

Date : 2025-05-08

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 25D24-PTH03

Customer Identification : Palo Santo - Ecuador - PJ0111R

Type : Essential Oil

Source : *Bursera graveolens*

Customer : Plant Therapy

Checked and approved by:

Alexis St-Gelais, Ph. D., Chimiste 2013-174

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GAS CHROMATOGRAPHIC ANALYSIS

Method : PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID

✖ISO

Results : See analysis summary (next page)

Analyst : Sylvain Mercier, M. Sc., Chimiste 2014-005

Date : 2025-05-01

PHYSICOCHEMICAL DATA

Refractive index : 1.4797 ± 0.0003 (20 °C)

Method : PC-MAT-016 - Measure of the refractive index of a liquid.

Analyst : Cindy Caron B. Sc.

Date : 2025-04-25

CONCLUSION

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

ANALYSIS SUMMARY - CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
Toluene	tr	Simple phenolic
3-Methylcyclopentanone	0.02	Aliphatic ketone
α -Thujene	0.01	Monoterpene
α -Pinene	0.06	Monoterpene
3-Methylcyclohexanone	0.02	Aliphatic ketone
β -Pinene	tr	Monoterpene
Sabinene	0.01	Monoterpene
Hexahydroacetophenone epimer I	0.02	Aliphatic ketone
Hexahydroacetophenone epimer II	0.02	Aliphatic ketone
Dehydro-1,8-cineole	0.02	Monoterpenic ether
Myrcene	0.37	Monoterpene
Pseudolimonene	0.02	Monoterpene
α -Phellandrene	0.17	Monoterpene
α -Terpinene	0.01	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
<i>para</i> -Cymene	0.76	Monoterpene
β -Phellandrene	0.25	Monoterpene
Limonene	61.17	Monoterpene
(<i>E</i>)- β -Ocimene	tr	Monoterpene
γ -Terpinene	0.03	Monoterpene
Octanol	tr	Aliphatic alcohol
Terpinolene	0.03	Monoterpene
<i>para</i> -Cymenene	0.04	Monoterpene
Linalool	0.04	Monoterpenic alcohol
1,3,8- <i>para</i> -Menthatriene	0.01	Monoterpene
<i>trans-para</i> -Mentha-2,8-dien-1-ol	0.06	Monoterpenic alcohol
Limona ketone	0.01	Normonoterpenic ketone
<i>cis</i> -Limonene oxide	0.03	Monoterpenic ether
<i>cis-para</i> -Mentha-2,8-dien-1-ol	0.05	Monoterpenic alcohol
<i>trans</i> -Limonene oxide	0.03	Monoterpenic ether
<i>cis</i> - β -Terpineol	0.07	Monoterpenic alcohol
Menthone	0.13	Monoterpenic ketone
Isomenthone	0.09	Monoterpenic ketone
Menthofuran	17.70	Monoterpenic ether
<i>trans</i> - β -Terpineol	0.09	Monoterpenic alcohol
neo-Menthol	0.02	Monoterpenic alcohol
<i>trans</i> -Isopulegone	0.08	Monoterpenic ketone
Terpinen-4-ol	0.05	Monoterpenic alcohol
Unknown	tr	Oxygenated monoterpene
<i>para</i> -Cymen-8-ol	0.03	Monoterpenic alcohol

