

Date : December 23, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20L23-PTH01

Customer identification : Tangerine Organic -France - TP01022010R

Type : Essential oil

Source : *Citrus reticulata* cv. Tangerine

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

Analysis date : December 23, 2020

Checked and approved by :

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

PHYSICOCHEMICAL DATA

Physical aspect: Bright orange liquid

Refractive index: 1.4741 ± 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
α -Thujene	tr	Monoterpene
α -Pinene	0.51	Monoterpene
Camphene	0.01	Monoterpene
β -Pinene	0.03	Monoterpene
Sabinene	0.44	Monoterpene
Myrcene	1.86	Monoterpene
α -Phellandrene	0.03	Monoterpene
Pseudolimonene	0.01	Monoterpene
Octanal	0.09	Aliphatic aldehyde
Δ^3 -Carene	0.12	Monoterpene
Limonene	93.21	Monoterpene
β -Phellandrene	0.32	Monoterpene
(Z)- β -Ocimene	0.01	Monoterpene
(E)- β -Ocimene	0.19	Monoterpene
γ -Terpinene	0.01	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Isoterpinolene	0.01	Monoterpene
Terpinolene	0.02	Monoterpene
Linalool	0.28	Monoterpenic alcohol
Nonanal	0.03	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.01	Monoterpenic ether
trans-Limonene oxide	0.02	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
Citronellal	0.03	Monoterpenic aldehyde
Terpinen-4-ol	0.01	Monoterpenic alcohol
α -Terpineol	0.02	Monoterpenic alcohol
Unknown	0.04	Unknown
Decanal	0.16	Aliphatic aldehyde
trans-Carveol	0.01	Monoterpenic alcohol
cis-Carveol	0.01	Monoterpenic alcohol
Neral	0.03	Monoterpenic aldehyde
(2E)-Decenal	0.01	Aliphatic aldehyde
Geranial	0.01	Monoterpenic aldehyde
Unknown	0.01	Oxygenated monoterpene
Limonen-10-ol	0.01	Monoterpenic alcohol
Limonene cis-glycol	0.01	Monoterpenic alcohol
α -Copaene	0.04	Sesquiterpene
Geranyl acetate	0.03	Monoterpenic ester
β -Elemene	0.02	Sesquiterpene
Dodecanal	0.05	Aliphatic aldehyde
β -Caryophyllene	0.02	Sesquiterpene
β -Copaene	0.02	Sesquiterpene
α -Humulene	0.02	Sesquiterpene
(E)- β -Farnesene	0.01	Sesquiterpene

Germacrene D	0.06	Sesquiterpene
Valencene	0.01	Sesquiterpene
α -Muurolene	0.03	Sesquiterpene
γ -Cadinene	0.02	Sesquiterpene
δ -Cadinene	0.05	Sesquiterpene
α -Elemol	0.01	Sesquiterpenic alcohol
(<i>E</i>)-Nerolidol	0.01	Sesquiterpenic alcohol
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
Tetradecanal	0.01	Aliphatic aldehyde
β -Sinensal	0.02	Sesquiterpenic aldehyde
α -Sinensal	0.10	Sesquiterpenic aldehyde
Myristic acid	0.06	Aliphatic acid
Palmitic acid	0.13	Aliphatic acid
Linoleic acid	0.06	Aliphatic acid
Oleic acid	0.10	Aliphatic acid
Stearic acid	0.17	Aliphatic acid
Tetramethoxyflavone isomer	0.03	Flavonoid
Tangeretin	0.05	Flavonoid
para-Cymene	0.01	Monoterpene
Consolidated total	98.77%	

