

GC/MS BATCH NUMBER: CC3100

ESSENTIAL OIL: CHAMOMILE ROMAN ORGANIC
BOTANICAL NAME: CHAMAEMELUM NOBILE
ORIGIN: HUNGARY

| KEY CONSTITUENTS PRESENT IN THIS BATCH OF CHAMOMILE ROMAN ORGANIC OIL | % |
|---|------|
| 3-METHYLAMYL ANGELATE | 14.3 |
| METHALLYL ANGELATE | 13.5 |
| α-PINENE | 9.4 |
| ISOAMYL ISOBUTYRATE | 9.0 |
| ISOBUTYL BUTYRATE | 8.5 |
| 3-METHYLAMYL ISOBUTYRATE | 6.8 |
| ISOAMYL ANGELATE | 5.7 |
| trans-PINOCARVEOL | 5.3 |
| 2-METHYLBUTYL ANGELATE | 4.9 |
| ISOBUTYL ANGELATE | 3.2 |
| PINOCARVONE | 2.1 |
| 2-METHYLBUTYL ISOBUTYRATE | 1.7 |
| 3-METHYLAMYL METHACRYLATE | 1.4 |
| ISOAMYL METHACRYLATE + 2- METHYLBUTYL METHACRYLATE | 1.1 |

Comments from Robert Tisserand: Light, apple-pear odor profile. High in classic Roman chamomile esters. No red flags.

Date : July 6, 2017

SAMPLE IDENTIFICATION

Internal code : 17G05-PTH5-1-DM

Customer identification : Organic Roman Chamomile - Hungary - CC3100610R

Type : Essential oil

Source : *Chamaemelum nobile*

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 : 2017-07-05

Checked and approved by :



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. | |
| Ethanol | 0.38 | 636 | 0.01 | 0.02 | 774 | 0.61 | Aliphatic alcohol |
| 2-Methylbutyral | 0.66 | 672 | 0.05 | | | | Aliphatic aldehyde |
| Isopropyl formate | 0.67 | 674 | 0.02 | | | | Aliphatic ester |
| Isoamyl alcohol | 1.13 | 735 | 0.17 | 11.48 | 1149 | 2.71* | Aliphatic alcohol |
| 2-Methylbutyl alcohol | 1.16 | 738 | 0.21 | [11.48] | 1149 | 2.71* | Aliphatic alcohol |
| Butyric acid | 1.58 | 793 | 0.14 | | | | Aliphatic acid |
| Hexanal | 1.72 | 807 | 0.03 | 0.03 | 1019 | 1.38 | Aliphatic aldehyde |
| Methyl angelate | 1.96 | 825 | 0.05 | 0.03 | 1051 | 1.69 | Aliphatic ester |
| Ethyl 2-methylbutyrate | 2.27 | 849 | 0.03 | 0.07 | 985 | 1.21 | Aliphatic ester |
| 3-Methylpentanol | 2.35 | 855 | 0.79 | 0.79 | 1267 | 4.30 | Aliphatic alcohol |
| cis-Hex-3-en-1-ol | 2.50 | 867 | 0.02 | 13.24 | 1320 | 5.06* | Aliphatic alcohol |
| Isoamyl acetate | 2.67 | 879 | 0.04 | 0.04 | 1068 | 1.84 | Aliphatic ester |
| 2-Methylbutyl acetate | 2.70* | 882 | 0.30 | 0.46 | 1060 | 1.77* | Aliphatic ester |
