

Date : March 21, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19C14-MPE02-1-SCC

Customer identification : Clary Sage - France - AB870070.02 - 103

Type : Essential oil

Source : *Salvia sclarea*

Customer : My Pure Earth Pte Ltd

ANALYSIS

Method: PC-PA-014-17J19 - Analysis of the composition of an essential oil, or other volatile liquid, by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Sylvain Mercier, M. Sc., Chimiste

Analysis date : March 15, 2019

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid
Refractive index: 1.4568 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

ANALYSIS SUMMARY

| Identification | DB-5 (%) | DB-WAX (%) | Classe |
|---------------------------------------|----------|------------|----------------------|
| Isovaleral | 0.02 | 0.02 | Aliphatic aldehyde |
| 2-Methylbutyral | 0.01 | 0.01 | Aliphatic aldehyde |
| Isoamyl alcohol | 0.01 | 0.01* | Aliphatic alcohol |
| 2-Methylbutanol | 0.01 | [0.01]* | Aliphatic alcohol |
| Toluene | tr | tr | Simple phenolic |
| Hexanal | tr | 0.01 | Aliphatic aldehyde |
| (2E)-Hexenal | 0.02 | 0.06* | Aliphatic aldehyde |
| (3Z)-Hexenol | 0.03 | 0.03* | Aliphatic alcohol |
| (2E)-Hexenol | 0.04 | 0.04 | Aliphatic alcohol |
| Hexanol | 0.03 | 0.03 | Aliphatic alcohol |
| α -Thujene | 0.01 | tr | Monoterpene |
| α -Pinene | 0.13 | 0.13 | Monoterpene |
| Camphene | 0.03 | 0.03 | Monoterpene |
| Benzaldehyde | 0.01 | 0.01 | Simple phenolic |
| β -Pinene | 0.15* | 0.12 | Monoterpene |
| Sabinene | [0.15]* | 0.03 | Monoterpene |
| Octen-3-ol | 0.04 | 0.06 | Aliphatic alcohol |
| Octan-3-one | 0.01 | 0.40* | Aliphatic ketone |
| Myrcene | 0.58* | 0.54 | Monoterpene |
| <i>trans</i> -Dehydroxylinalool oxide | [0.58]* | [0.06]* | Monoterpenic ether |
| <i>cis</i> -Dehydroxylinalool oxide | 0.04 | 0.04 | Monoterpenic ether |
| α -Terpinene | 0.01 | 0.01 | Monoterpene |
| para-Cymene | 0.03 | 0.02 | Monoterpene |
| Limonene | 0.23* | 0.22 | Monoterpene |
| β -Phellandrene | [0.23]* | 0.02* | Monoterpene |
| 1,8-Cineole | [0.23]* | [0.02]* | Monoterpenic ether |
| (Z)- β -Ocimene | 0.25 | 0.25 | Monoterpene |
| (E)- β -Ocimene | 0.40 | [0.40]* | Monoterpene |
| γ -Terpinene | 0.03 | 0.02 | Monoterpene |
| <i>cis</i> -Sabinene hydrate | 0.01 | 0.01* | Monoterpenic alcohol |
| <i>cis</i> -Linalool oxide (fur.) | 0.02 | 0.02 | Monoterpenic alcohol |
| Terpinolene | 0.10* | 0.09 | Monoterpene |
| <i>trans</i> -Linalool oxide (fur.) | [0.10]* | [0.01]* | Monoterpenic alcohol |
| Linalool | 15.77 | 82.02* | Monoterpenic alcohol |
| Hotrienol | [15.77] | 0.03 | Monoterpenic alcohol |
| <i>trans</i> -Pinocarveol | 0.01 | 0.01 | Monoterpenic alcohol |
| neo-allo-Ocimene | 0.01 | [0.03]* | Monoterpene |
| Nerol oxide | 0.02 | 0.02 | Aliphatic ether |
| Borneol | 0.03 | 1.35* | Monoterpenic alcohol |
| δ -Terpineol | 0.04 | 0.03 | Monoterpenic alcohol |
| Terpinen-4-ol | 0.03 | 0.03 | Monoterpenic alcohol |
| α -Terpineol | 1.23 | [1.35]* | Monoterpenic alcohol |
| Hodiendiol | 0.02 | 0.02 | Monoterpenic alcohol |
| Unknown | 0.03 | | Unknown |
| Linalyl formate | 0.69 | 0.72 | Monoterpenic ester |
| Nerol | 0.26 | 0.36 | Monoterpenic alcohol |
| Unknown | 0.04 | | Unknown |
| Unknown | 0.01 | | Monoterpenic ester |

