



GC/MS BATCH NUMBER: T10104

ESSENTIAL OIL: TANGERINE
BOTANICAL NAME: CITRUS RETICULATA
ORIGIN: BRAZIL

KEY CONSTITUENTS PRESENT IN THIS BATCH OF TANGERINE OIL	%
LIMONENE	90.9
γ-TERPINENE	2.9
MYRCENE	1.7

Comments from Robert Tisserand: Fresh, candy-sweet, citrus odor quality. Constituents are in expected amounts.

Date : April 17, 2018

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18D05-PTH1-1-CC

Customer identification : Tangerine - Brazil - T1010481R

Type : Essential oil

Source : *Citrus reticulata* cv. Tangerine

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 : Benoit Roger, Ph. D.

Analysis date : April 16, 2018

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/red liquid

Refractive index: 1.4743 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Ethanol	0.02	0.03	Aliphatic alcohol
α -Thujene	0.11	0.11	Monoterpene
α -Pinene	0.67	0.67	Monoterpene
Camphene	tr	tr	Monoterpene
β -Pinene	0.37*	0.25	Monoterpene
Sabinene	[0.37]*	0.13	Monoterpene
Myrcene	1.69	1.71	Monoterpene
α -Phellandrene	0.03	0.03	Monoterpene
Octanal	0.02	0.01	Aliphatic aldehyde
Δ 3-Carene	tr	tr	Monoterpene
α -Terpinene	0.05	0.06	Monoterpene
para-Cymene	0.04	0.31	Monoterpene
Limonene	90.99*	90.92	Monoterpene
1,8-Cineole	[90.99]*	0.21	Monoterpenic ether
(Z)- β -Ocimene	[90.99]*	0.02	Monoterpene
(E)- β -Ocimene	0.06	0.07	Monoterpene
γ -Terpinene	2.94	2.98	Monoterpene
Terpinolene	0.13	0.17	Monoterpene
Linalool	0.19*	0.20	Monoterpenic alcohol
Nonanal	[0.19]*	0.01	Aliphatic aldehyde
cis-Limonene oxide	0.01	0.01	Monoterpenic ether
trans-Limonene oxide	0.01	0.01	Monoterpenic ether
Citronellal	0.01	0.01	Monoterpenic aldehyde
Terpinen-4-ol	0.01	0.04*	Monoterpenic alcohol
α -Terpineol	tr	tr	Monoterpenic alcohol
Decanal	0.07	0.11	Aliphatic aldehyde
Octyl acetate	0.01	0.01	Aliphatic ester
Nerol	tr	tr	Monoterpenic alcohol
Neral	0.01	0.01	Monoterpenic aldehyde
Geraniol	0.01	0.01	Monoterpenic alcohol
Geranial	0.03	0.03*	Monoterpenic aldehyde
Limonen-10-ol	0.01	0.02	Monoterpenic alcohol
Undecanal	0.01	0.01	Aliphatic aldehyde
Neryl acetate	0.03	0.04	Monoterpenic ester
Geranyl acetate	0.06	0.07	Monoterpenic ester
β -Elemene	0.02	[0.04]*	Sesquiterpene
Dodecanal	0.04	0.04	Aliphatic aldehyde
β -Caryophyllene	0.02	[0.04]*	Sesquiterpene
trans- α -Bergamotene	tr	tr	Sesquiterpene
(E)- β -Farnesene	0.03	0.03	Sesquiterpene
Germacrene D	0.04	0.10	Sesquiterpene
Valencene	0.03	0.04	Sesquiterpene
α -Muurolole	tr	[0.03]*	Sesquiterpene
γ -Cadinene	0.13	0.13	Sesquiterpene
δ -Cadinene	0.05	0.04	Sesquiterpene
β -Sinensal	0.01	0.01	Sesquiterpenic aldehyde
α -Sinensal	0.02	0.02	Sesquiterpenic aldehyde
Myristic acid	0.05	0.05	Aliphatic acid