| Hexanol | 2.70* | 882 | [0.30] | 0.16 | 1297 | 4.72 | Aliphatic alcohol |
| Propyl methacrylate | 2.73 | 884 | 0.09 | [0.46] | 1060 | 1.77* | Aliphatic ester |
| Ethyl angelate? | 2.99 | 903 | 0.08 | | | | Aliphatic ester |
| Isobutyl isobutyrate | 3.25* | 919 | 0.54 | 0.48 | 1037 | 1.55 | Aliphatic ester |
| Tricyclene | 3.25* | 919 | [0.54] | 0.03 | 921 | 0.94 | Monoterpene |
| α-Pinene | 3.45 | 931 | 9.38 | 9.32 | 947 | 1.04 | Monoterpene |
| Prenyl acetate | 3.53 | 935 | 0.60 | 0.55 | 1193 | 3.28* | Aliphatic ester |
| Isobutyl methacrylate | 3.68 | 944 | 0.29 | 9.12 | 1110 | 2.24* | Aliphatic ester |
| Camphene | 3.72 | 947 | 0.48 | 0.48 | 1000 | 1.28 | Monoterpene |
| Thuja-2,4(10)-diene | 3.78 | 950 | 0.01 | [0.46] | 1060 | 1.77* | Monoterpene |
| Isobutyl butyrate | 3.99* | 963 | 9.43 | [9.12] | 1110 | 2.24* | Aliphatic ester |
| Methallyl methacrylate | 3.99* | 963 | [9.43] | 0.91 | 1197 | 3.34* | Aliphatic ester |
| Sabinene | 4.15 | 973 | 0.03 | [0.46] | 1060 | 1.77* | Monoterpene |
| β-Pinene | 4.22 | 976 | 0.31 | 0.25 | 1042 | 1.60 | Monoterpene |
| Isoamyl propionate | 4.26 | 979 | 0.03 | | | | Aliphatic ester |
| Methallyl isobutyrate | 4.45 | 990 | 0.52 | 0.51 | 1177 | 3.08 | Aliphatic ester |
| Myrcene | 4.49 | 993 | 0.03 | [9.12] | 1110 | 2.24* | Monoterpene |
| Propyl angelate | 4.63 | 1001 | 0.63 | [0.91] | 1197 | 3.34* | Aliphatic ester |
| Isobutyl 2-methylbutyrate | 4.77 | 1008 | 0.07 | 0.06 | 1140 | 2.60* | Aliphatic ester |
| Isoamyl isobutyrate | 4.99 | 1020 | 8.94 | [11.48] | 1149 | 2.71* | Aliphatic ester |
| 2-Methylbutyl isobutyrate | 5.03 | 1023 | 1.67 | [11.48] | 1149 | 2.71* | Aliphatic ester |
| para-Cymene | 5.15 | 1030 | 0.07 | 0.09 | 1208 | 3.48 | Monoterpene |
| Limonene | 5.19 | 1031 | 0.04 | [0.06] | 1140 | 2.60* | Monoterpene |
| β-Phellandrene | 5.22 | 1033 | 0.09 | [11.48] | 1149 | 2.71* | Monoterpene |
| 1,8-Cineole | 5.25 | 1035 | 0.12 | [11.48] | 1149 | 2.71* | Monoterp. ether |
| Isoamyl methacrylate + 2-Methylbutyl methacrylate | 5.49 | 1048 | 1.09 | 1.14 | 1223 | 3.65 | Aliphatic ester |
| Isobutyl angelate | 5.68 | 1058 | 3.20 | 3.46 | 1236 | 3.85* | Aliphatic ester |