| | | | |
|----------------------------|----------|----------|------------------------|
| Geraniol | 67.79* | 0.89 | Monoterpenic alcohol |
| Linalyl acetate | [67.79]* | [82.02] | Monoterpenic ester |
| Unknown | 0.02 | | Unknown |
| Neryl formate | 0.03* | 0.02 | Monoterpenic ester |
| Bornyl acetate | [0.03]* | 0.02 | Monoterpenic ester |
| Unknown | 0.03 | | Unknown |
| Geranyl formate | 0.07 | 0.10 | Monoterpenic ester |
| δ-Elemene | 0.02 | 0.02 | Sesquiterpene |
| Hodiendiol derivative | 0.10 | 0.10 | Oxygenated monoterpene |
| α-Terpinyl acetate | 0.07* | 0.03 | Monoterpenic ester |
| α-Cubebene | [0.07]* | 0.04 | Sesquiterpene |
| Unknown | 0.05* | | Monoterpenic ester |
| Unknown | [0.05]* | 0.03 | Oxygenated monoterpene |
| Unknown | 0.06 | 0.04 | Oxygenated monoterpene |
| Neryl acetate | 0.48 | 0.48 | Monoterpenic ester |
| α-Copaene | 0.63 | 0.63 | Sesquiterpene |
| (Z)-8-Hydroxylinalool? | 0.01 | 0.03 | Monoterpenic alcohol |
| β-Bourbonene | 0.17* | 0.15 | Sesquiterpene |
| 1,5-diepi-β-Bourbonene | [0.17]* | 0.01 | Sesquiterpene |
| Geranyl acetate | 0.79 | 0.81 | Monoterpenic ester |
| β-Cubebene | 0.15 | 0.15 | Sesquiterpene |
| β-Elemene | 0.09 | 1.58* | Sesquiterpene |
| Isocaryophyllene | 0.02 | [82.02]* | Sesquiterpene |
| β-Caryophyllene | 1.65 | [1.58]* | Sesquiterpene |
| β-Copaene | 0.05* | 0.04 | Sesquiterpene |
| Coumarin | [0.05]* | 0.02 | Coumarin |
| trans-α-Bergamotene | 0.03 | [1.58]* | Sesquiterpene |
| α-Humulene | 0.08 | 0.08 | Sesquiterpene |
| 9-epi-β-Caryophyllene | 0.03 | 0.02 | Sesquiterpene |
| Germacrene D | 3.51* | 3.45 | Sesquiterpene |
| α-Amorphene | [3.51]* | 0.04 | Sesquiterpene |
| β-Selinene | 0.06 | 0.05 | Sesquiterpene |
| Hodiendiol derivative IV | 0.23 | | Oxygenated monoterpene |
| Bicyclgermacrene | 0.46 | 0.41* | Sesquiterpene |
| α-Murolene | 0.04 | [0.41]* | Sesquiterpene |
| (Z)-α-Bisabolene | 0.07 | 0.09 | Sesquiterpene |
| Hodiendiol derivative II | 0.05 | 0.26* | Oxygenated monoterpene |
| β-Bisabolene | 0.19* | 0.03 | Sesquiterpene |
| γ-Cadinene | [0.19]* | 0.18 | Sesquiterpene |
| δ-Cadinene | 0.19* | 0.18 | Sesquiterpene |
| trans-Calamenene | [0.19]* | 0.02 | Sesquiterpene |
| β-Sesquiphellandrene | [0.19]* | 0.01 | Sesquiterpene |
| 1,5-Epoxysalvial-4(14)-ene | 0.03 | 0.03 | Sesquiterpenic ether |
| Spathulenol | 0.11 | 0.16 | Sesquiterpenic alcohol |
| Caryophyllene oxide isomer | 0.16* | 0.02 | Sesquiterpenic ether |
| Caryophyllene oxide | [0.16]* | [0.26]* | Sesquiterpenic ether |
| Salvial-4(14)-en-1-one | 0.04 | 0.03 | Aliphatic alcohol |
| Guaiol | 0.03 | 0.01 | Sesquiterpenic alcohol |
| Unknown | 0.10 | | Unknown |
| τ-Cadinol | 0.02 | 0.01 | Sesquiterpenic alcohol |
| β-Eudesmol | 0.07 | 0.05 | Sesquiterpenic alcohol |
| α-Eudesmol | 0.04 | 0.10 | Sesquiterpenic alcohol |

