

GC/MS BATCH NUMBER: C61101

ESSENTIAL OIL: CEDRUS ATLANTICA
BOTANICAL NAME: CEDRUS ATLANTICA
ORIGIN: MOROCCO

| KEY CONSTITUENTS PRESENT IN THIS BATCH OF CEDARWOOD ATLAS OIL | % |
|---------------------------------------------------------------|------|
| β -HIMACHALENE | 37.4 |
| α -HIMACHALENE | 15.0 |
| γ -HIMACHALENE | 8.8 |
| (E)- α -ATLANTONE | 7.9 |
| (E)- γ -ATLANTONE | 3.0 |
| (Z)- γ -ATLANTONE | 2.8 |
| (Z)- α -ATLANTONE | 1.8 |
| 11-AH-HIMACHALA-1,4-DIENE | 1.7 |
| γ -DEHYDRO-AR-HIMACHALENE | 1.3 |
| VESTITENONE | 1.2 |
| trans- α -BISABOLENE | 1.2 |
| LIMONA KETONE | 1.1 |

Comments from Robert Tisserand: Good odor profile, and constituents in expected amounts. Recommended. 2nd test - virtually identical.

Date : December 14, 2016

SAMPLE IDENTIFICATION

Internal code : 16L01-PTH12-1-DM

Customer identification : Cedarwood atlas - C6110166R

Type : Essential oil

Source : *Cedrus Atlantica*

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 : 2016-12-12

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. | |
| Mesityl oxide | 1.64 | 798 | 0.04 | 0.03 | 1051 | 1.46 | Aliphatic ketone |
| α -Pinene | 3.36 | 925 | 0.03 | 0.02 | 940 | 0.83 | Monoterpene |
| β -Pinene | 4.14 | 972 | tr | tr | 1033 | 1.32 | Monoterpene |
| Limonene | 5.10 | 1027 | 0.02 | 0.02 | 1134 | 2.20 | Monoterpene |
| Terpinolene | 6.13 | 1083 | 0.01 | 0.01 | 1217 | 3.18 | Monoterpene |
| para-Cymenene | 6.35 | 1096 | 0.02 | 0.02 | 1360 | 5.18 | Monoterpene |
| Limona ketone | 7.37 | 1134 | 1.14 | 1.19 | 1457 | 6.74 | Simple phenolic |
| Unknown (m/z = 93, 91 (34), 79 (32), 107 (29), 122 (27)...)) | 8.11 | 1161 | 0.07 | | | | |
| para-Methylacetophenone | 9.08 | 1197 | 0.16 | 0.17 | 1656 | 12.39 | Simple phenolic |
| α -Terpineol | 9.39 | 1204 | 0.05 | 38.53 | 1641 | 11.70* | Monoterp. alcohol |
| α -Longipinene | 15.60 | 1328 | 0.09 | 0.10 | 1407 | 5.86 | Sesquiterpene |
| α -Ylangene | 16.97 | 1349 | 0.04 | 0.04 | 1426 | 6.17 | Sesquiterpene |
| Longicyclene | 17.22 | 1353 | 0.02 | 0.03 | 1437 | 6.37 | Sesquiterpene |
| α -Copaene | 17.42 | 1356 | 0.01 | 0.01 | 1433 | 6.30 | Sesquiterpene |
| Unknown (m/z = 131, 146 (36), 91 (20), 202 (19), 145 (16), 159 (14)) | 18.46 | 1372 | 0.25 | | | | Sesquiterpene |
| Sibirene | 19.28 | 1384 | 0.12 | 0.09 | 1479 | 7.15 | Sesquiterpene |
| Longifolene | 19.39 | 1386 | 0.60 | 0.67 | 1484 | 7.25 | Sesquiterpene |
| Himachala-2,4-diene | 20.89 | 1406 | 0.62 | 0.64 | 1529 | 8.20 | Sesquiterpene |
| <i>trans</i> - α -Bergamotene | 21.43 | 1413 | 0.20 | 0.13 | 1519 | 7.91 | Sesquiterpene |
| Unknown (m/z = 105, 93 (59), 43 (52), 120 (49), 91 (49), 145 (43)... 204 (2)) | 21.96 | 1419 | 0.43 | | | | Sesquiterpene |
| α -Himachalene | 22.87 | 1430 | 15.00 | 15.11 | 1561 | 9.11 | Sesquiterpene |
| Vestitenone | 23.72 | 1440 | 1.24 | | | | Terpenic ketone |
| Unknown (m/z = 131, 105 (87), 119 (86), 91 (83), 159 (63), 187 (61), 202 (59)) | 24.44 | 1449 | 1.26 | 0.75 | 1643 | 11.81 | Sesquiterpene |
| γ -Himachalene | 25.28 | 1459 | 8.80 | 10.58 | 1611 | 10.60* | Sesquiterpene |
| 11- α H-Himachala-1,4-diene | 25.55 | 1462 | 1.69 | [10.58] | 1611 | 10.60* | Sesquiterpene |
| β -Himachalene | 27.65 | 1487 | 37.36 | [38.53] | 1641 | 11.70* | Sesquiterpene |
| <i>cis</i> - α -Bisabolene | 27.77 | 1488 | 0.15 | 0.28 | 1649 | 12.11 | Sesquiterpene |
| α -Dehydro-ar-himachalene | 28.43 | 1496 | 0.56 | 0.50 | 1751 | 16.89 | Sesquiterpene |
| γ -Dehydro-ar-himachalene | 29.54 | 1512 | 1.25 | 1.04 | 1806 | 20.03 | Sesquiterpene |
| Unknown (m/z = 187, 145 (91), 131 (64), 202 (42)) | 30.28 | 1522 | 0.31 | | | | Sesquiterpene |
| α -Calacorene | 31.07 | 1533 | 0.12 | 0.12 | 1798 | 19.57 | Sesquiterpene |
| <i>trans</i> - α -Bisabolene | 31.68 | 1541 | 1.16 | 1.12 | 1708 | 14.67 | Sesquiterpene |