α -Terpineol	8.10	Monoterpenic alcohol
<i>cis</i> -Dihydrocarvone	0.12	Monoterpenic ketone
Unknown	0.02	Unknown
<i>trans</i> -Dihydrocarvone	0.03	Monoterpenic ketone
<i>trans</i> -Isopiperitenol	0.01	Monoterpenic alcohol
<i>trans</i> -Piperitol	0.03	Monoterpenic alcohol
4,7-Dimethylbenzofuran?	0.01	Furan
<i>trans</i> -Carveol	0.09	Monoterpenic alcohol
<i>cis-para</i> -Mentha-1(7),8-dien-2-ol	0.02	Monoterpenic alcohol
<i>cis</i> -Carveol	0.05	Monoterpenic alcohol
Pulegone	0.82	Monoterpenic ketone
Carvone	1.11	Monoterpenic ketone
Unknown	0.06	Unknown
Unknown	0.01	Unknown
Perillaldehyde	tr	Monoterpenic aldehyde
Limonen-10-ol	0.01	Monoterpenic alcohol
Perilla alcohol	0.02	Monoterpenic alcohol
<i>para</i> -Menth-5-en-1,2-diol isomer III	0.01	Monoterpenic alcohol
Unknown	0.03	Unknown
Unknown	0.06	Unknown
Menthofurolactone isomer I	0.14	Monoterpenic lactone
Menthofurolactone isomer II	0.16	Monoterpenic lactone
Evodone	0.04	Monoterpenic ketone
α -Ylangene	0.03	Sesquiterpene
α -Copaene	0.08	Sesquiterpene
<i>cis</i> - β -Elemene	0.01	Sesquiterpene
β -Cubebene	0.04	Sesquiterpene
β -Elemene	0.12	Sesquiterpene
α -Cedrene	0.03	Sesquiterpene
β -Ylangene	0.04	Sesquiterpene
Unknown	0.03	Unknown
8-Hydroxycarvotanacetone	0.01	Monoterpenic alcohol
<i>cis</i> -Thujopsene	0.06	Sesquiterpene
β -Copaene	0.05	Sesquiterpene
β -Humulene	0.01	Sesquiterpene
Menthofurolactone isomer III	0.12	Monoterpenic lactone
<i>cis</i> - β -Bergamotene?	0.03	Sesquiterpene
Unknown	0.16	Sesquiterpene
α -Humulene	0.03	Sesquiterpene
Unknown	0.02	Unknown
γ -Gurjunene	0.01	Sesquiterpene
γ -Murolene	0.18	Sesquiterpene
Germacrene D	3.38	Sesquiterpene
β -Selinene	0.06	Sesquiterpene
Unknown	0.03	Unknown

Menthallactone	0.19	Monoterpenic lactone
Bicyclogermacrene	0.06	Sesquiterpene
α -Selinene	0.06	Sesquiterpene
α -Muurolene	0.10	Sesquiterpene
Germacrene A	0.01	Sesquiterpene
β -Bisabolene	0.06	Sesquiterpene
(3E,6E)- α -Farnesene	0.40	Sesquiterpene
γ -Cadinene	0.09	Sesquiterpene
trans-Calamenene	0.01	Sesquiterpene
Unknown	0.02	Sesquiterpene
δ -Cadinene	0.29	Sesquiterpene
Menthofurolactone analog	0.08	Monoterpenic lactone
α -Cadinene	0.03	Sesquiterpene
α -Calacorene	0.01	Sesquiterpene
Germacrene B	0.05	Sesquiterpene
7 α -Hydroxymintlactone	0.01	Monoterpenic alcohol
(E)-Nerolidol	0.02	Sesquiterpenic alcohol
Spathulenol	0.02	Sesquiterpenic alcohol
6,10-Epoxy-7(14)-isodaucene?	0.01	Sesquiterpenic ether
Globulol	0.01	Sesquiterpenic alcohol
Salvial-4(14)-en-1-one	0.01	Aliphatic alcohol
Viridiflorol	0.01	Sesquiterpenic alcohol
Unknown	0.03	Oxygenated sesquiterpene
Junenol	0.11	Sesquiterpenic alcohol
10-epi- γ -Eudesmol	0.03	Sesquiterpenic alcohol
1-epi-Cubenol	0.04	Sesquiterpenic alcohol
τ -Cadinol	0.02	Sesquiterpenic alcohol
τ -Muurolol	0.05	Sesquiterpenic alcohol
Cubenol	0.01	Sesquiterpenic alcohol
β -Eudesmol	0.04	Sesquiterpenic alcohol
Unknown	0.05	Sesquiterpenic alcohol
α -Cadinol	0.06	Sesquiterpenic alcohol
Germacre-4(15),5,10(14)-trien-1 α -ol	0.02	Sesquiterpenic alcohol
Unknown	0.06	Unknown
Consolidated total	99.03	