Palmitic acid	0.18	0.20	Aliphatic acid
Linoleic acid	0.18	0.17	Aliphatic acid
Oleic acid	0.14	0.16	Aliphatic acid
Stearic acid	0.07		Aliphatic acid
Tangeretin	0.22		Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.08		Flavonoid
Nobiletin	0.18		Flavonoid
Total identified	99.10%	99.24%	

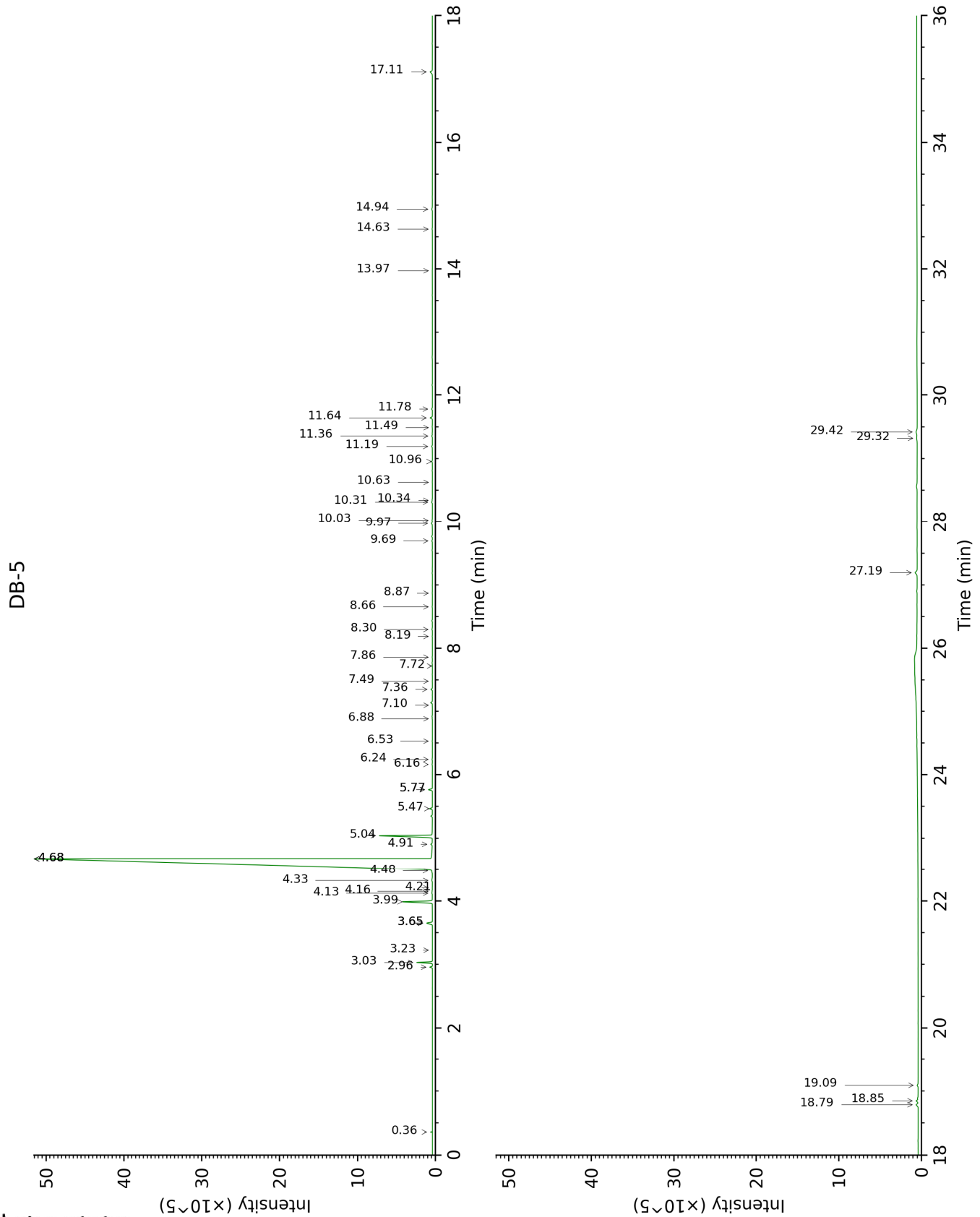
*: Two or more compounds are coeluting on this column

