

Fir, Douglas Essential Oil

Laboratoire
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SAMPLE IDENTIFICATION

Internal code : 17B16-FSE3-1-DM

Customer identification : Douglas Fir - Lot #99GD1213514B

Type : Essential oil

Source : *Pseudotsuga menziesii*

Customer : Flowers Shining Everywhere Inc.



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 : 2017-02-21

Checked and approved by :



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



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IDENTIFIED COMPOUNDS

| Identification | Column: BPS | | | Column: WAX | | | Molecular Class |
|----------------------------|-------------|------|---------|-------------|------|--------|--------------------|
| | R.T. | R.I. | % | % | R.I. | R.T. | |
| Ethyl 2-methylbutyrate | 2.34 | 846 | 0.03 | 0.05 | 989 | 1.51 | Aliphatic ester |
| cis-Hex-3-en-1-ol | 2.51 | 860 | 0.12 | 0.13 | 1326 | 5.78 | Aliphatic alcohol |
| Santene | 2.70 | 874 | 0.01 | 0.01 | 898 | 1.02 | Monoterpene |
| Tricyclene | 3.31 | 914 | 0.05 | 0.05 | 931 | 1.16 | Monoterpene |
| α -Thujene | 3.39 | 919 | 0.88 | 1.01 | 966 | 1.32 | Monoterpene |
| α -Pinene | 3.79 | 943 | 9.08 | 8.93 | 959 | 1.29 | Monoterpene |
| Camphene | 3.79 | 943 | 0.43 | 0.40 | 998 | 1.58 | Monoterpene |
| Sabinene | 4.25 | 971 | 14.17 | 14.10 | 1065 | 2.19 | Monoterpene |
| β -Pinene | 4.34 | 975 | 22.41 | 22.33 | 1047 | 2.02 | Monoterpene |
| Myrcene | 4.56 | 989 | 2.03 | 2.01 | 1119 | 2.74 | Monoterpene |
| Δ^3 -Carene | 4.87* | 1006 | 11.12 | 10.91 | 1101 | 2.50 | Monoterpene |
| α -Phellandrene | 4.87* | 1006 | [11.12] | 0.20 | 1112 | 2.65 | Monoterpene |
| α -Terpinene | 5.02 | 1014 | 2.15 | 2.11 | 1126 | 2.84 | Monoterpene |
| para-Cymene | 5.20 | 1024 | 0.79 | 0.79 | 1211 | 4.00 | Monoterpene |
| Limonene | 5.25 | 1027 | 1.93 | 1.89 | 1144 | 3.08 | Monoterpene |
| β -Phellandrene | 5.28 | 1028 | 1.42 | 1.48 | 1150 | 3.16* | Monoterpene |
| 1,8-Cineole | 5.33 | 1030 | 0.11 | 0.11 | 1150 | 3.16* | Monoterp. ether |
| cis- β -Ocimene | 5.42 | 1036 | 0.11 | 3.78 | 1193 | 3.73* | Monoterpene |
| trans- β -Ocimene | 5.60 | 1046 | 0.48 | 0.46 | 1204 | 3.90 | Monoterpene |
| γ -Terpinene | 5.80 | 1057 | 3.68 | [3.78] | 1193 | 3.73* | Monoterpene |
| cis-Sabinene hydrate | 6.09 | 1073 | 0.09 | 0.08 | 1414 | 7.38 | Monoterp. alcohol |
| Isoterpinolene | 6.19 | 1078 | 0.02 | 0.02 | 1218 | 4.28 | Monoterpene |
| Terpinolene | 6.32 | 1085 | 13.30 | 13.29 | 1229 | 4.28 | Monoterpene |
| para-Cymenene | 6.46 | 1093 | 0.21 | 0.20 | 1368 | 6.45 | Monoterpene |
| Linalool | 6.70 | 1101 | 0.10 | 0.31 | 1496 | 9.44* | Monoterp. alcohol |
| endo-Fenchol | 7.24 | 1121 | 0.19 | 4.55 | 1527 | 10.64* | Monoterp. alcohol |
| cis-para-Menth-2-en-1-ol | 7.40 | 1127 | 0.05 | [0.31] | 1496 | 9.44* | Monoterp. alcohol |
| Methyloctanoate | 7.47 | 1130 | 0.01 | 0.02 | 1295 | 5.27 | Aliphatic ester |
| trans-Pinocarveol | 7.71 | 1138 | 0.05 | 0.03 | 1568 | 12.20 | Monoterp. alcohol |
| trans-para-Menth-2-en-1-ol | 7.75 | 1140 | 0.11 | 0.17 | 1555 | 11.67 | Monoterp. alcohol |
| Camphene hydrate | 8.06 | 1151 | 0.11 | 0.11 | 1522 | 10.42 | Monoterp. alcohol |
| Citronellal | 8.10 | 1153 | 0.01 | 0.01 | 1426 | 7.68 | Monoterp. aldehyde |
| Borneol | 8.63 | 1172 | 0.04 | 0.47 | 1615 | 14.31* | Monoterp. alcohol |
| Terpinen-4-ol | 8.88 | 1181 | 4.56 | [4.55] | 1527 | 10.64* | Monoterp. alcohol |
| Ethyl octanoate | 9.23 | 1193 | 0.02 | | | | Aliphatic ester |
| para-Cymen-8-ol | 9.26 | 1194 | 0.18 | 0.16 | 1765 | 23.33 | Monoterp. alcohol |
| α -Terpineol | 9.45 | 1198 | 0.48 | 0.47 | 1621 | 14.63 | Monoterp. alcohol |
| trans-Piperitol | 9.95 | 1209 | 0.07 | 0.05 | 1663 | 16.88 | Monoterp. alcohol |
| Nerol | 10.71 | 1226 | 0.05 | 0.05 | 1726 | 20.71 | Monoterp. alcohol |
| Citronellol | 10.84 | 1229 | 1.38 | 1.41 | 1707 | 19.36 | Monoterp. alcohol |

