

Date : 2024-08-22

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

**Internal code :** 24H09-PTH02

**Customer Identification :** German Chamomile - Hungary - C80107R

**Type :** Essential Oil

**Source :** *Matricaria chamomilla*

**Customer :** Plant Therapy

Checked and approved by:

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

**Date :** 2024-08-22

## PHYSICOCHEMICAL DATA

**Refractive index :**  $1.5004 \pm 0.0003$  (20 °C)

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

**Analyst :** Cindy Caron B. Sc.

**Date :** 2024-08-09

## 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
$\alpha$ -Pinene	0.01	Monoterpene
$\beta$ -Pinene	0.01	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
2-Pentylfuran	0.01	Furan
$\alpha$ -Phellandrene	0.01	Monoterpene
<i>para</i> -Cymene	0.01	Monoterpene
Limonene	tr	Monoterpene
1,8-Cineole	0.01	Monoterpenic ether
( <i>Z</i> )- $\beta$ -Ocimene	0.01	Monoterpene
( <i>E</i> )- $\beta$ -Ocimene	0.05	Monoterpene
$\gamma$ -Terpinene	0.01	Monoterpene
Artemisia ketone	0.04	Monoterpenic ketone
Artemisia alcohol	0.02	Monoterpenic alcohol
<i>cis</i> -Chrysanthemol	0.01	Monoterpenic alcohol
Artemisyl acetate	0.01	Monoterpenic ester
Terpinen-4-ol	0.02	Monoterpenic alcohol
$\alpha$ -Terpineol	0.02	Monoterpenic alcohol
Safranal	0.01	Monoterpenic aldehyde
(3 <i>Z</i> )-Hexenyl isovalerate	0.04	Aliphatic ester
Carvone	0.02	Monoterpenic ketone
Hexyl isovalerate	0.02	Aliphatic ester
Geraniol	0.01	Monoterpenic alcohol
( <i>E</i> )-4,8-Dimethylnona-3,8-dien-2-one	0.08	Terpenic ketone
Thymol	0.02	Monoterpenic alcohol
(2 <i>E</i> ,4 <i>E</i> )-Decadienal	0.02	Aliphatic aldehyde
Bicycloelemene	0.05	Sesquiterpene
$\delta$ -Elemene isomer	0.01	Sesquiterpene
7 $\beta$ H-Silphiperfol-5-ene	0.01	Sesquiterpene
$\delta$ -Elemene	0.03	Sesquiterpene
Silphin-1-ene	tr	Sesquiterpene
$\alpha$ -Longipinene	0.03	Sesquiterpene
Dehydro-ar-ionene	0.01	Miscellaneous
Eugenol	0.01	Phenylpropanoid
$\alpha$ -Copaene	0.03	Sesquiterpene
Modhephene	0.07	Sesquiterpene
$\alpha$ -Isocomene	0.24	Sesquiterpene
Capric acid	0.14	Aliphatic acid
$\beta$ -Elemene	0.03	Sesquiterpene
( <i>Z</i> )-Jasmone	0.03	Jasmonate
$\beta$ -Isocomene	0.05	Sesquiterpene