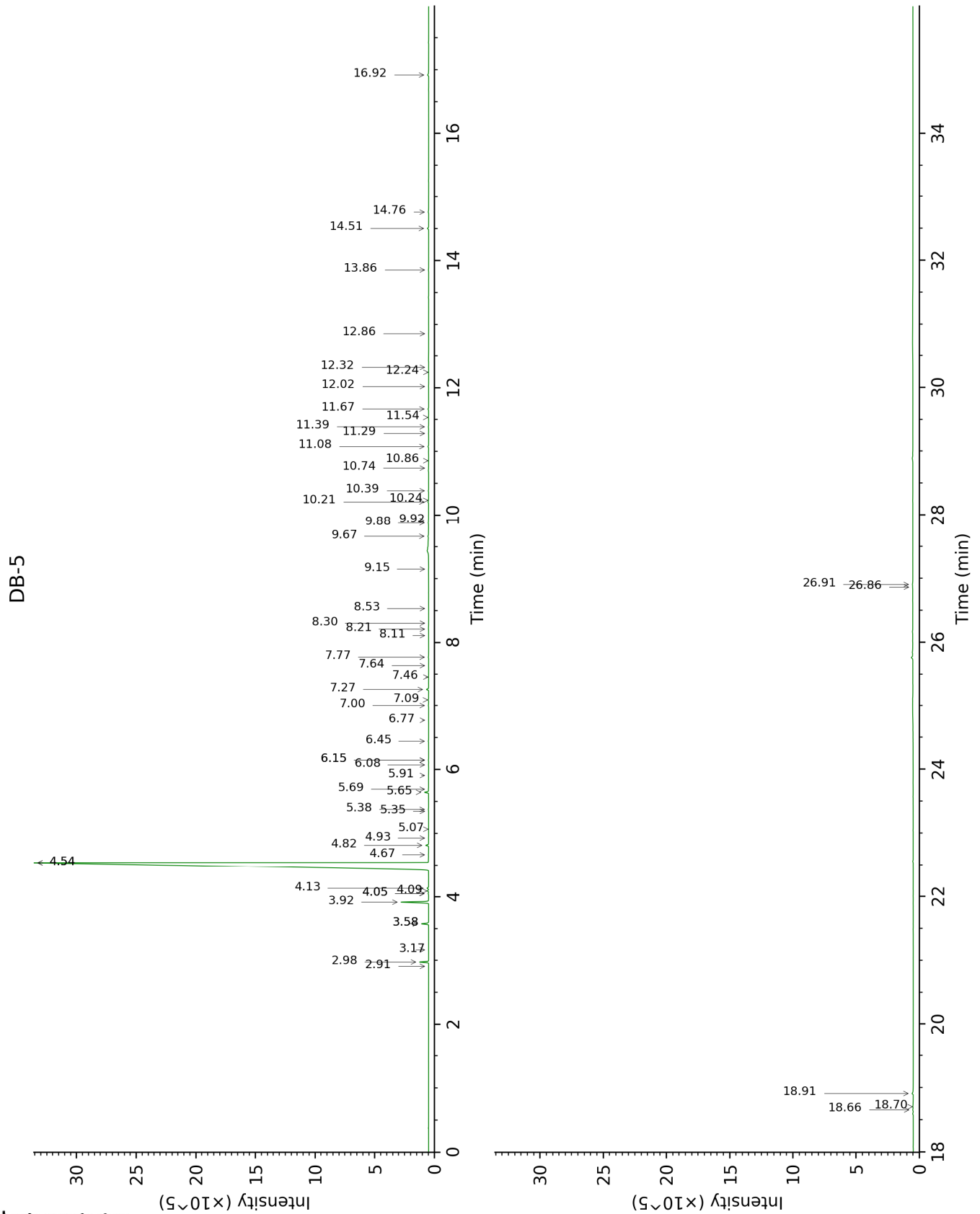
tr: The compound has been detected below 0.005% of total signal.