| | | | |
|-------------------------|---------------|---------------|------------------------|
| α -Cadinol | 0.01 | 0.02 | Sesquiterpenic alcohol |
| Bulnesol | 0.02 | 0.03 | Sesquiterpenic alcohol |
| Phytone | 0.02 | 0.02 | Terpenic ketone |
| Sclareoloxide | 0.10 | | Terpenic ether |
| Geranyl-para-cymene | 0.03 | 0.04 | Diterpene |
| Manool | 0.03 | 0.03 | Diterpenic alcohol |
| Sclareol | 0.41 | 0.40 | Diterpenic alcohol |
| Total identified | 98.56% | 97.73% | |

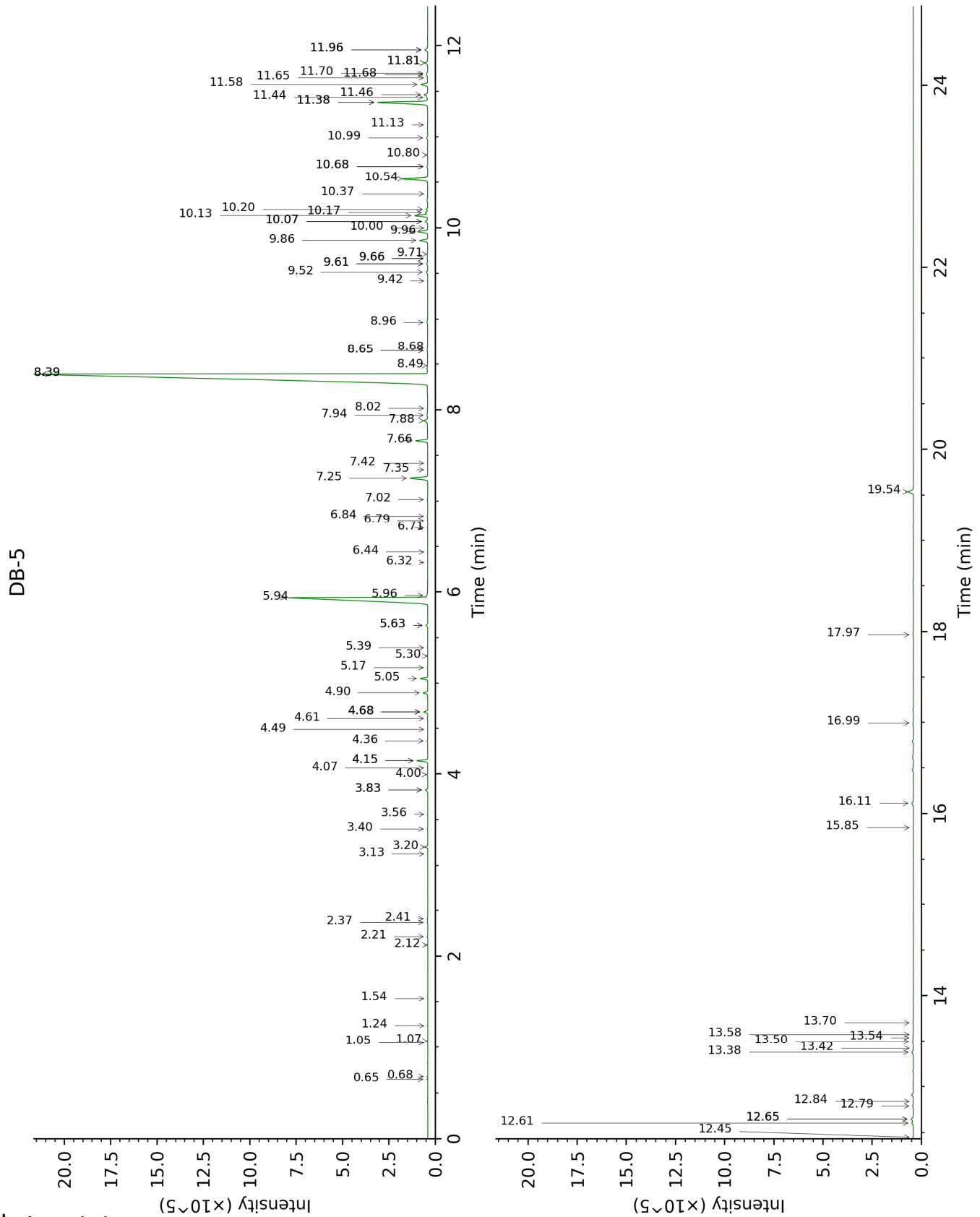
*: Two or more compounds are coeluting on this column

