

## GC/MS BATCH NUMBER: O30104

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**ESSENTIAL OIL:** SWEET ORANGE ORGANIC

**BOTANICAL NAME:** CITRUS SINENSIS

**ORIGIN:** USA

| KEY CONSTITUENTS PRESENT IN THIS BATCH OF SWEET ORANGE ORGANIC OIL | %    |
|--|------|
| LIMONENE   | 94.1 |
| MYRCENE  | 1.7  |
| $\alpha$ -PINENE   | 0.6  |
| LINALOOL   | 0.4  |
| SABINENE   | 0.3  |
| NERAL  | 0.1  |
| GERANIAL   | 0.1  |
| NOOTKATONE   | 0.1  |
| NONANAL  | 0.04 |
| $\beta$ -PINENE  | 0.03 |
| VALENCENE  | 0.03 |
| OCTANAL  | 0.01 |

Comments from Robert Tisserand: A deliciously fresh Orange oil, and all 12 key ISO constituents are within range.

**Date :** June 23, 2016

*SAMPLE IDENTIFICATION*

**Internal code :** 16F08-PTH5-1-SM

**Customer identification :** Organic Sweet Orange - USA - O30104510

**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).

Identifications double-checked by GC-MS

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

**Analysis date :** 2016-06-15

Checked and approved by :

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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.   |                      |
| $\alpha$ -Pinene                        | 3.34        | 928  | 0.55    | 0.56        | 947  | 0.89   | Monoterpene          |
| Sabinene                                | 4.04        | 971  | 0.26    | 0.27        | 1058 | 1.55   | Monoterpene          |
| $\beta$ -Pinene                         | 4.11        | 975  | 0.03    | 0.03        | 1040 | 1.41   | Monoterpene          |
| Myrcene                                 | 4.38        | 992  | 1.67    | 1.64        | 1117 | 2.06   | Monoterpene          |
| $\alpha$ -Phellandrene                  | 4.66*       | 1008 | 0.07    | 0.01        | 1111 | 2.00   | Monoterpene          |
| $\Delta^3$ -Carene                      | 4.66*       | 1008 | [0.07]  | 0.06        | 1092 | 1.82   | Monoterpene          |
| Octanal                                 | 4.76        | 1014 | 0.19    | 0.18        | 1234 | 3.49   | Aliphatic aldehyde   |
| Limonene                                | 5.18*       | 1037 | 94.09   | 94.07       | 1154 | 2.50   | Monoterpene          |
| 1,8-Cineole                             | 5.18*       | 1037 | [94.09] | 0.17        | 1155 | 2.51   | Monoterp. ether      |
| para-Cymene                             | 5.18*       | 1037 | [94.09] | 0.02        | 1211 | 3.16   | Monoterpene          |
| <i>trans</i> - $\beta$ -Ocimene         | 5.43        | 1051 | 0.01    | 0.01        | 1206 | 3.09   | Monoterpene          |
| Terpinolene                             | 6.19        | 1093 | tr      | tr          | 1226 | 3.37   | Monoterpene          |
| Octanol                                 | 6.31        | 1099 | 0.01    | 0.02        | 1505 | 7.80   | Aliphatic alcohol    |
| Linalool                                | 6.50        | 1107 | 0.37    | 0.38        | 1496 | 7.62   | Monoterp. alcohol    |
| Nonanal                                 | 6.64        | 1113 | 0.04    | 0.04        | 1339 | 4.96   | Aliphatic aldehyde   |
| <i>trans</i> -para-Mentha-2,8-dien-1-ol | 6.98        | 1125 | 0.10    | 0.14        | 1555 | 9.22   | Monoterp. alcohol    |
| <i>cis</i> -Limonene oxide              | 7.17        | 1132 | 0.25    | 0.25        | 1374 | 5.48   | Monoterp. ether      |
| <i>trans</i> -Limonene oxide            | 7.28        | 1136 | 0.17    | 0.18        | 1387 | 5.66   | Monoterp. ether      |
| <i>cis</i> -para-Mentha-2,8-dien-1-ol   | 7.35        | 1139 | 0.09    | 0.13        | 1597 | 10.48* | Monoterp. alcohol    |
| Citronellal                             | 7.77        | 1155 | 0.03    | 0.03        | 1418 | 6.15   | Monoterp. aldehyde   |
| $\alpha$ -Terpineol                     | 9.22        | 1206 | 0.04    | 0.04        | 1626 | 11.48  | Monoterp. alcohol    |
| Decanal                                 | 9.53        | 1213 | 0.18    | 0.15        | 1440 | 6.54   | Aliphatic aldehyde   |
| <i>trans</i> -Piperitol                 | 9.70        | 1217 | 0.01    | 0.02        | 1671 | 13.53  | Monoterp. alcohol    |
| <i>trans</i> -Carveol                   | 10.01       | 1224 | 0.15    | 0.17        | 1754 | 17.71  | Monoterp. alcohol    |
| <i>cis</i> -Carveol                     | 10.56       | 1236 | 0.11    | 0.12        | 1780 | 19.33  | Monoterp. alcohol    |
| Carvone                                 | 11.00*      | 1246 | 0.16    | 0.08        | 1648 | 12.52  | Monoterp. ketone     |
| Neral                                   | 11.00*      | 1246 | [0.16]  | [0.13]      | 1597 | 10.48* | Monoterp. aldehyde   |
| Geranial                                | 12.28       | 1275 | 0.08    | 0.04        | 1665 | 13.21* | Monoterp. aldehyde   |
| Limonene hydroperoxide I                | 14.24       | 1314 | 0.09    |             |      |        | Monoterp. peroxide   |
| Limonene hydroperoxide II               | 14.98       | 1326 | 0.07    |             |      |        | Monoterp. peroxide   |
| $\beta$ -Cubebene                       | 17.68       | 1368 | 0.08    | 0.04        | 1475 | 7.20   | Sesquiterpene        |
| Valencene                               | 25.91       | 1475 | 0.03    | [0.04]      | 1665 | 13.21* | Sesquiterpene        |
| $\delta$ -Cadinene                      | 28.58       | 1508 | 0.01    |             |      |        | Sesquiterpene        |
| $\beta$ -Sinensal                       | 39.36       | 1695 | 0.03    | 0.03        | 2121 | 38.41  | Sesquiterp. aldehyde |
| $\alpha$ -Sinensal                      | 41.31       | 1754 | 0.01    | 0.01        | 2225 | 41.28  | Sesquiterp. aldehyde |

|                         |       |      |               |               |  |                    |
|-------------------------|-------|------|---------------|---------------|--|--------------------|
| Nootkatone              | 42.29 | 1786 | 0.05          |               |  | Sesquiterp. ketone |
| <b>Total identified</b> |       |      | <b>99.03%</b> | <b>98.89%</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 :** 1.4725 ± 0.0003 (20 °C)

#### CONCLUSION

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



