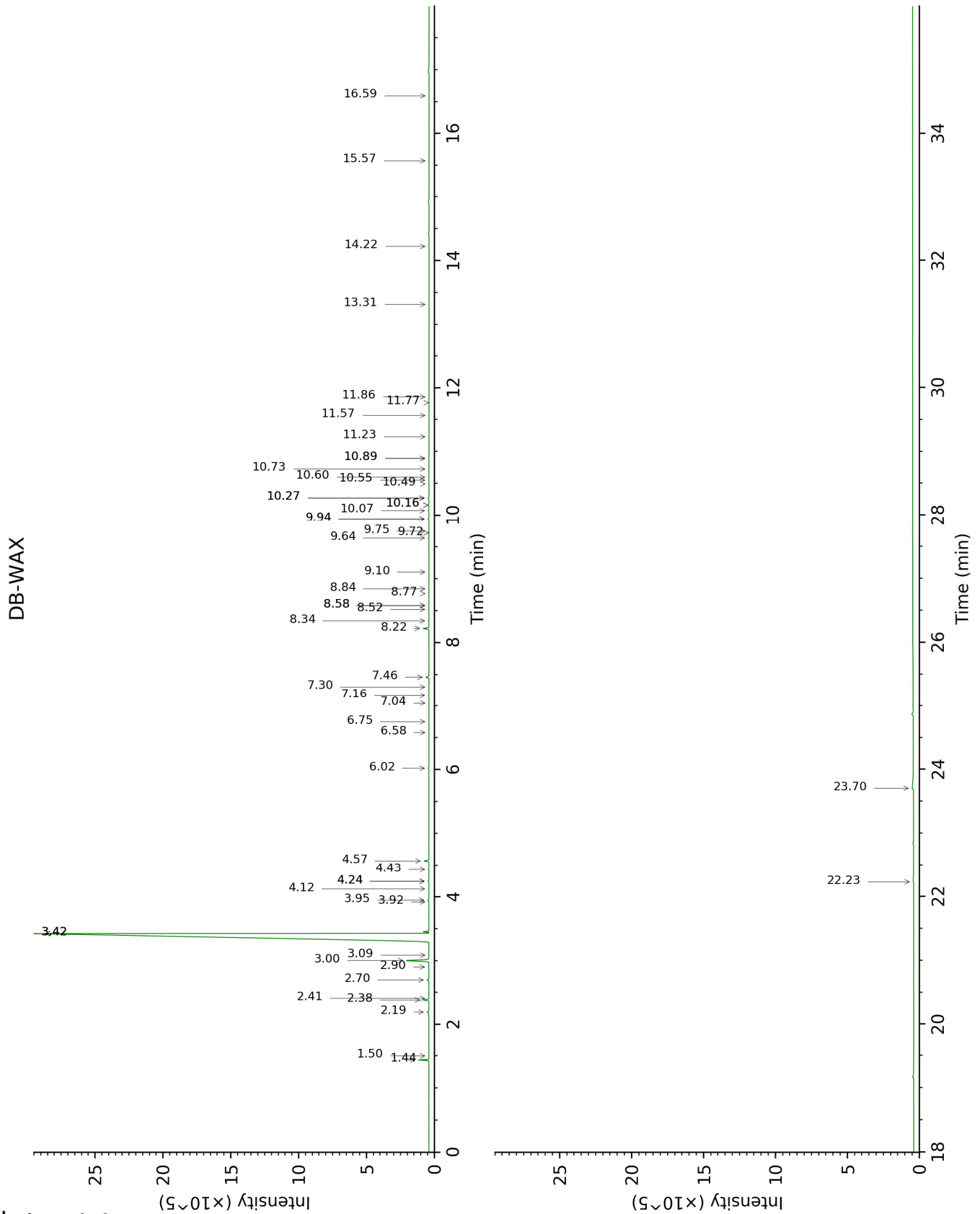
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	%
Heptane	0.77	706	tr			
α-Thujene	3.01	925	0.01	1.50	1001	0.01
α-Pinene	3.08	930	0.51	1.44	993	0.51
Camphene	3.28	942	0.01			
Thuja-2,4(10)-diene	3.32	946	0.02	2.41	1089	0.02
β-Pinene	3.68*	970	0.43	2.20	1068	0.11
Sabinene	3.68*	970	[0.43]	2.38	1086	0.33
Myrcene	4.02	992	1.75	3.00	1136	1.75
α-Phellandrene	4.17*	1002	0.36	2.90	1128	0.03
Octanal	4.17*	1002	[0.36]	4.57	1254	0.31
Δ3-Carene	4.25	1007	0.12	2.70	1113	0.12
α-Terpinene	4.36	1014	0.01	3.09	1143	0.01
ortho-Cymene	4.44	1019	0.01	4.24*	1230	0.05
para-Cymene	4.48	1021	0.03	4.24*	1230	[0.05]
β-Phellandrene	4.66*	1032	93.73	3.42*†	1169	93.92
1,8-Cineole	4.66*	1032	[93.73]	3.42*†	1169	[93.92]
Limonene	4.66*	1032	[93.73]	3.42*†	1169	[93.92]
(Z)-β-Ocimene	4.77	1040	0.01	3.92	1207	0.01
(E)-β-Ocimene	4.93	1049	0.02	4.12	1222	0.02
γ-Terpinene	5.04	1056	0.07	3.95	1209	0.07
cis-Sabinene hydrate	5.15	1063	0.01	7.04	1429	0.01
Octanol	5.31	1074	0.03	8.34	1527	0.03
Terpinolene	5.50	1085	0.03	4.43	1244	0.03
Linalool	5.73	1100	0.36	8.22	1517	0.38
Nonanal	5.78	1104	0.05	6.02	1354	0.04
trans-para-Mentha-2,8-dien-1-ol	5.98	1116	0.02	9.10	1586	0.01
cis-Limonene oxide	6.21	1131	0.01	6.58	1395	0.01
trans-Limonene oxide	6.25	1134	0.02	6.75	1407	0.02
Citronellal	6.54	1153	0.04	7.16	1438	0.04
Terpinen-4-ol	6.86	1173	0.01	8.77	1560	0.01
α-Terpineol	7.07	1187	0.06	9.94*	1653	0.07
cis-Piperitol	7.15	1192	0.01	9.72	1635	0.01
trans-Isopiperitenol	7.22	1197	0.01	10.50	1698	0.01
Decanal	7.37	1207	0.25	7.46	1460	0.23
trans-Carveol	7.52	1217	0.02	11.57	1789	0.02
Nerol	7.70	1229	0.02	11.23	1760	0.01
cis-Carveol	7.74	1232	0.01	11.86	1814	0.01
Neral	7.85	1240	0.05	9.64	1628	0.05
Geraniol	8.12	1258	0.01	11.77	1806	0.01
Perillaldehyde	8.28	1269	0.02	10.90*	1732	0.03
Geranial	8.31	1271	0.07	10.27*	1680	0.07
Decanol	8.41	1278	0.01	10.90*	1732	[0.03]
Limonen-10-ol	8.58	1290	0.01	13.32	1945	0.01
Undecanal	8.88	1306	0.01	8.84	1565	0.01
Neryl acetate	9.72	1366	0.01	10.27*	1680	[0.07]
α-Copaene	9.82	1372	0.02	7.30	1448	0.02