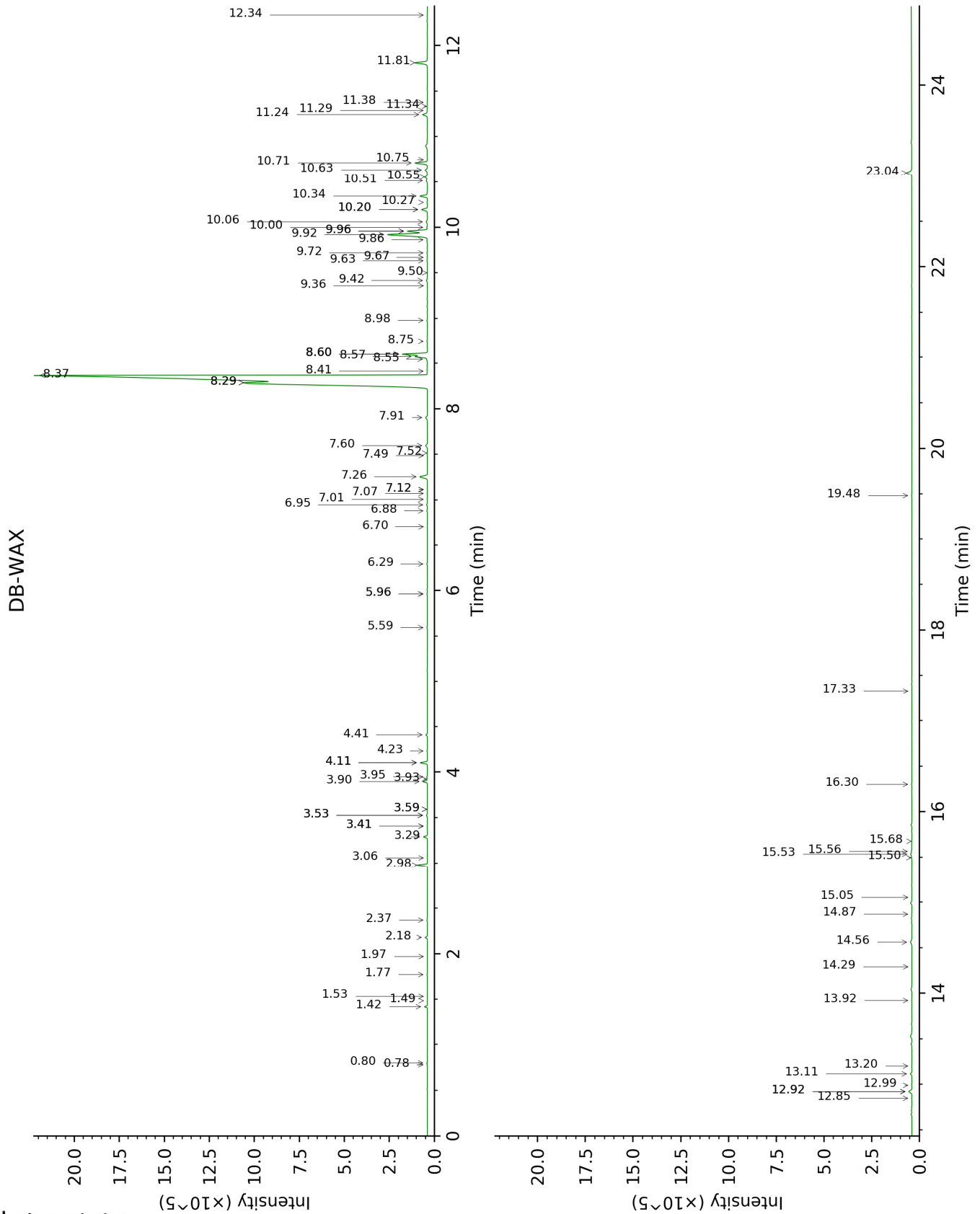
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