| | | | | | | | |
|--------------------------------------------------------------|--------|------|---------------|---------------|------|--------|------------------------|
| Unknown (m/z = 96, 95 (16), 91 (110), 41 (10)... 202? (3)) | 33.04 | 1560 | 0.14 | | | | |
| Himachalene oxide | 33.32 | 1563 | 0.27 | 0.24 | 1851 | 22.80 | Sesquiterp. ether |
| (E)-Nerolidol | 33.79 | 1570 | 0.09 | 0.09 | 1988 | 31.66 | Sesquiterp. alcohol |
| Unknown (m/z = 96, 95 (16), 91 (110), 41 (10)... 202? (3)) | 33.94 | 1572 | 0.19 | | | | |
| Longiborneol | 35.05 | 1587 | 0.29 | 0.37 | 2025 | 33.85 | Sesquiterp. alcohol |
| β-Himachalene oxide | 35.51 | 1593 | 0.34 | 0.27 | 1879 | 24.72 | Sesquiterp. ether |
| Unknown (m/z = 138, 110 (77), 137 (72), 41 (71)... 220 (29)) | 35.71 | 1598 | 0.62 | | | | Oxygenated sesquiterp. |
| 1-epi-Cubenol | 36.53 | 1618 | 0.16 | 0.11 | 1972 | 30.79 | Sesquiterp. alcohol |
| Cubenol | 36.77 | 1623 | 0.13 | 0.12 | 1936 | 28.66 | Sesquiterp. alcohol |
| Himachalol | 37.65 | 1645 | 0.61 | 0.77 | 2104 | 37.04 | Sesquiterp. alcohol |
| Allohimachalol | 38.19 | 1658 | 0.87 | 0.83 | 2120 | 37.57 | Sesquiterp. alcohol |
| (E)-10,11-Dihydroatlantone | 38.64* | 1669 | 1.22 | 0.56 | 2040 | 34.71 | Sesquiterp. ketone |
| β-Atlantone | 38.64* | 1669 | [1.22] | 0.50 | 2054 | 35.35 | Sesquiterp. ketone |
| (Z)-γ-Atlantone | 39.37 | 1685 | 2.75 | 3.24 | 2085 | 36.40* | Sesquiterp. ketone |
| Deodarone | 39.57 | 1690 | 0.98 | [3.24] | 2085 | 36.40* | Sesquiterp. ketone |
| Deodarone analog? | 39.66 | 1692 | 0.93 | 0.98 | 2097 | 36.79 | Sesquiterp. ketone |
| (E)-γ-Atlantone | 39.87 | 1699 | 3.04 | 3.10 | 2109 | 37.23 | Sesquiterp. ketone |
| (Z)-α-Atlantone | 40.54 | 1720 | 1.75 | 1.78 | 2139 | 38.21 | Sesquiterp. ketone |
| (E)-α-Atlantone | 42.45 | 1780 | 7.94 | 7.89 | 2212 | 40.22 | Sesquiterp. ketone |
| Nootkatone | 42.94 | 1795 | 0.27 | 0.26 | 2355 | 43.58 | Sesquiterp. ketone |
| Total identified | | | 92.14% | 91.56% | | | |