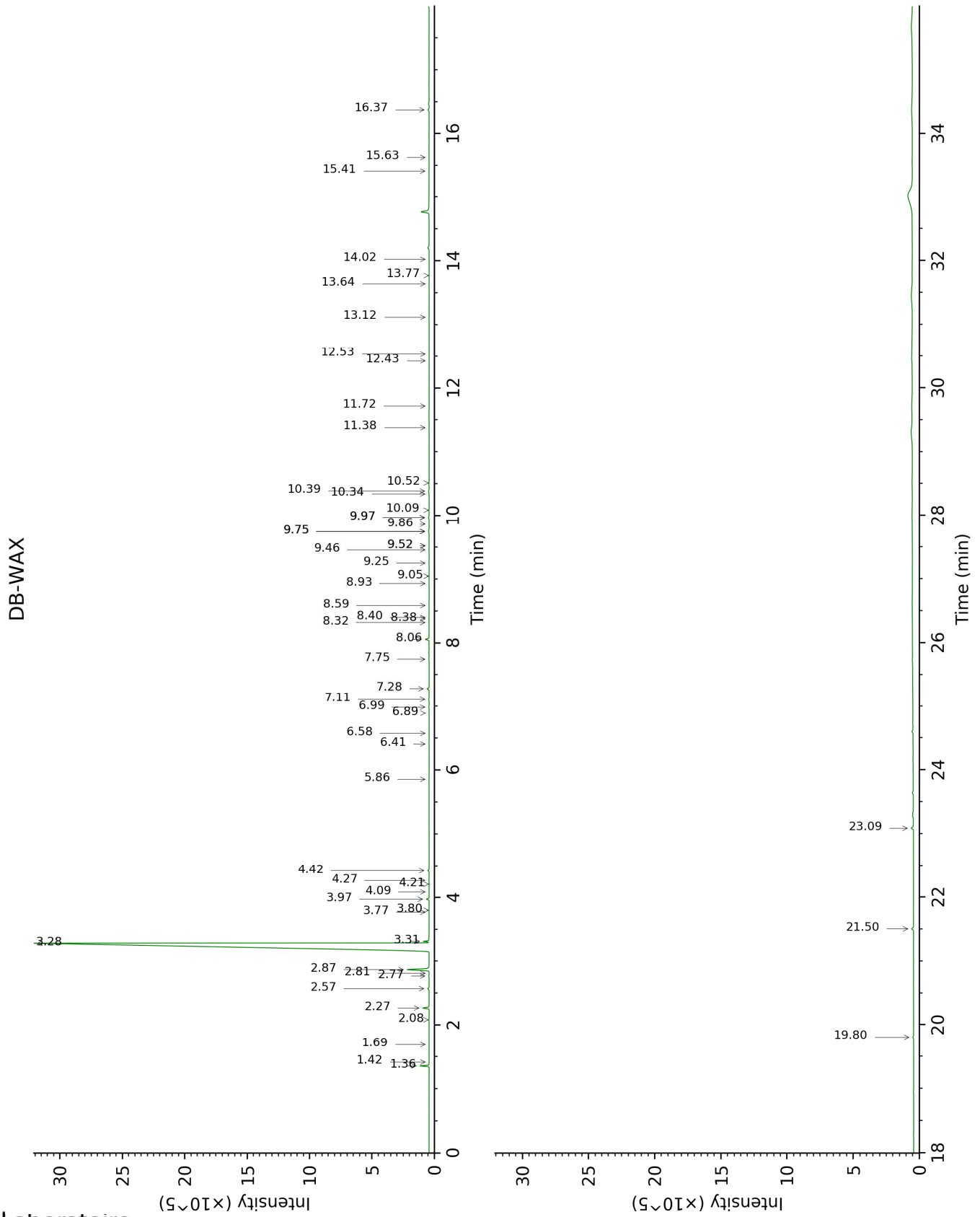
Note: no correction factor was applied

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	%
α -Thujene	2.91	926	tr	1.42	998	0.01
α -Pinene	2.98	930	0.51	1.36	990	0.51
Camphene	3.17	943	0.01	1.69	1026	tr
β -Pinene	3.58*	970	0.47	2.08	1065	0.03
Sabinene	3.58*	970	[0.47]	2.27	1083	0.44
Myrcene	3.92	992	1.86	2.87	1133	1.88
α -Phellandrene	4.05*	1001	0.04	2.77	1125	0.03
Pseudolimonene	4.05*	1001	[0.04]	2.81	1129	0.01
Octanal	4.09	1004	0.09	4.42	1252	0.11
Δ 3-Carene	4.13	1006	0.12	2.57	1110	0.11
Limonene	4.54*	1032	93.54	3.28	1166	93.21
β -Phellandrene	4.54*	1032	[93.54]	3.31	1168	0.32
(Z)- β -Ocimene	4.67	1040	0.01	3.80	1206	0.01
(E)- β -Ocimene	4.82	1049	0.19	3.97	1219	0.20
γ -Terpinene	4.93	1056	0.01	3.77	1204	0.01
<i>cis</i> -Sabinene hydrate	5.07	1065	0.01	6.89	1429	0.01
Isoterpinolene	5.35	1083	0.01	4.21	1236	0.01
Terpinolene	5.38	1084	0.02	4.27	1241	0.03
Linalool	5.65	1101	0.28	8.06	1516	0.29
Nonanal	5.69	1104	0.03	5.86	1353	0.02
<i>trans</i> -para-Mentha-2,8-dien-1-ol	5.91	1118	0.01	8.93	1583	0.01
<i>cis</i> -Limonene oxide	6.08	1129	0.01	6.41	1393	0.01
<i>trans</i> -Limonene oxide	6.15*	1134	0.02	6.58	1405	0.02
<i>cis</i> -para-Mentha-2,8-dien-1-ol	6.15*	1134	[0.02]	9.52*	1631	0.01
Citronellal	6.44	1153	0.03	6.99	1436	0.03
Terpinen-4-ol	6.77	1174	0.01	8.59	1557	0.01
α -Terpineol	7.00	1189	0.02	9.75*	1649	0.08
Unknown [m/z 121, 79 (98), 93 (87), 94 (73), 91 (63), 105 (45)...]	7.09	1194	0.04	7.75	1492	0.03
Decanal	7.27	1206	0.16	7.28	1458	0.17
<i>trans</i> -Carveol	7.46	1219	0.01	11.38	1785	0.01
<i>cis</i> -Carveol	7.64	1231	0.01	11.72	1815	0.01
