

## GC/MS BATCH NUMBER: O20103

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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	94.9
MYRCENE	1.9
$\alpha$ -PINENE	0.5
LINALOOL	0.5
SABINENE	0.3
OCTANAL	0.3
GERANIAL	0.1
NERAL	0.1
$\beta$ -PINENE	0.03
VALENCENE	0.01
NOOTKATONE	0.01

Comments from Robert Tisserand: An excellent, fresh Orange oil which conforms to 12 of 13 key ISO constituents

**Date :** February 26, 2016

*SAMPLE IDENTIFICATION*

**Internal code :** 16B22-PTH8-1-LC

**Customer identification :** Sweet Orange - Brazil - O2010251R

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

**Analysis date :** 2016-02-25

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.	
Hexanal	1.32	805	tr				Aliphatic aldehyde
$\alpha$ -Thujene	2.72	918	tr	0.01	957	0.97	Monoterpene
$\alpha$ -Pinene	2.81	924	0.52	0.52	946	0.93	Monoterpene
Camphene	3.07	940	tr	tr	1013	1.17	Monoterpene
Sabinene	3.49	967	0.33	0.34	1069	1.62	Monoterpene
$\beta$ -Pinene	3.53	970	0.03	0.02	1050	1.48	Monoterpene
Myrcene	3.85	990	1.84	1.86	1121	2.14	Monoterpene
$\alpha$ -Phellandrene	4.08*	1004	0.17	0.03	1114	2.05	Monoterpene
$\Delta$ 3-Carene	4.08*	1004	[0.17]	0.14	1100	1.89	Monoterpene
Octanal	4.22	1012	0.25	0.24	1238	3.61	Aliphatic aldehyde
1,8-Cineole	4.64*	1036	95.13	0.25	1160	2.60*	Monoterp. ether
para-Cymene	4.64*	1036	[95.13]	tr	1214	3.26	Monoterpene
Limonene	4.64*	1036	[95.13]	94.90	1160	2.59	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	4.88	1049	0.03	0.02	1208	3.18	Monoterpene
$\gamma$ -Terpinene	5.03	1058	tr	0.01	1195	3.00	Monoterpene
Isoterpinolene	5.39	1079	0.01	tr	1224	3.40	Monoterpene
Terpinolene	5.48	1084	0.02	0.02	1228	3.46	Monoterpene
Octanol	5.55	1088	0.03	0.04	1514	8.16	Aliphatic alcohol
Linalool	5.99	1109	0.45	0.40	1507	7.95	Monoterp. alcohol
<i>cis</i> -Limonene oxide	6.42	1128	0.02	0.02	1380	5.63	Monoterp. ether
<i>trans</i> -Limonene oxide	6.52	1133	0.02	0.02	1392	5.81	Monoterp. ether
Citronellal	6.95	1152	0.05	0.05	1420	6.30	Monoterp. aldehyde
$\alpha$ -Terpineol	8.22	1204	0.05	0.06	1632	12.08	Monoterp. alcohol
Decanal	8.41	1210	0.24	0.21	1441	6.69	Aliphatic aldehyde
<i>trans</i> -Piperitol	8.51	1212	0.01	0.02	1677	14.09	Monoterp. alcohol
Neral	9.53	1240	0.05	0.05	1608	11.02	Monoterp. aldehyde
Geranial	10.79	1273	0.09	0.09	1654	13.08	Monoterp. aldehyde
Undecanal	12.47	1310	0.01	0.01	1544	9.07	Aliphatic aldehyde
$\alpha$ -Copaene	14.89	1352	0.02	0.02	1430	6.50	Sesquiterpene
$\beta$ -Cubebene	15.75	1367	0.02	0.02	1476	7.35	Sesquiterpene
$\beta$ -Caryophyllene	17.40	1396	0.02	0.02	1520	8.35	Sesquiterpene
$\beta$ -Copaene	18.23	1407	0.03	0.03	1518	8.30	Sesquiterpene
Dodecanal	18.62	1412	0.04	0.03	1647	12.76	Aliphatic aldehyde
Germacrene D	21.94	1455	0.02	0.02	1621	11.58	Sesquiterpene
$\beta$ -Selinene	22.86	1467	0.04	0.05	1630	11.97	Sesquiterpene
Valencene	23.92	1481	0.01	0.01	1663	13.46	Sesquiterpene
$\delta$ -Cadinene	25.45	1500	0.02	0.02	1673	13.92	Sesquiterpene
Humulene epoxide II	32.62	1585	0.02				Sesquiterp. ether
$\beta$ -Sinensal	37.97	1690	0.03	0.04	2138	39.15	Sesquiterp. aldehyde

$\alpha$ -Sinensal	40.08	1749	0.02	0.02	2228	41.58	Sesquiterp. aldehyde
Nootkatone	41.36	1787	0.01	0.01	2370	44.81	Sesquiterp. ketone
<b>Total identified</b>			<b>99.65%</b>	<b>99.62%</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 :** Bright yellow liquid

**Refractive index :**  $1.4713 \pm 0.0003$  (20 °C)

#### CONCLUSION

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