Isocaryophyllene	0.04	Sesquiterpene
β-Caryophyllene	0.18	Sesquiterpene
β-Copaene	0.02	Sesquiterpene
α-Maaliene	0.01	Sesquiterpene
Aromadendrene	0.10	Sesquiterpene
Striatene?	0.01	Sesquiterpene
α-Humulene	0.06	Sesquiterpene
allo-Aromadendrene	0.10	Sesquiterpene
(E)-β-Farnesene	32.05	Sesquiterpene
Dehydrosesquicineole	0.20	Sesquiterpenic ether
Germacrene D	1.85	Sesquiterpene
β-Selinene	0.15	Sesquiterpene
ar-Curcumene	0.06	Sesquiterpene
Viridiflorene	0.15	Sesquiterpene
Bicyclogermacrene	1.38	Sesquiterpene
epi-Cubebol	0.01	Sesquiterpenic alcohol
α-Zingiberene	0.09	Sesquiterpene
(3Z,6E)-α-Farnesene	0.34	Sesquiterpene
α-Muurolene	0.06	Sesquiterpene
γ-Cadinene	0.01	Sesquiterpene
β-Bisabolene	0.10	Sesquiterpene
Cubebol	0.03	Sesquiterpenic alcohol
(3E,6E)-α-Farnesene	3.19	Sesquiterpene
3,6-Dihydrochamazulene	0.04	Azulene
Dihydrochamazulene isomer I	0.03	Azulene
δ-Cadinene	0.19	Sesquiterpene
β-Sesquiphellandrene	0.06	Sesquiterpene
(2Z?,8Z?)-Matricaria ester	0.04	Polyne ester
Unknown	0.03	Oxygenated sesquiterpene
α-Cadinene	0.04	Sesquiterpene
(E)-α-Bisabolene	0.04	Sesquiterpene
Salviadienol?	0.04	Sesquiterpenic alcohol
Sesquirosefuran?	0.03	Sesquiterpenic ether
(E)-Nerolidol	0.28	Sesquiterpenic alcohol
Spathulenol	0.89	Sesquiterpenic alcohol
Dendrolasin	0.17	Sesquiterpenic ether
Caryophyllene oxide	0.03	Sesquiterpenic ether
Globulol	0.08	Sesquiterpenic alcohol
Salvia-4(14)-en-1-one	0.02	Aliphatic alcohol
Viridiflorol	0.06	Sesquiterpenic alcohol
Ledol	0.11	Sesquiterpenic alcohol
5,6-Dihydrochamazulene	0.14	Azulene
(2,7Z)-Bisaboladien-4-ol	0.14	Sesquiterpenic alcohol
Unknown	0.08	Unknown
τ-Cadinol	0.05	Sesquiterpenic alcohol

τ-Muurolol	0.05	Sesquiterpenic alcohol
Unknown	0.19	Unknown
α-Bisabolol oxide B, epimer 2	0.12	Sesquiterpenic alcohol
α-Eudesmol	0.56	Sesquiterpenic alcohol
α-Bisabolol oxide B, epimer 1	4.06	Sesquiterpenic alcohol
Ageratochromene	0.05	Chromane
β-Bisabolol	0.08	Sesquiterpenic alcohol
(E)-Bisabol-11-ol	0.45	Sesquiterpenic alcohol
α-Bisabolol analog	0.07	Sesquiterpenic alcohol
Bisabolone oxide A	2.13	Sesquiterpenic ketone
α-Bisabolol	37.14	Sesquiterpenic alcohol
(2E,6Z)-Farnesol	0.22	Sesquiterpenic alcohol
Herniarin	0.04	Coumarin
Chamazulene	2.41	Azulene
α-Bisabolol oxide A	3.19	Sesquiterpenic alcohol
Bisabolol oxide, epimer I	0.02	Sesquiterpenic alcohol
Benzyl benzoate	0.05	Phenolic ester
Bisabolol oxide, epimer II	0.04	Sesquiterpenic alcohol
Bisabolol oxide, epimer III	0.03	Sesquiterpenic alcohol
Myristic acid	0.10	Aliphatic acid
Phytone	0.24	Terpenic ketone
(Z)-Spiroether	1.04	Polyyne
(E)-Spiroether	0.10	Polyyne
(Z)-Tibetin spiroether	0.03	Polyyne
(E)-Tibetin spiroether	0.05	Polyyne
Palmitic acid	0.25	Aliphatic acid
Ethyl palmitate	0.01	Aliphatic ester
Methyl linoleate	0.04	Aliphatic ester
Phytol	0.08	Diterpenic alcohol
Linoleic acid	0.06	Aliphatic acid
Oleic acid	0.03	Aliphatic acid
(9Z)-18-Octadecenolide?	0.01	Aliphatic lactone
Tricosane	0.05	Alkane
Tetracosane	0.02	Alkane
Pentacosane	0.13	Alkane
Hexacosane	0.01	Alkane
Heptacosane	0.05	Alkane
6,8-Pentacosanedione?	0.03	β-Diketone
Unknown	0.35	Unknown
Unknown	0.02	Unknown
<b>Consolidated total</b>	<b>97.60</b>	

