

Date : April 20, 2017

SAMPLE IDENTIFICATION

Internal code : 17D10-PTH14-1-DM

Customer identification : Ginger Root Co2 Organic - Nigeria - GL010056R

Type : Essential oil

Source : *Zingiber officinalis*

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 : 2017-04-19

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 | 1.74 | 809 | 0.17 | 0.93 | 994 | 1.43* | Aliphatic aldehyde |
| 2,4-Pentadienal? | 2.15 | 840 | 2.19 | 2.72 | 1062 | 2.03 | Aliphatic aldehyde |
| Tricyclene | 3.22 | 917 | 0.01 | 0.02 | 914 | 1.04 | Monoterpene |
| α -Pinene | 3.41 | 928 | 0.15 | 0.21 | 939 | 1.14 | Monoterpene |
| Camphene | 3.69 | 945 | 0.66 | [0.93] | 994 | 1.43* | Monoterpene |
| β -Pinene | 4.18 | 974 | 0.02 | 0.03 | 1034 | 1.78 | Monoterpene |
| Myrcene | 4.46 | 991 | 0.09 | 0.18 | 1112 | 2.51* | Monoterpene |
| 6-Methyl-5-hepten-2-one | 4.52 | 995 | 0.04 | 0.06 | 1272 | 4.73 | Aliphatic ketone |
| α -Phellandrene | 4.74 | 1007 | 0.04 | [0.18] | 1112 | 2.51* | Monoterpene |
| para-Cymene | 5.10 | 1026 | 0.04 | 0.02 | 1203 | 3.72 | Monoterpene |
| Limonene | 5.14 | 1029 | 0.14 | 0.15 | 1136 | 2.83 | Monoterpene |
| β -Phellandrene | 5.17 | 1031 | 0.09 | 0.59 | 1142 | 2.90* | Monoterpene |
| 1,8-Cineole | 5.20 | 1032 | 0.29 | [0.59] | 1142 | 2.90* | Monoterp. ether |
| Terpinolene | 6.16 | 1085 | 0.01 | 0.02 | 1218 | 3.94 | Monoterpene |
| Rose furan | 6.38 | 1096 | 0.04 | 0.04 | 1333 | 5.65 | Monoterp. ether |
| Linalool | 6.60 | 1106 | 0.08 | 0.11 | 1488 | 8.78 | Monoterp. alcohol |
| Camphor | 7.70 | 1146 | 0.02 | 0.03 | 1418 | 7.12* | Monoterp. ketone |
| Borneol | 8.46* | 1174 | 0.29 | 0.17 | 1618 | 13.52 | Monoterp. alcohol |
| Rosefuran epoxide | 8.46* | 1174 | [0.29] | 0.14 | 1532 | 10.17 | Monoterp. ether |
| α -Terpineol | 9.28 | 1202 | 0.13 | 0.44 | 1622 | 13.69* | Monoterp. alcohol |
| Decanal | 9.78 | 1213 | 1.63 | 2.12 | 1435 | 7.54* | Aliphatic aldehyde |
| Citronellol | 10.62 | 1232 | 0.07 | 0.09 | 1704 | 17.93 | Monoterp. alcohol |
| Neral | 11.01 | 1241 | 0.29 | 0.44 | 1594 | 12.44 | Monoterp. aldehyde |
| Geraniol | 11.65 | 1255 | 0.31 | 0.47 | 1777 | 22.63 | Monoterp. alcohol |
| Geranial | 12.50 | 1274 | 0.49 | 0.83 | 1643 | 14.79* | Monoterp. aldehyde |
| 2-Undecanone | 13.72 | 1301 | 0.11 | 0.06 | 1554 | 10.95 | Aliphatic ketone |
| α -Ylangene | 16.85 | 1348 | 0.03 | [0.03] | 1418 | 7.12* | Sesquiterpene |
| α -Copaene | 17.54 | 1359 | 0.06 | [2.12] | 1435 | 7.54* | Sesquiterpene |
| β -Elemene | 18.56 | 1374 | 0.11 | 0.10 | 1525 | 9.92 | Sesquiterpene |
| Sesquithujene | 19.94 | 1395 | 0.07 | 0.08 | 1518 | 9.62 | Sesquiterpene |
| β -Caryophyllene | 20.24 | 1400 | 0.02 | 0.02 | 1523 | 9.81 | Sesquiterpene |
| <i>trans</i> - α -Bergamotene | 21.52 | 1415 | 0.11 | 0.06 | 1530 | 10.08 | Sesquiterpene |
| 9-epi- β -Caryophyllene | 23.86 | 1443 | 0.09 | 0.07 | 1668 | 16.07 | Sesquiterpene |
| <i>trans</i> - β -Farnesene | 24.31 | 1449 | 0.09 | 0.11 | 1611 | 13.11 | Sesquiterpene |
| Germacrene D | 25.32 | 1461 | 0.03 | 0.50 | 1613 | 13.24 | Sesquiterpene |
| β -Selinene | 25.95 | 1468 | 0.06 | [0.44] | 1622 | 13.69* | Sesquiterpene |
| <i>ar</i> -Curcumene | 26.48 | 1475 | 3.16 | 8.71 | 1693 | 17.43* | Sesquiterpene |
| α -Selinene | 26.81 | 1479 | 0.33 | [0.83] | 1643 | 14.79* | Sesquiterpene |
| α -Zingiberene | 27.76 | 1490 | 3.05 | 4.71 | 1650 | 15.15 | Sesquiterpene |
| γ -Cadinene | 28.16 | 1495 | 0.04 | 0.05 | 1678 | 16.60 | Sesquiterpene |
| (<i>E,E</i>)- α -Farnesene | 28.71 | 1502 | 1.39 | 1.19 | 1694 | 17.50 | Sesquiterpene |

