



PLANT THERAPY  
100% PURE ESSENTIAL OILS

## GC/MS BATCH NUMBER: TK0103

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**ESSENTIAL OIL:** TURMERIC ORGANIC C02

**BOTANICAL NAME:** CURCUMA LONGA

**ORIGIN:** VIETNAM

| KEY CONSTITUENTS PRESENT IN THIS BATCH OF TURMERIC ORGANIC C02 OIL | %    |
|--|------|
| $\beta$ -TURMERONE   | 22.2 |
| $\alpha$ -TURMERONE  | 15.4 |
| $\alpha$ -TURMERONE  | 12.8 |
| $\beta$ -SESQUIPHELLANDRENE  | 5.5  |
| $\alpha$ -ZINGIBERENE  | 3.6  |
| $\alpha$ -CURCUMENE  | 2.9  |
| (E)- $\alpha$ -ATLANTONE   | 1.4  |

Comments from Robert Tisserand: Radiant, spicy-powdery-woody odor profile. Constituents are in expected amounts.

**Date :** April 7, 2017

*SAMPLE IDENTIFICATION*

**Internal code :** 17C29-PTH2-1-DM

**Customer identification :** Turmeric CO2 Organic - Vietnam - TK010372R

**Type :** Essential oil

**Source :** *Curcuma longa*

**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 :** 2017-04-03

Checked and approved by :

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Sylvain Mercier, M. Sc., chimiste 2014-005