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

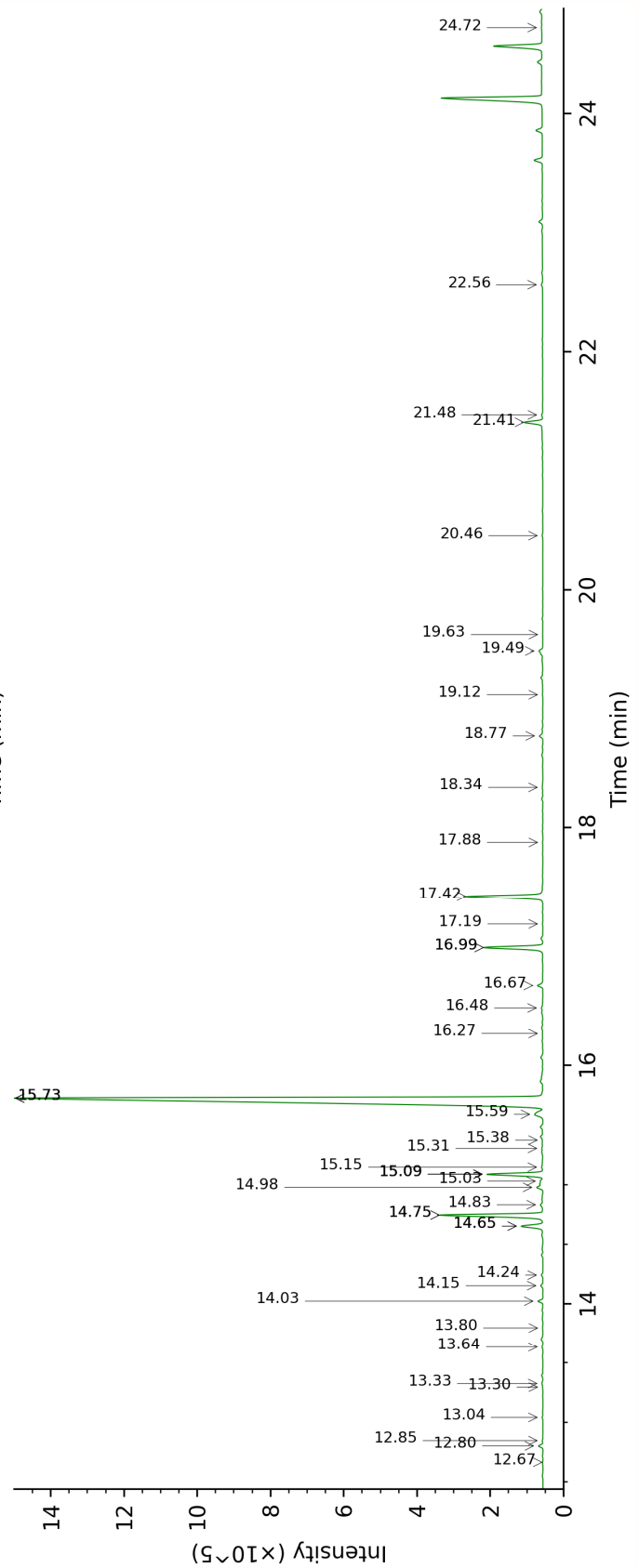
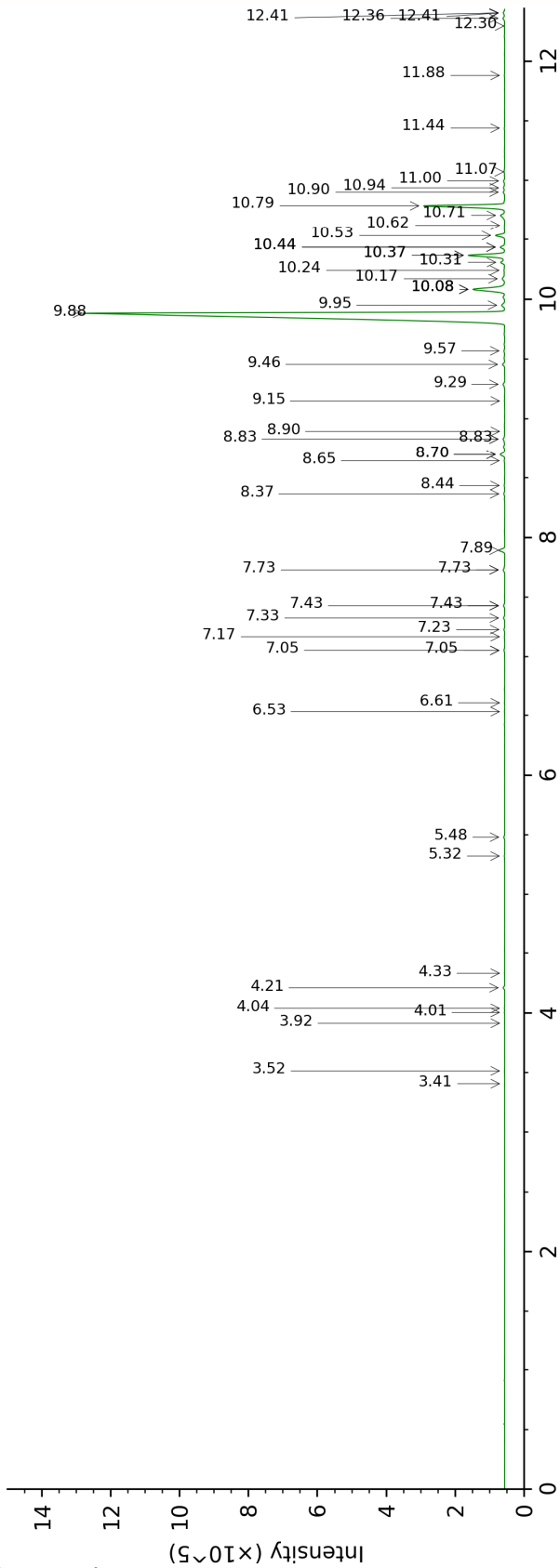
overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report to access the full untreated data and perform their own calculations if needed.