| | | | | | | | |
|-------------------------------------------------------------------------------|-------|------|---------------|---------------|------|--------|---------------------|
| δ-Cadinene | 28.92 | 1505 | 0.71 | [8.71] | 1693 | 17.43* | Sesquiterpene |
| β-Sesquiphellandrene | 30.12 | 1521 | 2.66 | [8.71] | 1693 | 17.43* | Sesquiterpene |
| cis-Sesquisabinene hydrate | 32.79 | 1558 | 0.05 | | | | Sesquiterp. alcohol |
| (E)-Nerolidol | 33.54 | 1569 | 0.06 | 0.07 | 1990 | 35.88 | Sesquiterp. alcohol |
| trans-Sesquisabinene hydrate | 34.59 | 1584 | 0.34 | | | | Sesquiterp. alcohol |
| (cis?)-Zingiberenol | 36.21 | 1611 | 0.25 | 0.21 | 2015 | 37.00 | Sesquiterp. alcohol |
| (trans?)-Zingiberenol | 37.07 | 1632 | 0.12 | | | | Sesquiterp. alcohol |
| β-Eudesmol | 37.56 | 1644 | 0.16 | 0.16 | 2105 | 39.89 | Sesquiterp. alcohol |
| Zingerone | 38.30 | 1662 | 6.94 | 9.76 | 2651 | 51.89 | Phenylbutanoid |
| Shyobunol | 39.07 | 1681 | 0.16 | 0.17 | 2202 | 42.49 | Sesquiterp. alcohol |
| Cedr-8-en-13-ol | 39.61 | 1694 | 1.00 | 1.48 | 2258 | 43.85 | Sesquiterp. alcohol |
| Unknown (m/z = 69, 41 (95), 109 (88), 43 (83), 95 (56), 177 (54), 55 (50)...) | 43.47 | 1816 | 0.98 | 1.45 | 2639 | 51.66 | |
| Palmitic acid | 47.98 | 1989 | 0.58 | 0.52 | 2809 | 54.72 | Fatty acid |
| Linoleic acid | 51.79 | 2156 | 0.78 | 0.53 | 3070 | 59.09 | Fatty acid |
| Stearic acid | 52.47 | 2187 | 0.23 | 0.15 | 3076 | 59.18 | Fatty acid |
| [5]-Paradol? | 53.41 | 2231 | 0.32 | | | | Gingerol derivative |
| [6]-Shogaol | 55.08 | 2312 | 8.96 | 9.94 | 3354 | 63.47 | Gingerol derivative |
| [7]-Paradol | 55.57 | 2336 | 0.24 | 0.38 | 3227 | 61.57 | Gingerol derivative |
| [6]-Gingerol | 57.05 | 2411 | 8.56 | | | | Gingerol derivative |
| Methyl [6]-gingerol | 58.02 | 2461 | 0.26 | | | | Gingerol derivative |
| [8]-Shogaol | 59.10 | 2518 | 2.53 | 6.50 | 3569 | 66.60* | Gingerol derivative |
| [9]-Paradol | 59.21 | 2524 | 2.22 | [6.50] | 3569 | 66.60* | Gingerol derivative |
| Diacetoxy-[6]-gingerdial | 59.66 | 2548 | 0.33 | | | | Gingerol derivative |
| [8]-Gingerol | 60.95 | 2619 | 2.52 | | | | Gingerol derivative |
| [10]-Shogaol | 62.96 | 2733 | 3.70 | 3.25 | 3795 | 69.70 | Gingerol derivative |
| [11]-Paradol | 63.75 | 2779 | 0.50 | 0.49 | 3584 | 66.80 | Gingerol derivative |
| [10]-Gingerol | 64.68 | 2833 | 0.67 | | | | Gingerol derivative |
| [13]-Paradol | 68.13 | 3047 | 0.89 | 0.57 | 3810 | 69.89 | Gingerol derivative |
| 1-Dehydro-[10]-gingerdione | 69.04 | 3105 | 4.03 | | | | Gingerol derivative |
| [15]-Paradol | 70.35 | 3191 | 0.77 | 0.53 | 4036 | 73.18 | Gingerol derivative |
| 1-Dehydro-[12]-gingerdione | 72.43 | 3322 | 0.90 | | | | Gingerol derivative |
| Total identified | | | 67.48% | 60.18% | | | |

*: 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 : Orange-brown liquid

Refractive index : 1.5050 ± 0.0003 (20 °C)

CONCLUSION

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



