

Date : February 10, 2017

SAMPLE IDENTIFICATION

Internal code : 17B03-GUR9-1-DM

Customer identification : Rosemary - Lot #949-R12

Type : Essential oil

Source : *Rosmarinus officinalis*

Customer : HealthLand LLC.

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 : 2017-02-10

Checked and approved by :

Alexis St-Gelais, M. Sc., chimiste 2013-174

Note: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.

This report is digitally signed, it is only considered valid if the digital signature is intact.

IDENTIFIED COMPOUNDS

| Identification | Column: BP5 | | | Column: WAX | | | Molecular Class |
|---------------------------------|-------------|------|---------|-------------|------|--------|-------------------|
| | R.T. | R.I. | % | % | R.I. | R.T. | |
| <i>cis</i> -Hex-3-en-1-ol | 2.59 | 865 | 0.01 | 0.01 | 1329 | 5.81 | Aliphatic alcohol |
| Tricyclene | 3.30 | 914 | 0.19 | 0.16 | 932 | 1.16 | Monoterpene |
| α -Thujene | 3.39 | 919 | 0.12 | 0.23 | 968 | 1.33 | Monoterpene |
| α -Pinene | 3.52 | 927 | 13.09 | 12.50 | 963 | 1.30 | Monoterpene |
| Camphene | 3.79* | 943 | 4.36 | 4.14 | 1001 | 1.60 | Monoterpene |
| α -Fenchene | 3.79* | 943 | [4.36] | 0.09 | 992 | 1.53 | Monoterpene |
| Thuja-2,4(10)-diene | 3.87 | 948 | 0.08 | 0.10 | 1061 | 2.15* | Monoterpene |
| Sabinene | 4.21 | 968 | 0.04 | [0.10] | 1061 | 2.15* | Monoterpene |
| β -Pinene | 4.28 | 972 | 4.51 | 4.30 | 1045 | 1.99 | Monoterpene |
| Myrcene | 4.55* | 988 | 1.53 | 1.27 | 1120 | 2.75 | Monoterpene |
| Octen-3-ol | 4.55* | 988 | [1.53] | 0.19 | 1401 | 7.07 | Aliphatic alcohol |
| Octan-3-one | 4.60 | 991 | 0.07 | 0.06 | 1203 | 3.88 | Aliphatic ketone |
| α -Phellandrene | 4.82* | 1003 | 0.20 | 0.18 | 1113 | 2.66 | Monoterpene |
| Δ 3-Carene | 4.82* | 1003 | [0.20] | 0.01 | 1098 | 2.47 | Monoterpene |
| α -Terpinene | 5.01 | 1014 | 0.59 | 0.54 | 1127 | 2.85 | Monoterpene |
| 1,8-Cineole | 5.38* | 1034 | 48.04 | 47.19 | 1159 | 3.28* | Monoterp. ether |
| Limonene | 5.38* | 1034 | [48.04] | [47.19] | 1159 | 3.28* | Monoterpene |
| <i>para</i> -Cymene | 5.38* | 1034 | [48.04] | 1.50 | 1213 | 4.03 | Monoterpene |
| <i>cis</i> - β -Ocimene | 5.42 | 1036 | 0.11 | 0.05 | 1191 | 3.71 | Monoterpene |
| <i>trans</i> - β -Ocimene | 5.60 | 1046 | 0.01 | 0.01 | 1205 | 3.92 | Monoterpene |
| γ -Terpinene | 5.78 | 1056 | 0.68 | 0.64 | 1194 | 3.74 | Monoterpene |
| <i>cis</i> -Sabinene hydrate | 6.08 | 1072 | 0.04 | 0.04 | 1408 | 7.23 | Monoterp. alcohol |
| Terpinolene | 6.26 | 1082 | 0.27 | 0.25 | 1227 | 4.24 | Monoterpene |
| <i>para</i> -Cymenene | 6.44 | 1092 | 0.07 | 0.05 | 1370 | 6.48 | Monoterpene |
| Linalool | 6.70 | 1101 | 0.90 | 0.96 | 1498 | 9.52 | Monoterp. alcohol |
| <i>trans</i> -Sabinene hydrate | 6.80 | 1105 | 0.02 | 0.01 | 1495 | 9.39 | Monoterp. alcohol |
| endo-Fenchol | 7.13 | 1117 | 0.06 | 0.06 | 1520 | 10.34 | Monoterp. alcohol |
| <i>trans</i> -Pinocarveol | 7.65 | 1136 | 0.07 | 0.07 | 1571 | 12.32 | Monoterp. alcohol |
| Camphor | 7.89 | 1145 | 12.31 | 12.70 | 1429 | 7.74* | Monoterp. ketone |
| Camphene hydrate | 8.03 | 1150 | 0.06 | 0.06 | 1525 | 10.56 | Monoterp. alcohol |
| Pinocarvone | 8.29 | 1159 | 0.09 | 0.07 | 1478 | 8.96 | Monoterp. ketone |
| Borneol | 8.59* | 1171 | 2.90 | 2.52 | 1620 | 14.55 | Monoterp. alcohol |
| δ -Terpineol | 8.59* | 1171 | [2.90] | 0.51 | 1601 | 13.53* | Monoterp. alcohol |
| Terpinen-4-ol | 8.81 | 1179 | 0.70 | 0.67 | 1528 | 10.67 | Monoterp. alcohol |
| <i>para</i> -Cymen-8-ol | 9.24 | 1193 | 0.04 | 0.03 | 1768 | 23.54 | Monoterp. alcohol |
| α -Terpineol | 9.43 | 1198 | 2.18 | 2.15 | 1624 | 14.79 | Monoterp. alcohol |
| Verbenone | 9.93 | 1209 | 0.10 | [0.51] | 1601 | 13.53* | Monoterp. ketone |
| Bornyl acetate | 13.09 | 1279 | 0.37 | 0.38 | 1505 | 9.78 | Monoterp. ester |
| α -Cubebene | 16.21 | 1330 | 0.01 | 0.02 | 1416 | 7.44 | Sesquiterpene |
| α -Ylangene | 17.45 | 1349 | 0.10 | 0.07 | 1422 | 7.59 | Sesquiterpene |
| α -Copaene | 17.91 | 1356 | 0.22 | [12.70] | 1429 | 7.74* | Sesquiterpene |