Geranyl acetate	9.99	1385	0.01	10.73	1718	0.01
β-Elemene	10.03	1388	0.02	8.52	1540	0.03
Dodecanal	10.32	1409	0.05	10.16*	1671	0.04
β-Caryophyllene	10.38	1413	0.05	8.58*	1545	0.03
β-Copaene	10.53	1424	0.07	8.58*	1545	[0.03]
α-Humulene	10.84	1447	0.02			
(E)-β-Farnesene	10.99	1459	0.01	9.75	1637	0.01
Germacrene D	11.22	1476	0.03	9.94*	1653	[0.07]
Valencene	11.39	1488	0.04	10.08	1664	0.05
α-Murolene	11.52	1498	0.01	10.16*	1671	[0.04]
γ-Cadinene	11.68	1510	0.03	10.60	1707	0.03
δ-Cadinene	11.81	1520	0.04	10.55	1703	0.01
α-Elemol	12.12	1545	0.02	14.22	2030	0.02
Caryophyllene oxide	12.49	1574	0.01			
β-Sinensal	13.97	1695	0.02	15.58	2162	0.02
α-Sinensal	14.62	1751	0.01	16.59	2267	0.01
Myristic acid	14.82	1768	0.02			
Palmitic acid	16.99	1967	0.08	22.23	2926	0.10
Stearic acid	19.01	2167	0.32	23.70	3123	0.54
Tetramethoxyflavone isomer	27.04	3135	0.01			
Total identified		99.08%			99.30%	
Total reported		99.08%			99.30%	

*: Two or more compounds are coeluting on this column

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