Neral	7.77	1240	0.03	9.46	1626	0.03
(2E)-Decenal	8.11	1263	0.01	9.05	1592	0.01
Geranial	8.21	1270	0.01	10.09	1677	0.02
Unknown [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	8.30	1276	0.01	12.43	1877	0.01
Limonen-10-ol	8.53	1292	0.01	13.12	1940	0.02
Limonene <i>cis</i> -glycol	9.15	1331	0.01	15.63	2183	0.01
α -Copaene	9.67	1368	0.04	7.11	1445	0.04
Geranyl acetate	9.88	1383	0.03	10.52	1712	0.02
β -Elemene	9.92	1386	0.02	8.40	1542	0.02

Dodecanal	10.21	1407	0.05	9.97*	1667	0.07
β-Caryophyllene	10.24	1409	0.02	8.38	1541	0.01
β-Copaene	10.39	1421	0.02	8.32	1536	0.02
α-Humulene	10.74	1447	0.02	9.25	1609	0.02
(E)-β-Farnesene	10.86	1456	0.01	9.52*	1631	[0.01]
Germacrene D	11.08	1473	0.06	9.75*	1649	[0.08]
Valencene	11.29	1488	0.01	9.86	1658	0.01
α-Muurolene	11.39	1496	0.03	9.97*	1667	[0.07]
γ-Cadinene	11.54	1507	0.02	10.34	1697	0.03
δ-Cadinene	11.67	1518	0.05	10.39	1701	0.06
α-Elemol	12.02	1546	0.01	14.02	2025	0.01
(E)-Nerolidol	12.24	1563	0.01	13.77	2001	0.01
Germacrene D-4-ol	12.32	1569	0.01	13.64	1988	0.01
Tetradecanal	12.86	1612	0.01	12.53	1886	0.01
β-Sinensal	13.86	1695	0.02	15.42	2161	0.02
α-Sinensal	14.50	1750	0.10	16.37	2260	0.10
Myristic acid	14.76	1773	0.06	19.80	2644	0.09
Palmitic acid	16.92	1969	0.13	21.50	2854	0.20
Linoleic acid	18.66	2139	0.06			
Oleic acid	18.70	2144	0.10			
Stearic acid	18.91	2165	0.17	23.09	3064	0.27
Tetramethoxyflavone isomer	26.86	3097	0.03			
Tangeretin	26.90	3101	0.05			
para-Cymene				4.09	1227	0.01
Total identified		98.71%			98.70%	
Total reported		98.76%			98.74%	

*: Two or more compounds are coeluting on this column

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