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

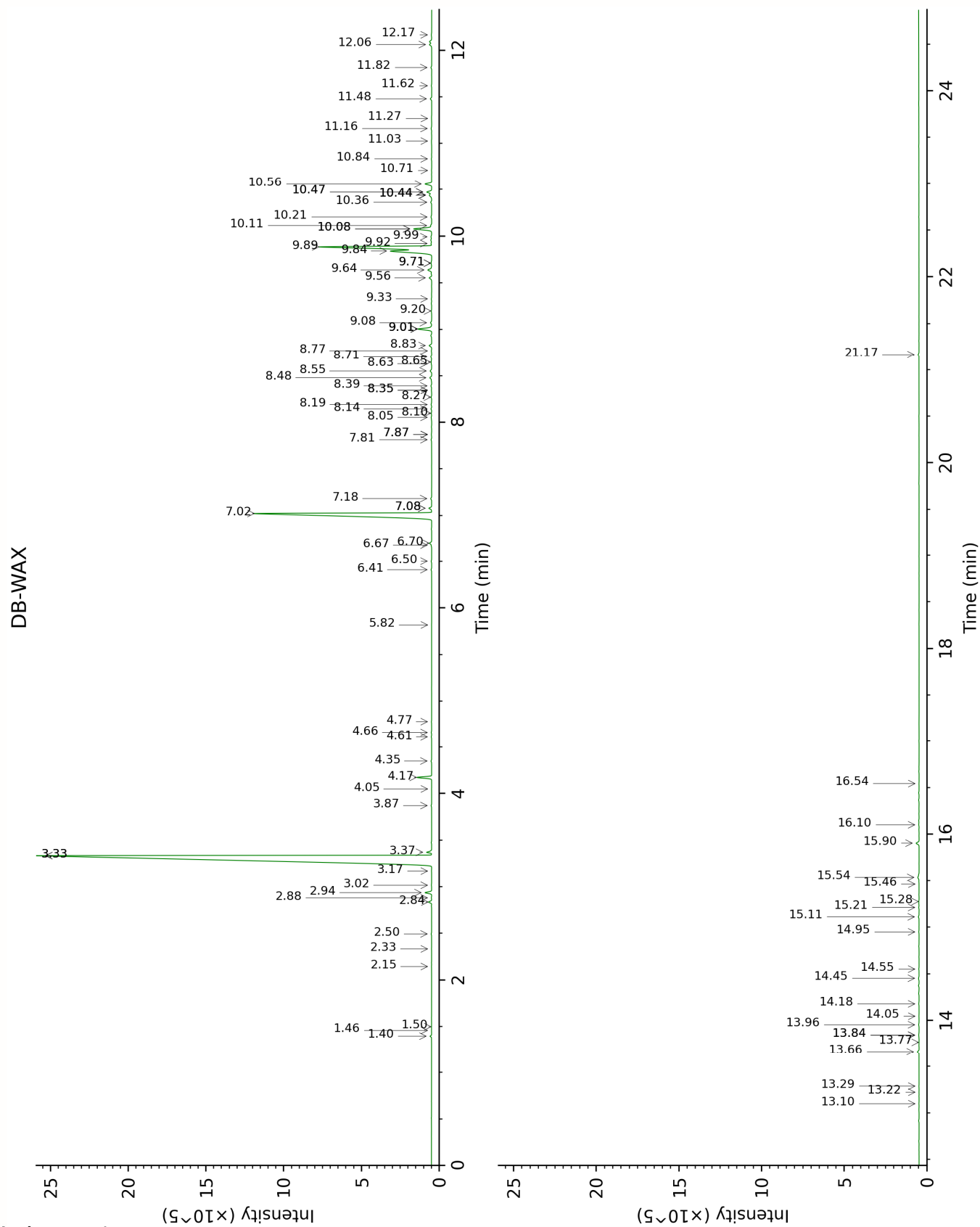
Note: no correction factor was applied

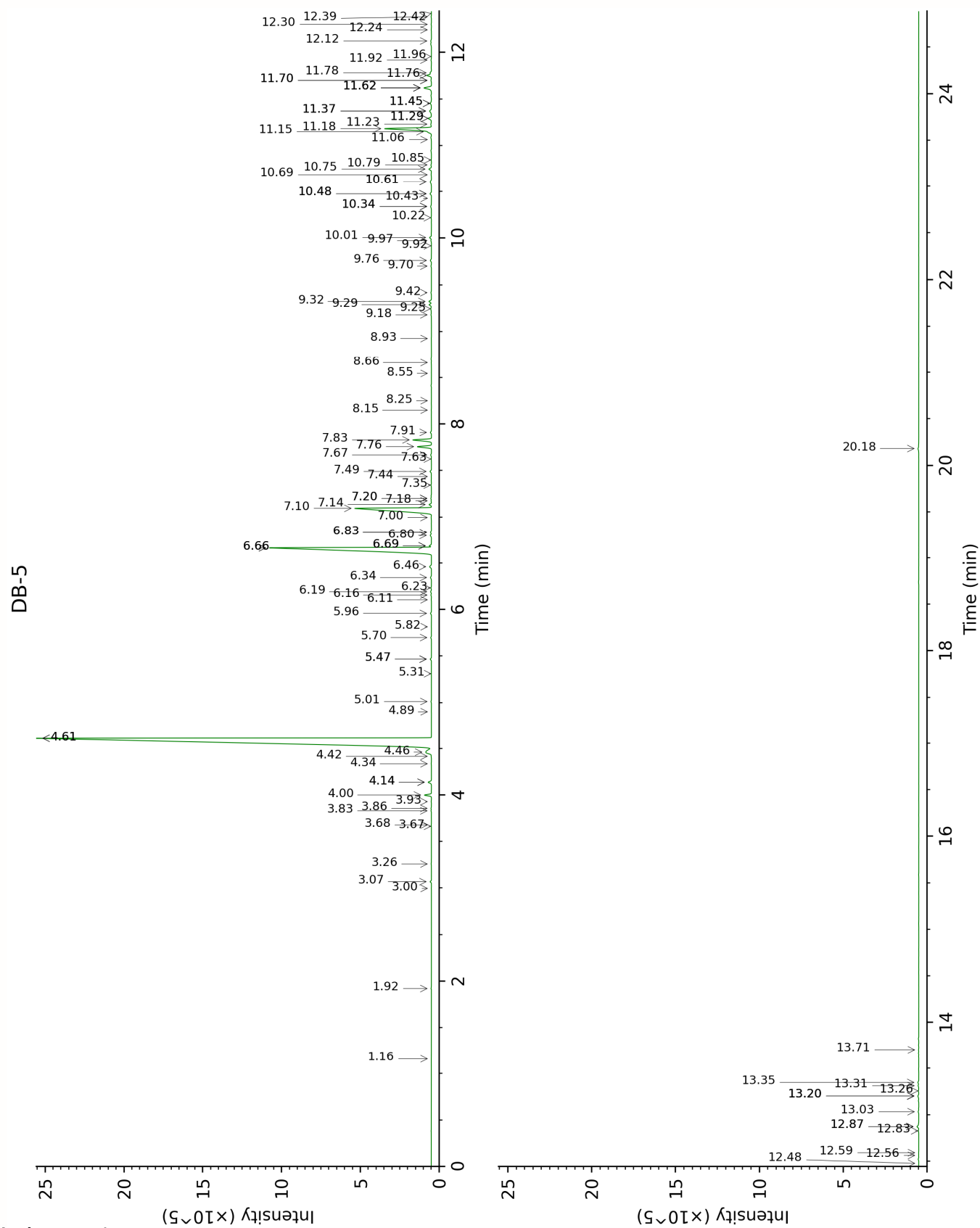
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm is set to prioritize data from the most standard DB-5 column, and smallest values so as to avoid overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report to access the full untreated data and perform their own calculations if needed.

Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

Bracketed value ([xx]): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

This page was intentionally left blank. The following pages present the complete data of the analysis.