| | | | | | | | |
|---|-------|------|---------------|---------------|------|-------|---------------------|
| β -Caryophyllene | 20.86 | 1399 | 3.51 | 3.60 | 1518 | 10.28 | Sesquiterpene |
| α -Himachalene | 23.26 | 1428 | 0.02 | 0.02 | 1558 | 11.79 | Sesquiterpene |
| α -Humulene | 23.57 | 1432 | 0.34 | 0.36 | 1581 | 12.64 | Sesquiterpene |
| γ -Muuroleone | 25.63 | 1456 | 0.18 | 0.21 | 1607 | 13.86 | Sesquiterpene |
| α -Selinene | 27.04 | 1473 | 0.06 | 0.07 | 1628 | 15.01 | Sesquiterpene |
| α -Muuroleone | 27.77 | 1482 | 0.08 | 0.09 | 1641 | 15.68 | Sesquiterpene |
| γ -Cadinene | 28.80 | 1495 | 0.14 | 0.14 | 1664 | 16.93 | Sesquiterpene |
| β -Bisabolene | 29.06 | 1499 | 0.12 | 0.11 | 1653 | 16.36 | Sesquiterpene |
| δ -Cadinene | 29.49 | 1505 | 0.31 | 0.29 | 1670 | 17.27 | Sesquiterpene |
| <i>trans</i> -Calamenene | 29.80 | 1509 | 0.03 | 0.03 | 1730 | 20.95 | Sesquiterpene |
| <i>trans</i> -Cadina-1,4-diene | 30.37 | 1517 | 0.02 | 0.02 | 1694 | 18.51 | Sesquiterpene |
| α -Calacorene | 30.92 | 1524 | 0.02 | 0.03 | 1800 | 25.69 | Sesquiterpene |
| Caryophyllene oxide | 33.84 | 1565 | 0.08 | 0.06 | 1845 | 29.03 | Sesquiterp. ether |
| Humulene epoxide II | 35.48 | 1588 | 0.01 | 0.01 | 1897 | 32.78 | Sesquiterp. ether |
| Caryophylla-4(12),8(13)-dien-5 α -ol | 36.96 | 1621 | 0.01 | 0.02 | 2181 | 42.67 | Sesquiterp. alcohol |
| Total identified | | | 99.07% | 98.85% | | | |

*: 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 : 1.4660 ± 0.0003 (20 °C)

COMPLIANCE WITH ISO 1342:2000 (ROSMARINUS OFFICINALIS)

| Compound | % | ISO 1342:2000 | | | | Satisfied? |
|-------------------------|--------|----------------------|-------|------------|-------|-----------------|
| | | Morocco/Tunisia type | | Spain type | | |
| | | % min | % max | % min | % max | |
| α-Pinene | 13.1 | 9 | 14 | 18 | 26 | Morocco/Tunisia |
| Camphene | 4.1 | 2.5 | 6 | 8 | 13 | Morocco/Tunisia |
| β-Pinene | 4.5 | 4 | 9 | 2 | 5 | Yes |
| Myrcene | 1.3 | 1 | 2 | 2.5 | 4.5 | Morocco/Tunisia |
| Limonene | 47.2 | 1.5 | 4 | 2.5 | 5.5 | Morocco/Tunisia |
| 1,8-Cineole | | 38 | 55 | 17 | 25 | |
| para-Cymene | 1.5 | 0.5 | 2.5 | 1 | 2 | Yes |
| Camphor | 12.3 | 5 | 15 | 12.5 | 22 | Morocco/Tunisia |
| Bornyl acetate | 0.4 | 0.1 | 1.6 | 0.4 | 2.5 | Yes |
| α-Terpineol | 2.2 | 1 | 2.5 | 1 | 3.5 | Yes |
| Borneol | 2.5 | 1 | 5 | 2 | 4.5 | Yes |
| Verbenone | 0.1 | | 0.4 | 0.7 | 2.5 | Morocco/Tunisia |
| Refractive index | 1.4660 | 1.464 | 1.470 | 1.464 | 1.472 | Yes |

CONCLUSION

No adulterant, contaminant or diluent were detected using this method. The oil complies with the ISO norm for a Morocco/Tunisia rosemary oil.