| | | | | | | | |
|--------------------------|-------|------|---------------|---------------|------|--------|---------------------|
| Geraniol | 11.88 | 1252 | 0.15 | 0.12 | 1781 | 24.32 | Monoterp. alcohol |
| Bornyl acetate | 13.13 | 1280 | 0.18 | 0.17 | 1503 | 9.71 | Monoterp. ester |
| trans-Pinocarvyl acetate | 13.52 | 1288 | 0.04 | 0.04 | 1545 | 11.82 | Monoterp. ester |
| Methyl decanoate | 16.08 | 1328 | 0.14 | | | | Aliphatic ester |
| Citronellyl acetate | 17.56 | 1351 | 2.75 | 2.90 | 1602 | 13.61 | Monoterp. ester |
| β-Elemene | 19.15 | 1375 | 0.05 | 0.06 | 1518 | 10.27 | Sesquiterpene |
| Geranyl acetate | 19.63 | 1382 | 1.09 | 1.09 | 1691 | 18.30 | Monoterp. ester |
| Sibirene | 19.81 | 1385 | 0.10 | 0.08 | 1478 | 8.97 | Sesquiterpene |
| Longifolene | 19.90 | 1386 | 0.11 | [0.31] | 1496 | 9.44* | Sesquiterpene |
| Ethyl decanoate | 20.84 | 1399 | 0.08 | | | | Aliphatic ester |
| β-Caryophyllene | 20.92 | 1400 | 0.10 | 0.10 | 1514 | 10.13 | Sesquiterpene |
| trans-α-Bergamotene | 22.46 | 1418 | 0.05 | 0.07 | 1531 | 10.79 | Sesquiterpene |
| 6,9-Guadiene | 22.87 | 1423 | 0.04 | 0.03 | 1535 | 10.93 | Sesquiterpene |
| α-Humulene | 23.62 | 1432 | 0.17 | 0.16 | 1578 | 12.55 | Sesquiterpene |
| Germacrene D | 25.84 | 1459 | 0.34 | [0.47] | 1615 | 14.31* | Sesquiterpene |
| α-Muurolene | 28.00 | 1485 | 0.06 | 0.04 | 1651 | 16.21 | Sesquiterpene |
| γ-Cadinene | 28.92 | 1497 | 0.05 | 0.07 | 1657 | 16.56 | Sesquiterpene |
| δ-Cadinene | 29.54 | 1505 | 0.12 | 0.17 | 1668 | 17.14 | Sesquiterpene |
| trans-α-Bisabolene | 32.09 | 1541 | 0.11 | 0.09 | 1701 | 18.96 | Sesquiterpene |
| Selin-6-en-4α-ol? | 36.45 | 1609 | 0.17 | 0.18 | 2052 | 39.05 | Sesquiterp. alcohol |
| Isospathulenol | 36.90 | 1620 | 0.06 | 0.05 | 2151 | 41.91 | Sesquiterp. alcohol |
| α-Cadinol | 38.08 | 1649 | 0.02 | 0.02 | 2122 | 41.14 | Sesquiterp. alcohol |
| Cembrene | 45.93 | 1899 | 0.05 | | | | Diterpene |
| cis-Abienol | 51.50 | 2135 | 0.29 | 0.29 | 2662 | 52.76 | Diterp. alcohol |
| Total identified | | | 98.25% | 97.77% | | | |

*: 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: Faindy yellow liquid

Refractive index: 1.4735 ± 0.0003 (20 °C)

CONCLUSION

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