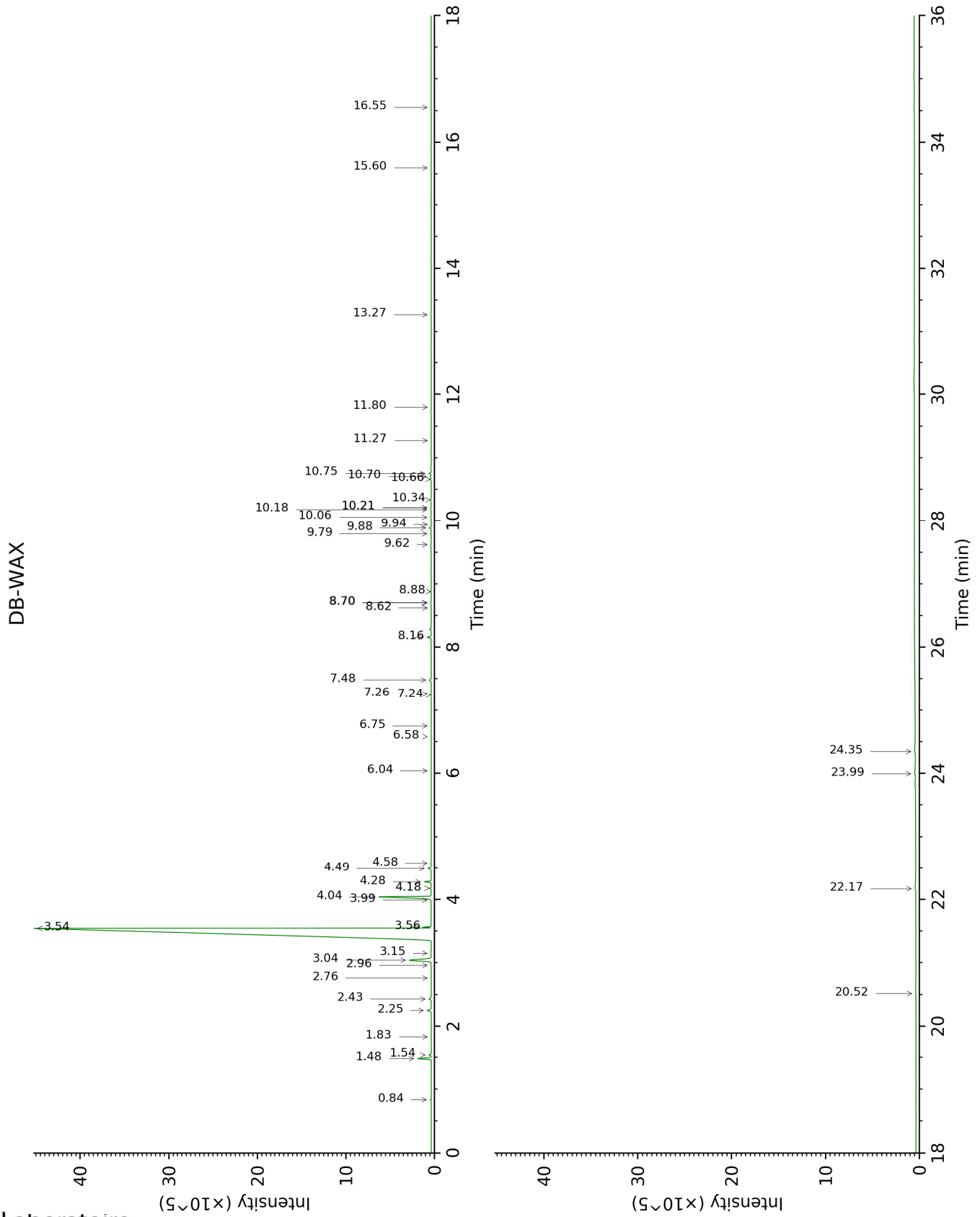
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	%
Ethanol	0.36	496	0.02	0.84	902	0.03
α -Thujene	2.96	923	0.11	1.54	1006	0.11
α -Pinene	3.03	928	0.67	1.48	1000	0.67
Camphene	3.23	941	tr	1.83	1034	tr
β -Pinene	3.65*	969	0.37	2.25	1073	0.25
Sabinene	3.65*	969	[0.37]	2.43	1091	0.13
Myrcene	3.99	992	1.69	3.04	1139	1.71
α -Phellandrene	4.13	1001	0.03	2.96	1133	0.03
Octanal	4.16	1003	0.02	4.58	1252	0.01
Δ 3-Carene	4.21	1006	tr	2.76	1117	tr
α -Terpinene	4.33	1013	0.05	3.15	1147	0.06
para-Cymene	4.48	1023	0.04	4.28	1230	0.31
Limonene	4.68*	1035	90.99	3.54	1177	90.92
1,8-Cineole	4.68*	1035	[90.99]	3.56	1178	0.21
(Z)- β -Ocimene	4.68*	1035	[90.99]	3.99	1210	0.02
(E)- β -Ocimene	4.91	1050	0.06	4.18	1223	0.07
γ -Terpinene	5.04	1058	2.94	4.04	1214	2.98
Terpinolene	5.47	1085	0.13	4.49	1246	0.17
Linalool	5.77*	1104	0.19	8.16	1512	0.20
Nonanal	5.77*	1104	[0.19]	6.04	1354	0.01
cis-Limonene oxide	6.16	1129	0.01	6.58	1393	0.01
trans-Limonene oxide	6.24	1134	0.01	6.75	1406	0.01
Citronellal	6.53	1153	0.01	7.24	1442	0.01
Terpinen-4-ol	6.88	1175	0.01	8.70*	1554	0.04
α -Terpineol	7.10	1189	tr	9.94	1653	tr
Decanal	7.36	1206	0.07	7.48	1461	0.11
Octyl acetate	7.48	1214	0.01	7.26	1444	0.01
Nerol	7.72	1230	tr	11.27	1764	tr