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IDENTIFIED COMPOUNDS

| Identification               | Column: BP5 |      |        | Column: WAX |      |        | Molecular Class     |
|------------------------------|-------------|------|--------|-------------|------|--------|---------------------|
|                              | R.T.        | R.I. | %      | %           | R.I. | R.T.   |                     |
| Toluene                      | 1.30        | 757  | 0.01   | 0.01        | 953  | 1.20   | Simple phenolic     |
| $\alpha$ -Pinene             | 3.40        | 928  | 0.04   | 0.03        | 939  | 1.14   | Monoterpene         |
| $\beta$ -Pinene              | 4.18        | 974  | 0.01   | 0.01        | 1035 | 1.78   | Monoterpene         |
| Myrcene                      | 4.45        | 990  | 0.03   | 0.03        | 1112 | 2.52   | Monoterpene         |
| $\alpha$ -Phellandrene       | 4.72*       | 1006 | 0.38   | 0.35        | 1106 | 2.43   | Monoterpene         |
| $\Delta$ 3-Carene            | 4.72*       | 1006 | [0.38] | 0.01        | 1083 | 2.25   | Monoterpene         |
| $\alpha$ -Terpinene          | 4.91        | 1016 | 0.02   | 0.02        | 1119 | 2.60   | Monoterpene         |
| para-Cymene                  | 5.09        | 1026 | 0.28   | 0.27        | 1204 | 3.74   | Monoterpene         |
| Limonene                     | 5.13        | 1028 | 0.06   | 0.06        | 1136 | 2.83   | Monoterpene         |
| $\beta$ -Phellandrene        | 5.16        | 1030 | 0.03   | 0.64        | 1142 | 2.91*  | Monoterpene         |
| 1,8-Cineole                  | 5.19        | 1032 | 0.61   | [0.64]      | 1142 | 2.91*  | Monoterp. ether     |
| cis- $\beta$ -Ocimene        | 5.31        | 1038 | 0.01   | 0.02        | 1184 | 3.46*  | Monoterpene         |
| trans- $\beta$ -Ocimene      | 5.50        | 1048 | 0.01   | 0.01        | 1198 | 3.64   | Monoterpene         |
| $\gamma$ -Terpinene          | 5.68        | 1058 | 0.02   | [0.02]      | 1184 | 3.46*  | Monoterpene         |
| Terpinolene                  | 6.15        | 1084 | 0.25   | 0.24        | 1219 | 3.95   | Monoterpene         |
| para-Cymenene                | 6.34        | 1095 | 0.01   | 0.01        | 1362 | 6.13   | Monoterpene         |
| Linalool                     | 6.59        | 1105 | 0.01   | 0.10        | 1499 | 9.07*  | Monoterp. alcohol   |
| Terpinen-4-ol                | 8.64        | 1181 | 0.02   | 0.02        | 1524 | 9.86   | Monoterp. alcohol   |
| para-Cymen-8-ol              | 9.09        | 1197 | 0.08   | 0.09        | 1763 | 21.74  | Monoterp. alcohol   |
| $\alpha$ -Terpineol          | 9.25        | 1202 | 0.04   | 0.05        | 1623 | 13.78  | Monoterp. alcohol   |
| $\beta$ -Elemene             | 18.70       | 1376 | 0.03   | 1.49        | 1515 | 9.52*  | Sesquiterpene       |
| Sesquithujene                | 19.90       | 1394 | 0.12   | [0.10]      | 1499 | 9.07*  | Sesquiterpene       |
| $\beta$ -Caryophyllene       | 20.37       | 1401 | 1.47   | [1.49]      | 1515 | 9.52*  | Sesquiterpene       |
| $\alpha$ -Santalene          | 20.76       | 1406 | 0.56   | 0.53        | 1506 | 9.23   | Sesquiterpene       |
| trans- $\alpha$ -Bergamotene | 21.95       | 1420 | 0.06   | 0.05        | 1520 | 9.71   | Sesquiterpene       |
| cis- $\beta$ -Farnesene      | 22.63       | 1428 | 0.12   | 0.08        | 1584 | 12.12  | Sesquiterpene       |
| $\alpha$ -Humulene           | 23.10       | 1434 | 0.34   | 0.34        | 1574 | 11.72  | Sesquiterpene       |
| Thujopsadiene                | 23.81       | 1443 | 0.16   | 0.14        | 1589 | 12.27  | Sesquiterpene       |
| trans- $\beta$ -Farnesene    | 24.27       | 1448 | 0.33   | 0.31        | 1611 | 13.11  | Sesquiterpene       |
| $\gamma$ -Curcumene          | 25.99       | 1469 | 0.07   | 0.05        | 1620 | 13.58  | Sesquiterpene       |
| ar-Curcumene                 | 26.31       | 1473 | 2.91   | 1.60        | 1693 | 17.39  | Sesquiterpene       |
| $\alpha$ -Zingiberene        | 27.63       | 1488 | 3.63   | 3.71        | 1648 | 15.06  | Sesquiterpene       |
| $\beta$ -Curcumene           | 28.58*      | 1500 | 1.03   | 0.05        | 1672 | 16.30  | Sesquiterpene       |
| $\beta$ -Bisabolene          | 28.58*      | 1500 | [1.03] | 0.95        | 1652 | 15.27  | Sesquiterpene       |
| trans- $\gamma$ -Bisabolene  | 29.42       | 1512 | 0.53   | 6.67        | 1691 | 17.31* | Sesquiterpene       |
| $\beta$ -Sesquiphellandrene  | 30.03       | 1520 | 5.45   | [6.67]      | 1691 | 17.31* | Sesquiterpene       |
| trans- $\alpha$ -Bisabolene  | 31.71       | 1544 | 0.48   | 0.49        | 1716 | 18.67  | Sesquiterpene       |
| cis-Sesquisabinene hydrate   | 32.73       | 1558 | 0.19   |             |      |        | Sesquiterp. alcohol |
| (E)-Nerolidol                | 33.48*      | 1568 | 0.42   | 0.10        | 1997 | 36.22  | Sesquiterp. alcohol |
| Caryophyllene oxide          | 33.48*      | 1568 | [0.42] | 0.25        | 1842 | 27.17  | Sesquiterp. ether   |
| ar-Dihydroturmerone          | 34.73       | 1586 | 0.17   | 0.10        | 2211 | 42.72  | Sesquiterp. ketone  |