| | | | | | | | |
|--|-------|------|---------------|---------------|------|--------|--------------------|
| γ-Terpinene | 5.71 | 1060 | 0.07 | [0.55] | 1193 | 3.28* | Monoterpene |
| Prenyl isobutyrate | 5.78 | 1064 | 0.11 | 7.14 | 1260 | 4.20* | Aliphatic ester |
| Methallyl angelate | 5.99 | 1075 | 13.47 | [13.24] | 1320 | 5.06* | Aliphatic ester |
| 3-Methylamyl propionate? | 6.11 | 1082 | 0.31 | 0.33 | 1249 | 4.04 | Aliphatic ester |
| Butyl angelate | 6.40 | 1097 | 0.27 | 0.30 | 1290 | 4.63* | Aliphatic ester |
| Isobutyl tiglate | 6.46 | 1101 | 0.03 | [0.30] | 1290 | 4.63* | Aliphatic ester |
| Isoamyl 2-methylbutyrate | 6.57 | 1105 | 0.16 | [3.46] | 1236 | 3.85* | Aliphatic ester |
| 2-Methylbutyl 2-methylbutyrate | 6.64 | 1107 | 0.14 | [3.46] | 1236 | 3.85* | Aliphatic ester |
| α-Thujone | 6.79 | 1113 | 0.03 | 0.05 | 1359 | 5.66 | Monoterp. ketone |
| Methallyl tiglate? | 6.87 | 1115 | 0.18 | 0.16 | 1386 | 6.07 | Aliphatic ester |
| 3-Methylamyl isobutyrate | 6.97* | 1119 | 6.86 | [7.14] | 1260 | 4.20* | Aliphatic ester |
| β-Thujone | 6.97* | 1119 | [6.86] | 0.04 | 1373 | 5.87 | Monoterp. ketone |
| α-Campholenal | 7.24 | 1129 | 0.02 | | | | Monoterp. aldehyde |
| trans-Pinocarveol | 7.68 | 1145 | 5.25 | 5.11 | 1565 | 10.24 | Monoterp. alcohol |
| 3-Methylamyl methacrylate | 7.71 | 1146 | 1.42 | 1.26 | 1335 | 5.27 | Aliphatic ester |
| Isoamyl angelate | 7.83 | 1151 | 5.68 | 5.55 | 1340 | 5.36 | Aliphatic ester |
| 2-Methylbutyl angelate | 7.94 | 1155 | 4.94 | 6.22 | 1344 | 5.43 | Aliphatic ester |
| Camphene hydrate | 8.07 | 1160 | 0.13 | 0.12 | 1522 | 8.88* | Monoterp. alcohol |
| <i>C. nobile</i> biomarker | 8.17 | 1163 | 0.60 | 0.59 | 1404 | 6.35 | Aliphatic ester |
| Isoborneol | 8.25* | 1166 | 2.31 | 0.12 | 1593 | 11.26 | Monoterp. alcohol |
| Pinocarvone | 8.25* | 1166 | [2.31] | 2.13 | 1469 | 7.65 | Monoterp. ketone |
| Borneol | 8.63 | 1180 | 0.19 | 0.24 | 1607 | 11.77* | Monoterp. alcohol |
| Terpinen-4-ol | 8.81 | 1187 | 0.03 | [0.12] | 1522 | 8.88* | Monoterp. alcohol |
| Isobutyl 3-hydroxy-2-methylenebutyrate | 9.05 | 1195 | 0.05 | 0.06 | 1705 | 16.27 | Aliphatic ester |
| Prenyl angelate | 9.33 | 1203 | 0.75 | 14.41 | 1450 | 7.22* | Aliphatic ester |
| Myrtenol | 9.45 | 1206 | 0.33 | 0.33 | 1700 | 16.00 | Monoterp. alcohol |
| Myrtenal | 9.51* | 1207 | 0.89 | 0.72 | 1530 | 9.07 | Monoterp. aldehyde |
| α-Terpineol | 9.51* | 1207 | [0.89] | 0.16 | 1612 | 11.97 | Monoterp. alcohol |
| Verbenone | 9.81 | 1214 | 0.06 | [0.24] | 1607 | 11.77* | Monoterp. ketone |
| 2-Hydroxy-2-methylbut-3-enyl 2-methyl-(2Z)-butenoate + 3-Methylamyl angelate | 11.35 | 1248 | 0.02 | 0.01 | 1436 | 6.86 | Aliphatic esters |
| 3-Methylamyl angelate | 11.72 | 1256 | 14.29 | [14.41] | 1450 | 7.22* | Aliphatic ester |
| Isoamyl 3-hydroxy-2-methylenebutyrate | 13.53 | 1297 | 0.07 | 0.07 | 1819 | 23.06 | Aliphatic ester |
| 3-Methylamyl tiglate | 14.06 | 1306 | 0.06 | 0.13 | 1514 | 8.72 | Aliphatic ester |
| Myrtenyl isobutyrate? | 24.57 | 1452 | 0.05 | 0.07 | 1655 | 13.71 | Aliphatic ester |
| Germacrene D | 25.65 | 1465 | 0.02 | [0.24] | 1607 | 11.77* | Sesquiterpene |
| Total identified | | | 98.39% | 98.04% | | | |