*: 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

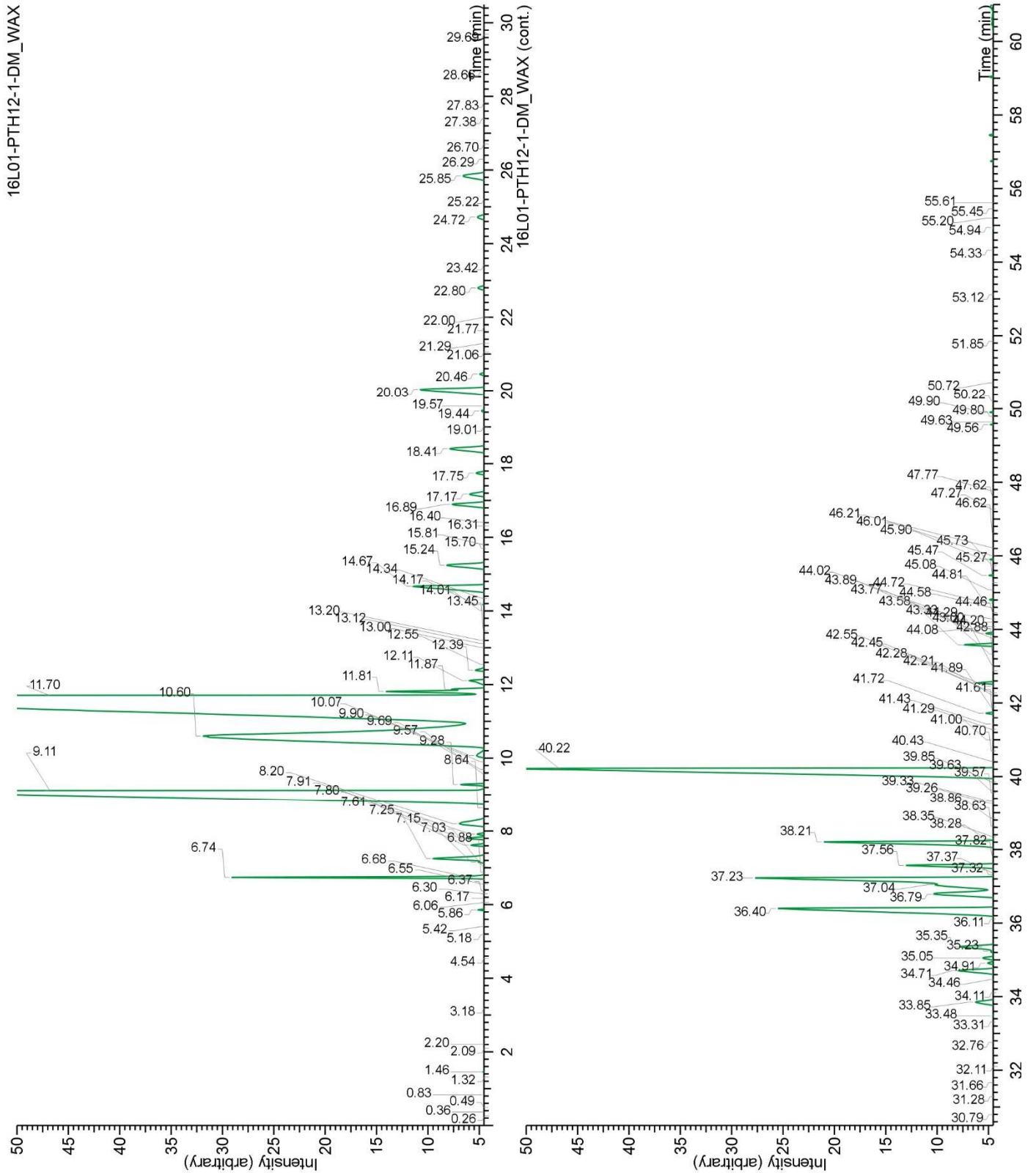
OTHER DATA

Physical aspect : Yellow liquid

Refractive index : 1.5120 ± 0.0003 (20 °C)

CONCLUSION

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



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