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FULL ANALYSIS DATA

| Identification | Column DB-5 | | | Column DB-WAX | | |
|---------------------------------------|-------------|------|---------|---------------|------|--------|
| | R.T | R.I | % | R.T | R.I | % |
| Isovaleral | 0.65 | 641 | 0.02 | 0.80 | 890 | 0.02 |
| 2-Methylbutyral | 0.68 | 651 | 0.01 | 0.78 | 882 | 0.01 |
| Isoamyl alcohol | 1.05 | 731 | 0.01 | 3.59* | 1181 | 0.01 |
| 2-Methylbutanol | 1.07 | 734 | 0.01 | 3.59* | 1181 | [0.01] |
| Toluene | 1.24 | 757 | tr | 1.53 | 1003 | tr |
| Hexanal | 1.54 | 797 | tr | 1.97 | 1046 | 0.01 |
| (2E)-Hexenal | 2.12 | 847 | 0.02 | 3.53* | 1176 | 0.06 |
| (3Z)-Hexenol | 2.21 | 855 | 0.03 | 5.96* | 1352 | 0.03 |
| (2E)-Hexenol | 2.37 | 867 | 0.04 | 6.29 | 1375 | 0.04 |
| Hexanol | 2.41 | 871 | 0.03 | 5.59 | 1325 | 0.03 |
| α-Thujene | 3.13 | 924 | 0.01 | 1.49 | 998 | tr |
| α-Pinene | 3.20 | 929 | 0.13 | 1.42 | 992 | 0.13 |
| Camphene | 3.40 | 942 | 0.03 | 1.77 | 1027 | 0.03 |
| Benzaldehyde | 3.56 | 953 | 0.01 | 7.49 | 1463 | 0.01 |
| β-Pinene | 3.83* | 970 | 0.15 | 2.18 | 1066 | 0.12 |
| Sabinene | 3.83* | 970 | [0.15] | 2.37 | 1085 | 0.03 |
| Octen-3-ol | 4.00 | 981 | 0.04 | 6.95 | 1423 | 0.06 |
| Octan-3-one | 4.07 | 986 | 0.01 | 4.10* | 1218 | 0.40 |
| Myrcene | 4.15* | 991 | 0.58 | 2.98 | 1134 | 0.54 |
| <i>trans</i> -Dehydroxylinalool oxide | 4.15* | 991 | [0.58] | 3.53* | 1176 | [0.06] |
| <i>cis</i> -Dehydroxylinalool oxide | 4.36 | 1006 | 0.04 | 3.95 | 1207 | 0.04 |
| α-Terpinene | 4.49 | 1014 | 0.01 | 3.06 | 1140 | 0.01 |
| para-Cymene | 4.61 | 1021 | 0.03 | 4.23 | 1228 | 0.02 |
| Limonene | 4.68* | 1026 | 0.23 | 3.29 | 1158 | 0.22 |
| β-Phellandrene | 4.68* | 1026 | [0.23] | 3.41* | 1167 | 0.02 |
| 1,8-Cineole | 4.68* | 1026 | [0.23] | 3.41* | 1167 | [0.02] |
| (Z)-β-Ocimene | 4.90 | 1039 | 0.25 | 3.90 | 1204 | 0.25 |
| (E)-β-Ocimene | 5.05 | 1049 | 0.40 | 4.10* | 1218 | [0.40] |
| γ-Terpinene | 5.17 | 1056 | 0.03 | 3.93 | 1206 | 0.02 |
| <i>cis</i> -Sabinene hydrate | 5.30 | 1065 | 0.01 | 7.12* | 1436 | 0.01 |
| <i>cis</i> -Linalool oxide (fur.) | 5.39 | 1070 | 0.02 | 6.70 | 1405 | 0.02 |
| Terpinolene | 5.64* | 1086 | 0.10 | 4.41 | 1240 | 0.09 |
| <i>trans</i> -Linalool oxide (fur.) | 5.64* | 1086 | [0.10] | 7.12* | 1436 | [0.01] |
| Linalool | 5.94† | 1105 | 15.77 | 8.29*† | 1523 | 82.02 |
| Hotrienol | 5.96† | 1106 | [15.77] | 8.98 | 1576 | 0.03 |
| <i>trans</i> -Pinocarveol | 6.32 | 1130 | 0.01 | 9.36 | 1606 | 0.01 |
| neo-allo-Ocimene | 6.44 | 1137 | 0.01 | 5.96* | 1352 | [0.03] |
| Nerol oxide | 6.71 | 1154 | 0.02 | 7.01 | 1428 | 0.02 |
| Borneol | 6.79 | 1160 | 0.03 | 9.96* | 1655 | 1.35 |
| δ-Terpineol | 6.84 | 1163 | 0.04 | 9.63 | 1629 | 0.03 |
| Terpinen-4-ol | 7.02 | 1175 | 0.03 | 8.75 | 1559 | 0.03 |

