

## GC/MS BATCH NUMBER: M20106

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**ESSENTIAL OIL:** MARJORAM  
**BOTANICAL NAME:** ORGANUM MAJORANA  
**ORIGIN:** EGYPT

| KEY CONSTITUENTS PRESENT IN THIS BATCH OF MARJORAM OIL | %    |
|--|------|
| TERPINEN-4-OL  | 22.9 |
| trans-SABINENE HYDRATE                                 | 17.0 |
| γ-TERPINENE  | 12.9 |
| SABINENE   | 8.0  |
| α-TERPINENE  | 7.9  |
| cis-SABINENE HYDRATE                                   | 3.8  |
| α-TERPINEOL  | 3.2  |
| TERPINOLENE  | 3.0  |
| β-CARYOPHYLLENE  | 2.4  |
| MYRCENE  | 2.1  |
| LIMONENE   | 2.1  |
| LINALYL ACETATE  | 1.9  |
| β-PHELLANDRENE   | 1.8  |
| p-CYMENE   | 1.6  |
| cis-PARA-MENTH-2-EN-1-OL                               | 1.5  |
| BICYCLOGERMACRENE                                      | 1.2  |

Comments from Robert Tisserand: Fresh, green, herbaceous odor quality. Constituents are in expected amounts.

**Date :** December 13, 2017

*SAMPLE IDENTIFICATION*

**Internal code :** 17L08-PTH1-1-CC

**Customer identification :** Marjoram - Egypt - M2010675R

**Type :** Essential oil

**Source :** *Origanum majorana*

**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 :** 2017-12-13

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.   |                    |
| Methyl 2-methylbutyrate  | 1.41        | 771  | 0.03    | 0.03        | 911  | 0.99*  | Aliphatic ester    |
| <i>cis</i> -Hex-3-en-1-ol  | 2.51        | 866  | 0.02    | 0.01        | 1316 | 5.31   | Aliphatic alcohol  |
| Tricyclene   | 3.21        | 914  | 0.02    | [0.03]      | 911  | 0.99*  | Monoterpene        |
| $\alpha$ -Thujene  | 3.31        | 920  | 0.62    | 0.85        | 957  | 1.17   | Monoterpene        |
| $\alpha$ -Pinene   | 3.42        | 927  | 0.81    | 0.53        | 946  | 1.12   | Monoterpene        |
| Camphene   | 3.71        | 944  | 0.03    | 0.02        | 1000 | 1.39   | Monoterpene        |
| Sabinene   | 4.16        | 970  | 8.01    | 7.91        | 1055 | 1.92   | Monoterpene        |
| $\beta$ -Pinene  | 4.21        | 973  | 0.46    | 0.40        | 1039 | 1.75   | Monoterpene        |
| Myrcene  | 4.49        | 990  | 2.13    | 1.51        | 1116 | 2.48*  | Monoterpene        |
| Octen-3-ol   | 4.53        | 992  | 0.04    | 4.03        | 1401 | 6.64*  | Aliphatic alcohol  |
| Pseudolimonene   | 4.71        | 1002 | 0.06    | [1.51]      | 1116 | 2.48*  | Monoterpene        |
| $\alpha$ -Phellandrene   | 4.76        | 1005 | 0.33    | 0.18        | 1110 | 2.41   | Monoterpene        |
| $\alpha$ -Terpinene  | 4.97        | 1017 | 7.86    | 8.40        | 1124 | 2.59   | Monoterpene        |
| <i>para</i> -Cymene  | 5.16        | 1027 | 1.55    | 1.70        | 1208 | 3.69*  | Monoterpene        |
| Limonene   | 5.19        | 1028 | 2.10    | 1.67        | 1140 | 2.81   | Monoterpene        |
| $\beta$ -Phellandrene  | 5.22        | 1030 | 1.84    | 2.43        | 1146 | 2.89*  | Monoterpene        |
| 1,8-Cineole  | 5.24        | 1031 | 0.07    | [2.43]      | 1146 | 2.89*  | Monoterp. ether    |
| <i>cis</i> - $\beta$ -Ocimene  | 5.36        | 1037 | 0.03    | 12.79       | 1191 | 3.47*  | Monoterpene        |
| <i>trans</i> - $\beta$ -Ocimene  | 5.54        | 1047 | 0.05    | [1.70]      | 1208 | 3.69*  | Monoterpene        |
| $\gamma$ -Terpinene  | 5.77        | 1060 | 12.91   | [12.79]     | 1191 | 3.47*  | Monoterpene        |
| <i>cis</i> -Sabinene hydrate   | 6.10        | 1078 | 3.84    | [4.03]      | 1401 | 6.64*  | Monoterp. alcohol  |
| Terpinolene  | 6.22        | 1084 | 2.99    | 2.98        | 1223 | 3.93   | Monoterpene        |
| <i>trans</i> -Sabinene hydrate   | 6.83*       | 1111 | 17.60   | 16.98       | 1475 | 8.37   | Monoterp. alcohol  |
| Linalool   | 6.83*       | 1111 | [17.60] | 2.39        | 1487 | 8.65*  | Monoterp. alcohol  |
| <i>cis</i> - <i>para</i> -Menth-2-en-1-ol                                | 7.28        | 1127 | 1.52    | [2.39]      | 1487 | 8.65*  | Monoterp. alcohol  |
| <i>trans</i> -Pinocarveol  | 7.66        | 1141 | 0.07    | 0.09        | 1560 | 11.03  | Monoterp. alcohol  |
| Camphor  | 7.74        | 1144 | 0.03    | 0.02        | 1429 | 7.28   | Monoterp. ketone   |
| <i>trans</i> - <i>para</i> -Menth-2-en-1-ol                              | 7.81        | 1147 | 0.86    | 0.93        | 1548 | 10.60  | Monoterp. alcohol  |
| Terpinen-4-ol  | 9.01        | 1190 | 22.93   | 25.65       | 1526 | 9.80*  | Monoterp. alcohol  |
| Unknown (m/z = 79, 91 (70), 93 (67), 121 (65), 94 (50)... 137 (17)...) ) | 9.45        | 1203 | 0.34    | 0.25        | 1457 | 7.92   |                    |
| $\alpha$ -Terpineol  | 9.59        | 1206 | 3.19    | 3.19        | 1617 | 13.24* | Monoterp. alcohol  |
| <i>cis</i> -Piperitol  | 9.89        | 1213 | 0.02    |             |      |        | Monoterp. alcohol  |
| <i>trans</i> -Piperitol  | 10.04       | 1216 | 0.45    | 0.42        | 1659 | 15.44* | Monoterp. alcohol  |
| Citronellol  | 10.88       | 1234 | 0.08    | 0.05        | 1721 | 18.77  | Monoterp. alcohol  |
| Neral  | 11.33       | 1244 | 0.25    | 0.29        | 1595 | 12.31  | Monoterp. aldehyde |
| Linalyl acetate  | 11.44       | 1247 | 1.85    | 1.93        | 1499 | 8.91   | Monoterp. ester    |
| Geraniol   | 11.91       | 1257 | 0.07    | 0.08        | 1771 | 22.08  | Monoterp. alcohol  |
| Geranial   | 12.71       | 1275 | 0.02    | 1.23        | 1640 | 14.43* | Monoterp. aldehyde |
| <i>trans</i> -Pinocarvyl acetate   | 13.47       | 1291 | 0.06    | [25.65]     | 1526 | 9.80*  | Monoterp. ester    |