Neral	7.86	1240	0.01	9.62	1627	0.01
Geraniol	8.19	1261	0.01	11.80	1810	0.01
Geranial	8.30	1269	0.03	10.21*	1675	0.03
Limonen-10-ol	8.66	1293	0.01	13.27	1943	0.02
Undecanal	8.87	1307	0.01	8.88	1568	0.01
Neryl acetate	9.69	1365	0.03	10.34	1685	0.04
Geranyl acetate	9.97	1385	0.06	10.70	1716	0.07
β -Elemene	10.02	1389	0.02	8.70*	1554	[0.04]
Dodecanal	10.32	1409	0.04	10.18	1672	0.04
β -Caryophyllene	10.34	1412	0.02	8.70*	1554	[0.04]
trans- α -Bergamotene	10.63	1433	tr	8.62	1548	tr
(E)- β -Farnesene	10.96	1457	0.03	9.79	1641	0.03
Germacrene D	11.19	1475	0.04	9.88	1648	0.10
Valencene	11.36	1487	0.03	10.06	1663	0.04
α -Muurolene	11.49	1497	tr	10.21*	1675	[0.03]
γ -Cadinene	11.64	1508	0.13	10.75	1720	0.13
δ -Cadinene	11.78	1519	0.05	10.66	1712	0.04
β -Sinensal	13.97	1696	0.01	15.60	2168	0.01
α -Sinensal	14.63	1752	0.02	16.55	2267	0.02
Myristic acid	14.94	1779	0.05	20.52	2721	0.05

Palmitic acid	17.11	1978	0.18	22.17	2932	0.20
Linoleic acid	18.79	2145	0.18	24.35	3233	0.17
Oleic acid	18.85	2152	0.14	23.99	3182	0.16
Stearic acid	19.09	2177	0.07			
Tangeretin	27.19	3157	0.22			
3,3',4',5,6,7,8- Heptamethoxyflavone	29.32	3338	0.08			
Nobiletin	29.42	3345	0.18			
Total identified		99.10%			99.24%	
Total reported		99.10%			99.24%	

*: 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