FULL ANALYSIS DATA

Toluene	Column DB-WAX			Column DB-5		
	1.50	1002.4	tr	1.16	758.3	tr
3-Methylcyclopentanone	3.34*	1165.7	[61.17]	1.92	841.0	0.02
α-Thujene	1.46	998.4	0.01	3.00	925.9	0.01
α-Pinene	1.40	991.5	0.06	3.07	930.7	0.06
3-Methylcyclohexanone	4.77	1273.0	0.02	3.26	943.4	0.02
β-Pinene	2.14	1066.4	0.01	3.66	970.5	tr
Sabinene	2.33	1085.2	0.01	3.68	971.5	0.01
Hexahydroacetophenone epimer I	4.61	1261.0	0.02	3.83	981.7	0.02
Hexahydroacetophenone epimer II	4.66	1264.4	0.02	3.86	983.5	0.02
Dehydro-1,8-cineole	3.17	1152.6	0.01	3.93	988.3	0.02
Myrcene	2.94	1134.5	0.37	4.00	993.1	0.37
Pseudolimonene	2.88	1130.1	0.02	4.14*	1002.3	[0.20]
α-Phellandrene	2.84	1126.6	0.17	4.14*	1002.3	[0.20]
α-Terpinene	3.02	1140.7	0.02	4.34	1015.0	0.01
Carvomenthene	2.50	1099.7	0.03	4.42	1020.0	0.01
para-Cymene	4.18	1229.2	0.78	4.46	1022.9	0.76
β-Phellandrene	3.37	1168.6	0.25	4.61*	1032.3	[61.41]
Limonene	3.34*	1165.7	[61.17]	4.61*	1032.3	[61.41]
(E)-β-Ocimene	4.05	1220.1	tr	4.90	1050.4	tr
γ-Terpinene	3.87	1207.1	0.03	5.01	1057.8	0.03
Octanol	8.27	1528.0	0.03	5.31	1076.8	tr
Terpinolene	4.35	1242.1	0.03	5.47*	1086.8	[0.07]
para-Cymenene	6.41	1390.3	0.04	5.47*	1086.8	[0.07]
Linalool	8.14	1518.3	0.04	5.70	1101.5	0.04
1,3,8-para-Menthatriene	5.82	1348.2	0.01	5.82	1109.0	0.01
trans-para-Mentha-2,8- dien-1-ol	9.01*	1584.5	[0.89]	5.96	1118.3	0.06
Limona ketone	7.87*	1497.2	[0.02]	6.11	1127.8	0.01
cis-Limonene oxide	6.50	1396.9	0.03	6.16	1131.1	0.03
cis-para-Mentha-2,8- dien-1-ol	9.56	1628.1	0.16	6.19	1133.4	0.05
trans-Limonene oxide	6.68	1409.5	0.02	6.23	1136.1	0.03
cis-β-Terpineol	9.08	1589.7	0.08	6.34	1143.3	0.07
Menthone	6.70	1411.0	0.14	6.46	1150.9	0.13
Isomenthone	7.08*	1439.1	[0.17]	6.66*	1164.0	[17.79]
Menthofuran	7.02	1434.9	17.70	6.66*	1164.0	[17.79]
trans-β-Terpineol	9.71*	1640.7	[0.06]	6.69*	1165.4	[0.11]
neo-Menthol	8.63	1555.5	0.02	6.69*	1165.4	[0.11]
trans-Isopulegone	9.01*	1584.5	[0.89]	6.80	1172.8	0.08
Terpinen-4-ol	8.65	1556.9	0.05	6.83*	1174.9	[0.05]
Unknown CASA XVIII	9.71*	1640.7	[0.06]	6.83*	1174.9	[0.05]