|                         |       |      |               |               |      |        |                     |
|-------------------------|-------|------|---------------|---------------|------|--------|---------------------|
| Neryl acetate           | 17.88 | 1360 | 0.03          | [0.42]        | 1659 | 15.44* | Monoterp. ester     |
| Geranyl acetate         | 19.37 | 1382 | 0.06          | 0.04          | 1686 | 16.83  | Monoterp. ester     |
| $\beta$ -Caryophyllene  | 20.68 | 1401 | 2.38          | [25.65]       | 1526 | 9.80*  | Sesquiterpene       |
| Aromadendrene           | 22.02 | 1417 | 0.01          | [25.65]       | 1526 | 9.80*  | Sesquiterpene       |
| $\alpha$ -Humulene      | 23.43 | 1434 | 0.10          | 0.08          | 1580 | 11.81  | Sesquiterpene       |
| Germacrene D            | 25.67 | 1461 | 0.01          | [3.19]        | 1617 | 13.24* | Sesquiterpene       |
| Bicyclogermacrene       | 26.94 | 1476 | 1.21          | [1.23]        | 1640 | 14.43* | Sesquiterpene       |
| $\delta$ -Cadinene      | 29.39 | 1506 | 0.02          | 0.02          | 1673 | 16.18  | Sesquiterpene       |
| Caryophyllene oxide     | 33.86 | 1569 | 0.06          | 0.07          | 1841 | 26.89  | Sesquiterp. ether   |
| Spathulenol             | 34.06 | 1572 | 0.04          | 0.02          | 2020 | 37.16  | Sesquiterp. alcohol |
| <b>Total identified</b> |       |      | <b>98.72%</b> | <b>98.92%</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 :** Faintly yellow liquid

**Refractive index :**  $1.4723 \pm 0.0003$  (20 °C)

#### CONCLUSION

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

17L08-PTH1-1-CC\_BP5