| | | | | | | |
|--|--------|------|---------|-------|------|---------|
| α-Terpineol | 7.25 | 1190 | 1.23 | 9.96* | 1655 | [1.35] |
| Hodiendiol | 7.35 | 1196 | 0.02 | 12.99 | 1915 | 0.02 |
| Unknown [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...] | 7.42 | 1200 | 0.03 | | | |
| Linalyl formate | 7.66 | 1217 | 0.69 | 8.58 | 1545 | 0.72 |
| Nerol | 7.88 | 1232 | 0.26 | 11.24 | 1762 | 0.36 |
| Unknown [m/z 43, 93 (49), 41 (22), 80 (22), 69 (17), 121 (14)...] | 7.94 | 1236 | 0.04 | | | |
| Unknown [m/z 121, 43 (93), 41 (37), 107 (35), 67 (33), 136 (32)... 154 (1)] | 8.02 | 1241 | 0.01 | | | |
| Geraniol | 8.39* | 1267 | 67.79 | 11.81 | 1810 | 0.89 |
| Linalyl acetate | 8.39* | 1267 | [67.79] | 8.37† | 1530 | [82.02] |
| Unknown [m/z 121, 43 (75), 95 (57), 41 (34), 93 (33), 69 (28)...] | 8.49 | 1273 | 0.02 | | | |
| Neryl formate | 8.65* | 1284 | 0.03 | 9.67 | 1632 | 0.02 |
| Bornyl acetate | 8.65* | 1284 | [0.03] | 8.41 | 1533 | 0.02 |
| Unknown [m/z 43, 121 (74), 93 (42), 95 (38), 107 (29), 41 (29), 136 (28)...] | 8.68 | 1286 | 0.03 | | | |
| Geranyl formate | 8.96 | 1306 | 0.07 | 10.06 | 1663 | 0.10 |
| δ-Elementene | 9.42 | 1333 | 0.02 | 7.07 | 1432 | 0.02 |
| Hodiendiol derivative | 9.52 | 1340 | 0.10 | 13.11 | 1926 | 0.10 |
| α-Terpinyl acetate | 9.61* | 1346 | 0.07 | 9.86 | 1647 | 0.03 |
| α-Cubebene | 9.61* | 1346 | [0.07] | 6.88 | 1418 | 0.04 |
| Unknown [m/z 43, 121 (52), 93 (48), 79 (33), 41 (30), 136 (26), 81 (25)...] | 9.66* | 1350 | 0.05 | | | |
| Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)] | 9.66* | 1350 | [0.05] | 11.29 | 1765 | 0.03 |
| Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)] | 9.71 | 1354 | 0.06 | 11.34 | 1769 | 0.04 |
| Neryl acetate | 9.86 | 1364 | 0.48 | 10.34 | 1686 | 0.48 |
| α-Copaene | 9.96 | 1371 | 0.63 | 7.26 | 1446 | 0.63 |
| (Z)-8-Hydroxylinalool? | 10.00 | 1374 | 0.01 | 13.92 | 2002 | 0.03 |
| β-Bourbonene | 10.07* | 1379 | 0.17 | 7.60 | 1471 | 0.15 |
| 1,5-diepi-β-Bourbonene | 10.07* | 1379 | [0.17] | 7.52 | 1465 | 0.01 |