*: 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

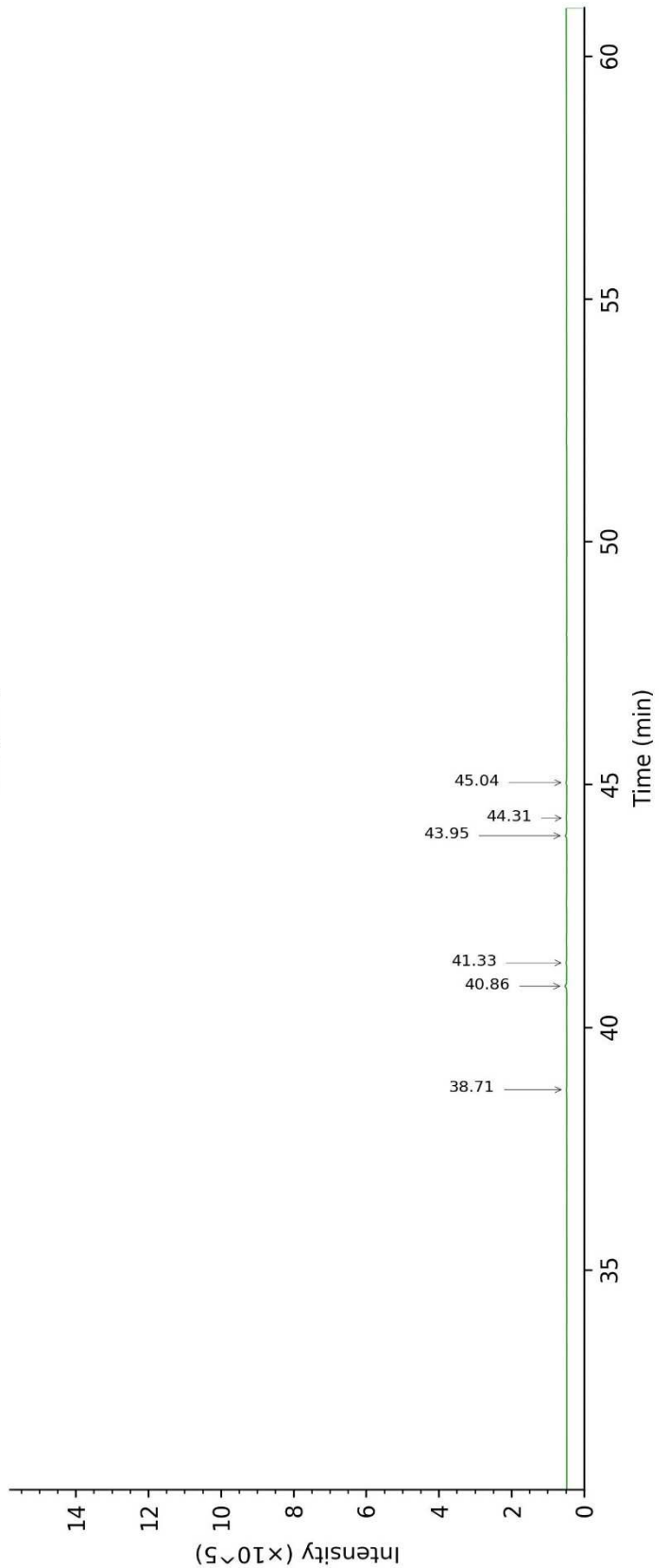
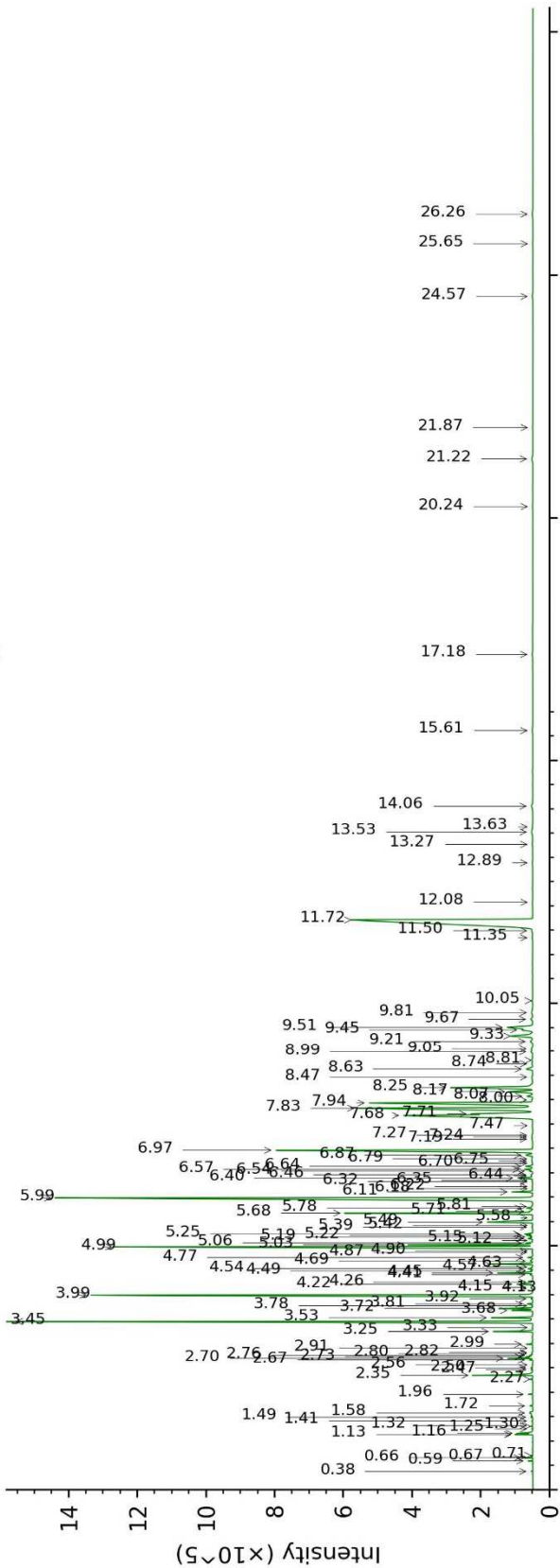
Physical aspect : Clear liquid

Refractive index : 1.4373 ± 0.0003 (20 °C)

CONCLUSION

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

17G05-PTH5-1-DM_BP5



17G05-PTH5-1-DM_WAX

