

## GC/MS BATCH NUMBER: O20104

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**ESSENTIAL OIL:** ORANGE (SWEET)  
**BOTANICAL NAME:** CITRUS SINENSIS  
**ORIGIN:** BRAZIL

KEY CONSTITUENTS PRESENT IN THIS BATCH OF ORANGE (SWEET) OIL	%
LIMONENE	95.4
MYRCENE	1.9
$\alpha$ -PINENE	0.5
LINALOOL	0.5
SABINENE	0.3
OCTANAL	0.3
GERANIAL	0.1
NERAL	0.1
NONANAL	0.04
$\beta$ -PINENE	0.03
VALENCENE	0.01
NOOTKATONE	0.01

Comments from Robert Tisserand: Excellent odor quality and all 12 key constituents conform to the ISO standard.

**Date :** September 28, 2016

*SAMPLE IDENTIFICATION*

**Internal code :** 16I16-PTH9-1-DM

**Customer identification :** Sweet Orange - O2010463R

**Type :** Essential oil

**Source :** *Citrus sinensis*

**Customer :** Plant Therapy

*ANALYSIS*

**Method :** PC-PA-001-15E06, "Analysis of the composition of a liquid essential oil by GC-FID" (in French).

**Analyst :** Sylvain Mercier, M. Sc., chimiste

**Analysis date :** 2016-09-27

Checked and approved by :



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

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IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
$\alpha$ -Thujene	3.25	918	tr				Monoterpene
$\alpha$ -Pinene	3.35	924	0.51	0.52	943	0.85	Monoterpene
Camphene	3.64	942	tr	tr	1011	1.14	Monoterpene
Sabinene	4.07	968	0.28	0.28	1053	1.47	Monoterpene
$\beta$ -Pinene	4.13	971	0.03	0.02	1036	1.34	Monoterpene
Myrcene	4.43	989	1.87	1.88	1114	1.97	Monoterpene
$\alpha$ -Phellandrene	4.69*	1004	0.20	0.02	1109	1.92	Monoterpene
$\Delta^3$ -Carene	4.69*	1004	[0.20]	0.15	1087	1.74	Monoterpene
Octanal	4.81	1011	0.28	0.27	1231	3.37	Aliphatic aldehyde
Limonene	5.30*	1038	95.03	95.42	1158	2.48	Monoterpene
para-Cymene	5.30*	1038	[95.03]	tr	1207	3.05	Monoterpene
cis- $\beta$ -Ocimene	5.32	1040	0.02	0.01	1188	2.83	Monoterpene
trans- $\beta$ -Ocimene	5.49	1049	0.02	0.02	1201	2.99	Monoterpene
cis-Sabinene hydrate	6.01	1077	0.01	0.01	1404	5.82	Monoterp. alcohol
Terpinolene	6.13	1083	0.03	0.02	1222	3.25	Monoterpene
Octanol	6.17	1086	0.04	0.04	1498	7.52	Aliphatic alcohol
Linalool	6.65	1107	0.46	0.45	1489	7.34	Monoterp. alcohol
Nonanal	6.70	1109	0.05	0.04	1336	4.84	Aliphatic aldehyde
cis-Limonene oxide	7.24	1129	0.01	0.01	1370	5.32	Monoterp. ether
trans-Limonene oxide	7.36	1133	0.01	0.01	1383	5.50	Monoterp. ether
Citronellal	7.86	1152	0.05	0.04	1417	5.99	Monoterp. aldehyde
Terpinen-4-ol	8.69	1183	0.01	0.01	1546	8.67	Monoterp. alcohol
$\alpha$ -Terpineol	9.34	1203	0.07	0.07	1624	11.01	Monoterp. alcohol
Decanal	9.64	1210	0.25	0.22	1439	6.41*	Aliphatic aldehyde
Neral	10.98	1240	0.05	0.03	1597	10.21	Monoterp. aldehyde
Geranial	12.47	1273	0.09	0.11	1649	12.10*	Monoterp. aldehyde
Undecanal	14.47	1310	0.01	0.01	1550	8.82	Aliphatic aldehyde
$\alpha$ -Copaene	17.37	1355	0.03	[0.22]	1439	6.41*	Sesquiterpene
$\beta$ -Cubebene	18.35	1370	0.02	0.01	1478	7.12	Sesquiterpene
$\beta$ -Caryophyllene	20.22	1398	0.03	0.03	1525	8.05	Sesquiterpene
Dodecanal	21.40	1412	0.04	[0.11]	1649	12.10*	Aliphatic aldehyde
Germacrene D	25.18	1458	0.02	0.02	1635	11.44	Sesquiterpene
Valencene	27.33	1483	0.01	0.01	1672	13.09	Sesquiterpene
$\delta$ -Cadinene	28.88	1503	0.03	0.02	1675	13.22	Sesquiterpene
$\beta$ -Sinensal	39.59	1690	0.02	0.02	2132	37.95	Sesquiterp. aldehyde
$\alpha$ -Sinensal	41.54	1751	0.02	0.02	2233	40.77	Sesquiterp. aldehyde
Nootkatone	42.79	1790	0.01	0.01	2361	43.72	Sesquiterp. ketone
<b>Total identified</b>			<b>99.61%</b>	<b>99.80%</b>			

\*: Two or more compounds are coeluting on this column

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

Note: no correction factor was applied

*OTHER DATA*

**Physical aspect :** Yellow liquid

**Refractive index :**  $1.4710 \pm 0.0003$  (20 °C)

*CONCLUSION*

No adulterant, contaminant or diluent were detected using this method.