[m/z 69, 84 (62), 41 (30), 123 (26), 97 (24), 109 (23)...]						
<i>para</i> -Cymen-8-ol	11.62	1799.2	0.02	7.00	1185.6	0.03
α -Terpineol	9.89	1654.6	8.01	7.10	1192.1	8.10
<i>cis</i> -Dihydrocarvone	8.55	1549.5	0.10	7.14	1194.7	0.12
Unknown MISC XXXII [m/z 121, 79 (61), 93 (55), 94 (40), 91 (39), 84 (37)...]	8.10	1514.7	0.03	7.18	1197.3	0.02
<i>trans</i> -Dihydrocarvone	8.77	1566.5	0.03	7.20*	1199.0	[0.04]
<i>trans</i> -Isopiperitenol	10.47*	1702.3	[0.32]	7.20*	1199.0	[0.04]
<i>trans</i> -Piperitol	10.44*	1699.5	[0.20]	7.35	1208.5	0.03
4,7-Dimethylbenzofuran?				7.44	1214.7	0.01
<i>trans</i> -Carveol	11.48	1787.0	0.08	7.49	1218.5	0.09
<i>cis-para</i> -Mentha-1(7),8-dien-2-ol	12.06	1838.0	0.15	7.63	1227.5	0.02
<i>cis</i> -Carveol	11.82	1816.3	0.05	7.67	1230.6	0.05
Pulegone	9.01*	1584.5	[0.89]	7.76	1236.6	0.82
Carvone	10.08*	1670.1	[1.20]	7.83	1241.6	1.11
Unknown BUGR I [m/z 112, 43 (70), 70 (63), 59 (53), 97 (46), 84 (25)...]	10.36	1693.0	0.06	7.91	1247.0	0.06
Unknown MEPU IV [m/z 112, 70 (63), 43 (59), 59 (51), 97 (45), 84 (22)...]	11.03	1748.8	0.03	8.15	1263.4	0.01
Perillaldehyde	10.71	1722.2	0.02	8.25	1270.3	tr
Limonen-10-ol	13.22	1942.5	0.01	8.55	1290.4	0.01
Perilla alcohol	13.29	1948.4	0.01	8.66	1298.4	0.02
<i>para</i> -Menth-5-en-1,2-diol isomer III	15.28	2139.8	0.02	8.93	1313.0	0.01
Unknown BUGR II [m/z 124, 123 (43), 121 (35), 166 (30), 93 (30), 136 (17)...]				9.18	1331.1	0.03
Unknown BUGR III [m/z 150, 71 (67), 107 (54), 43 (44), 109 (42)...]				9.25	1335.8	0.06
Menthofurolactone isomer I				9.29	1338.9	0.14
Menthofurolactone isomer II				9.32	1341.4	0.16
Evodone				9.42	1348.0	0.04
α -Ylangene	7.08*	1439.1	[0.17]	9.70	1368.3	0.03
α -Copaene	7.18	1446.7	0.06	9.76	1372.6	0.08
<i>cis</i> - β -Elemene	8.34*	1533.6	[0.02]	9.92	1383.7	0.01