| | | | | | | |
|---|--------|------|--------|--------|------|---------|
| Geranyl acetate | 10.13 | 1384 | 0.79 | 10.71 | 1717 | 0.81 |
| β-Cubebene | 10.17 | 1386 | 0.15 | 7.91 | 1494 | 0.15 |
| β-Elementene | 10.20 | 1388 | 0.09 | 8.60* | 1548 | 1.58 |
| Isocaryophyllene | 10.37 | 1401 | 0.02 | 8.29*† | 1523 | [82.02] |
| β-Caryophyllene | 10.54 | 1413 | 1.65 | 8.60* | 1548 | [1.58] |
| β-Copaene | 10.68* | 1423 | 0.05 | 8.55 | 1543 | 0.04 |
| Coumarin | 10.68* | 1423 | [0.05] | 17.33 | 2346 | 0.02 |
| <i>trans</i> -α-Bergamotene | 10.80 | 1433 | 0.03 | 8.60* | 1548 | [1.58] |
| α-Humulene | 10.99 | 1447 | 0.08 | 9.42 | 1611 | 0.08 |
| 9-epi-β-Caryophyllene | 11.13 | 1457 | 0.03 | 9.50 | 1618 | 0.02 |
| Germacrene D | 11.38* | 1476 | 3.51 | 9.92 | 1652 | 3.45 |
| α-Amorphene | 11.38* | 1476 | [3.51] | 9.72 | 1636 | 0.04 |
| β-Selinene | 11.44 | 1480 | 0.06 | 10.00 | 1658 | 0.05 |
| Hodiendiol derivative IV | 11.46 | 1482 | 0.23 | | | |
| Bicyclogermacrene | 11.58 | 1490 | 0.46 | 10.20* | 1674 | 0.41 |
| α-Murolene | 11.65 | 1496 | 0.04 | 10.20* | 1674 | [0.41] |
| (Z)-α-Bisabolene | 11.68 | 1498 | 0.07 | 10.51 | 1700 | 0.09 |
| Hodiendiol derivative II | 11.70 | 1500 | 0.05 | 12.92* | 1909 | 0.26 |
| β-Bisabolene | 11.81* | 1508 | 0.19 | 10.27 | 1680 | 0.03 |
| γ-Cadinene | 11.81* | 1508 | [0.19] | 10.55 | 1703 | 0.18 |
| δ-Cadinene | 11.96* | 1520 | 0.19 | 10.63 | 1710 | 0.18 |
| <i>trans</i> -Calamenene | 11.96* | 1520 | [0.19] | 11.38 | 1773 | 0.02 |
| β-Sesquiphellandrene | 11.96* | 1520 | [0.19] | 10.75 | 1720 | 0.01 |
| 1,5-Epoxysalvial-4(14)-ene | 12.45 | 1559 | 0.03 | 12.34 | 1856 | 0.03 |
| Spathulenol | 12.61 | 1571 | 0.11 | 14.56 | 2063 | 0.16 |
| Caryophyllene oxide isomer | 12.65* | 1574 | 0.16 | 12.85 | 1902 | 0.02 |
| Caryophyllene oxide | 12.65* | 1574 | [0.16] | 12.92* | 1909 | [0.26] |
| Salvial-4(14)-en-1-one | 12.79 | 1585 | 0.04 | 13.20 | 1934 | 0.03 |
| Guaiol | 12.84 | 1589 | 0.03 | 14.29 | 2037 | 0.01 |
| Unknown [m/z 135, 93 (29), 79 (29), 41 (26), 107 (22), 67 (21), 69 (20)...] | 13.38 | 1633 | 0.10 | | | |
| τ-Cadinol | 13.42 | 1636 | 0.02 | 15.05 | 2111 | 0.01 |
| β-Eudesmol | 13.50 | 1643 | 0.07 | 15.56 | 2162 | 0.05 |
| α-Eudesmol | 13.54 | 1646 | 0.04 | 15.53 | 2159 | 0.10 |
| α-Cadinol | 13.58 | 1649 | 0.01 | 15.68 | 2173 | 0.02 |
| Bulnesol | 13.70 | 1660 | 0.02 | 15.50 | 2155 | 0.03 |
| Phytone | 15.85 | 1846 | 0.02 | 14.87 | 2092 | 0.02 |
| Sclareoloxide | 16.11 | 1870 | 0.10 | | | |
| Geranyl-paracymene | 16.99 | 1952 | 0.03 | 16.30 | 2237 | 0.04 |
| Manool | 17.97 | 2046 | 0.03 | 19.48 | 2589 | 0.03 |

| | | | | | | |
|-------------------------|---------------|------|------|---------------|------|------|
| Sclareol | 19.54 | 2206 | 0.41 | 23.04 | 3040 | 0.40 |
| Total identified | 98.56% | | | 97.73% | | |
| Total reported | 98.84% | | | 97.79% | | |

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

†: Peaks apexes were resolved, but peaks overlapped and were summed for analysis

tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index