|   |        |      |               |               |      |        |                        |
|---|--------|------|---------------|---------------|------|--------|------------------------|
| ar-Turmerol   | 34.94  | 1588 | 0.31          |               |      |        | Sesquiterp. alcohol    |
| Tumerone  | 36.60  | 1620 | 0.78          |               |      |        | Sesquiterp. ketone     |
| β-Turmerone   | 38.83† | 1675 | 38.69         | 22.15         | 2145 | 41.02  | Sesquiterp. ketone     |
| ar-Turmerone  | 38.88† | 1676 | [38.69]       | 15.36         | 2071 | 38.84  | Sesquiterp. ketone     |
| Germacrone  | 38.97  | 1678 | 0.20          | 0.15          | 2079 | 39.08  | Sesquiterp. ketone     |
| (Z)-γ-Atlantone   | 39.22  | 1685 | 0.07          | 0.06          | 2089 | 39.37  | Sesquiterp. ketone     |
| Unknown (m/z = 120, 91 (37), 85 (36), 41 (34), 77 (28), 119 (27), 93 (27)...) ) | 39.36  | 1688 | 0.71          |               |      |        | Oxygenated sesquiterp. |
| (E)-γ-Atlantone   | 39.58  | 1693 | 0.45          | 0.43          | 2107 | 39.95  | Sesquiterp. ketone     |
| α-Turmerone   | 39.97  | 1704 | 12.76         | 12.95         | 2125 | 40.50  | Sesquiterp. ketone     |
| (Z)-α-Atlantone   | 40.38  | 1716 | 0.18          | 0.19          | 2153 | 41.21  | Sesquiterp. ketone     |
| Curcuphenol   | 40.54  | 1722 | 0.04          | 0.03          | 2569 | 50.34  | Sesquiterp. alcohol    |
| (6R,7R)-Bisabolone  | 40.63  | 1725 | 0.24          |               |      |        | Sesquiterp. ketone     |
| (6S,7R)-Bisabolone  | 41.20  | 1743 | 0.94          | 2.26          | 2204 | 42.54* | Sesquiterp. ketone     |
| <i>C. longa</i> biomarker I   | 41.40  | 1749 | 0.36          | 0.19          | 2287 | 44.50  | Oxygenated sesquiterp. |
| Unknown (m/z = 83, 55 (20), 53 (6), 91 (6))                                     | 41.67  | 1757 | 0.62          |               |      |        | Oxygenated sesquiterp. |
| ar-Turmerol analogue?   | 41.81  | 1762 | 0.56          | 0.49          | 2421 | 47.42  | Sesquiterp. alcohol    |
| (E)-α-Atlantone   | 42.19  | 1774 | 1.44          | [2.26]        | 2204 | 42.54* | Sesquiterp. ketone     |
| <i>C. longa</i> biomarker II  | 42.99  | 1799 | 0.74          | 0.79          | 2553 | 50.04  | Oxygenated sesquiterp. |
| <i>C. longa</i> biomarker III   | 45.40  | 1887 | 0.78          | 0.67          | 2742 | 53.54  | Oxygenated sesquiterp. |
| Unknown (m/z = 83, 135 (75), 118 (44), 55 (29), 91 (27), 232 (21))              | 45.49  | 1890 | 0.21          |               |      |        | Oxygenated sesquiterp. |
| Unknown (m/z = 83, 137 (72), 110 (60), 55 (37), 109 (26)...) )                  | 45.85  | 1903 | 0.33          |               |      |        | Oxygenated sesquiterp. |
| Unknown (m/z = 83, 149 (65), 135 (53), 55 (30), 214 (27)... 232? (11))          | 47.06  | 1952 | 0.55          |               |      |        | Oxygenated sesquiterp. |
| <i>C. longa</i> biomarker IV  | 48.21  | 1998 | 0.54          | 0.47          | 3106 | 59.67  | Oxygenated sesquiterp. |
| <b>Total identified</b>   |        |      | <b>79.07%</b> | <b>75.07%</b> |      |        |                        |

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

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

†: Peaks apexes were resolved, but peaks overlapped and were summed for analysis

Note: no correction factor was applied

#### OTHER DATA

**Physical aspect :** Bright yellow liquid

**Refractive index :** 1.5110 ± 0.0003 (20 °C)

#### CONCLUSION

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