β-Cubebene	7.81	1493.0	0.04	9.98	1387.7	0.04
β-Elemene	8.48	1543.9	0.12	10.01	1390.0	0.12
α-Cedrene	8.05	1511.4	0.03	10.22	1405.2	0.03
β-Ylangene	8.19	1521.8	0.04	10.34*	1414.2	[0.07]
Unknown CAO V XXXII [m/z 43, 57 (37), 69 (30), 55 (29), 87 (23)... 168 (5)]				10.34*	1414.2	[0.07]
8-Hydroxycarvotanacetone	16.54	2269.7	0.01	10.43	1420.8	0.01
cis-Thujopsene	8.71	1561.4	0.06	10.48*	1424.5	[0.09]
β-Copaene	8.39	1537.2	0.05	10.48*	1424.5	[0.09]
β-Humulene	7.87*	1497.2	[0.02]	10.61*	1434.4	[0.14]
Menthofurolactone isomer III				10.61*	1434.4	[0.14]
cis-β-Bergamotene?				10.69	1440.2	0.03
Unknown BOCA IV [m/z 91, 161 (92), 105 (85), 119 (63), 133 (53), 79 (49), 204 (46)]	8.83	1570.9	0.16	10.75	1444.9	0.16
α-Humulene	9.33	1610.0	0.03	10.79	1448.2	0.03
Unknown CALU X [m/z 109, 110 (33), 43 (30), 95 (23), 71 (20), 41 (19)...]				10.85	1452.2	0.02
γ-Gurjunene	9.20	1599.7	0.04	11.06	1468.6	0.01
γ-Murolene	9.64	1634.8	0.28	11.15	1475.0	0.18
Germacrene D	9.84	1651.1	3.42	11.18	1477.4	3.38
β-Selinene	9.92	1657.5	0.04	11.23	1481.1	0.06
Unknown BUGR IV [m/z 149, 161 (51), 93 (43), 91 (42), 164 (42), 105 (37)...204? (11)]	8.34*	1533.6	[0.02]	11.29*	1485.8	[0.22]
Menthallactone	15.90	2203.2	0.19	11.29*	1485.8	[0.22]
Bicyclgermacrene	10.11	1672.9	0.06	11.37*	1491.6	[0.17]
α-Selinene	9.99	1663.3	0.06	11.37*	1491.6	[0.17]
α-Murolene	10.08*	1670.1	[1.20]	11.45*	1497.8	[0.10]
Germacrene A	10.44*	1699.5	[0.20]	11.45*	1497.8	[0.10]
β-Bisabolene	10.21	1680.3	0.06	11.62*	1510.6	[0.54]
(3E,6E)-α-Farnesene	10.56	1709.6	0.40	11.62*	1510.6	[0.54]
γ-Cadinene	10.44*	1699.5	[0.20]	11.62*	1510.6	[0.54]
trans-Calamenene	11.27	1769.2	0.01	11.70*	1516.9	[0.04]
Unknown MIAL I [m/z 161, 81 (93), 105 (66), 93 (60), 119 (60), 204 (54)...]	14.55	2068.1	0.02	11.70*	1516.9	[0.04]
δ-Cadinene	10.47*	1702.3	[0.32]	11.76	1521.2	0.29
Menthofurolactone				11.78	1523.4	0.08

analog						
α -Cadinene	10.84	1732.7	0.02	11.92	1534.2	0.03
α -Calacorene	12.17	1847.2	0.04	11.96	1537.2	0.01
Germacrene B	11.16	1760.1	0.05	12.12	1550.4	0.05
7 α -Hydroxymintlactone	21.17	2807.2	0.06	12.24	1559.9	0.01
(E)-Nerolidol	13.84*	2000.0	[0.04]	12.30	1564.5	0.02
Spathulenol	14.45	2058.6	0.04	12.39	1571.1	0.02
6,10-Epoxy-7(14)-isodaucene?				12.42	1573.9	0.01
Globulol	13.96	2010.7	0.03	12.48	1578.2	0.01
Salvial-4(14)-en-1-one	13.10	1931.0	0.01	12.56	1585.1	0.01
Viridiflorol	14.05	2019.5	0.01	12.59	1587.4	0.01
Unknown CULO XXIII [m/z 43, 93 (88), 91 (76), 79 (73), 69 (64), 41 (63), 95 (53).. 220 (3)]				12.83	1606.0	0.03
Junenol	13.66	1982.9	0.11	12.87*	1609.8	[0.13]
10-epi- γ -Eudesmol	14.18	2032.2	0.03	12.87*	1609.8	[0.13]
1-epi-Cubenol	13.84*	2000.0	[0.04]	13.03	1623.1	0.04
τ -Cadinol	14.95	2107.2	0.02	13.20*	1637.2	[0.07]
τ -Muurolol	15.11	2123.4	0.05	13.20*	1637.2	[0.07]
Cubenol	13.77	1992.6	0.01	13.20*	1637.2	[0.07]
β -Eudesmol	15.46	2158.5	0.01	13.26	1641.8	0.04
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109 (40)... 204 (35), 222 (2)]	15.21	2133.5	0.02	13.31	1646.4	0.05
α -Cadinol	15.54	2165.7	0.11	13.35	1649.3	0.06
Germacre-4(15),5,10(14)-trien-1 α -ol	16.10	2223.6	0.03	13.71	1679.0	0.02
Unknown MEPU XVI [m/z 165, 166 (48), 137 (11), 67 (9), 124 (7), 43 (7)...]				20.18	2300.8	0.06
Total reported		98.71%			99.09%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is taken into account in the consolidated 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