**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.

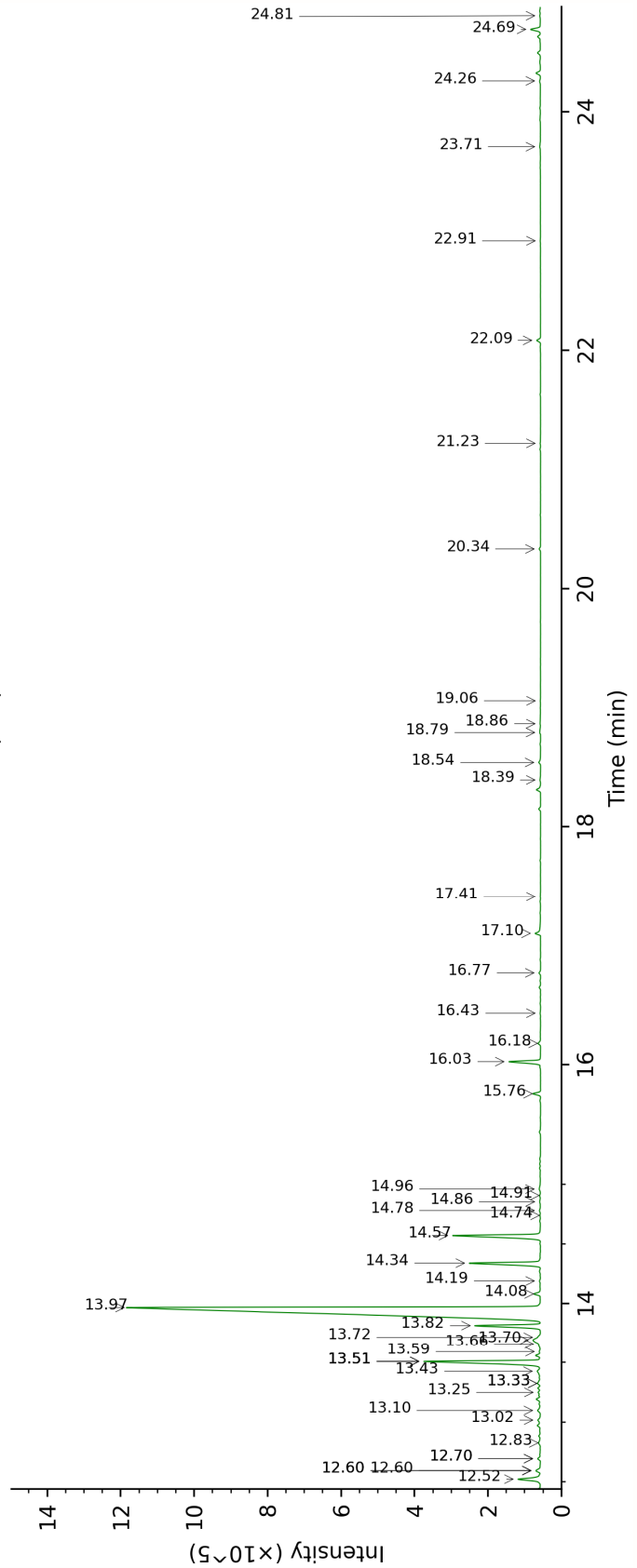
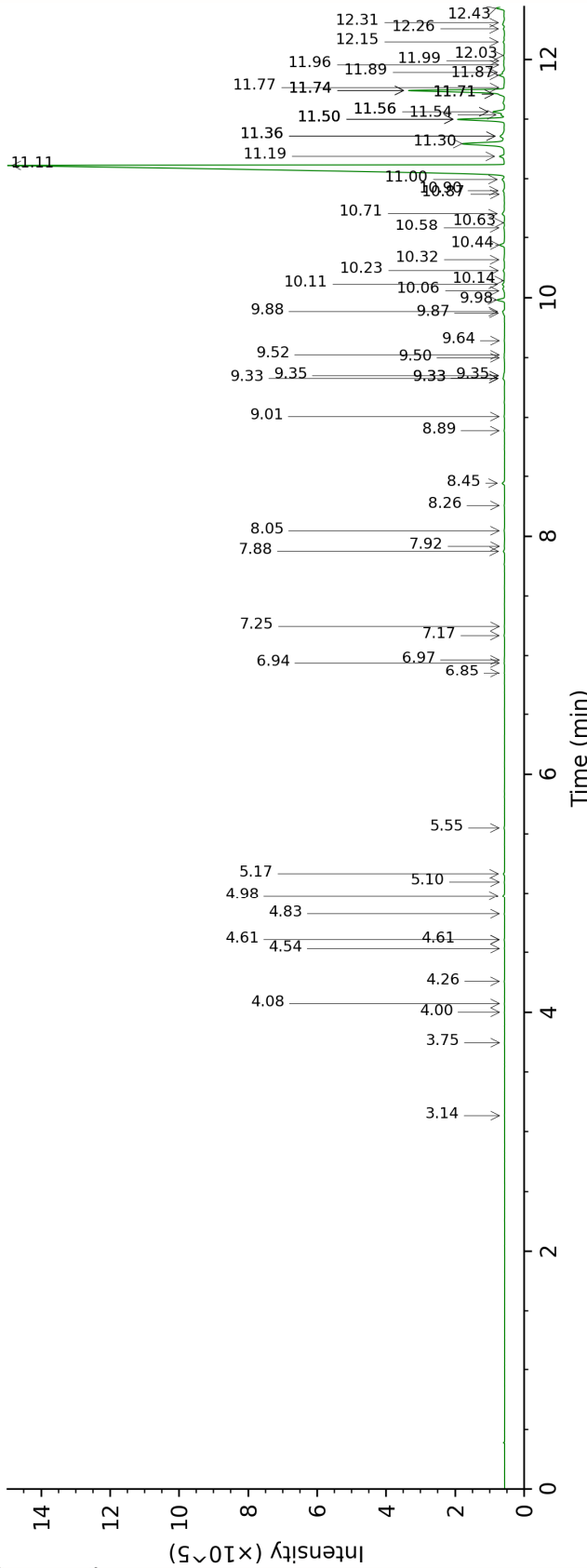
This page was intentionally left blank. The following pages present the complete data of the analysis.

DB-WAX





DB-5



FULL ANALYSIS DATA

<b><math>\alpha</math>-Pinene</b>	<b>Column DB-WAX</b>			<b>Column DB-5</b>		
				3.14	930.3	0.01
$\beta$ -Pinene				3.75	970.7	0.01
6-Methyl-5-hepten-2-one	5.32	1298.1	0.01	4.00	987.5	0.01
2-Pentylfuran	3.92	1197.3	tr	4.08	992.3	0.01
$\alpha$ -Phellandrene				4.26	1004.5	0.01
<i>para</i> -Cymene	4.33	1227.3	0.01	4.54	1021.7	0.01
Limonene	3.41	1158.8	tr	4.61*	1026.3	[0.02]
1,8-Cineole	3.52	1167.0	0.01	4.61*	1026.3	[0.02]
( <i>Z</i> )- $\beta$ -Ocimene	4.01	1203.8	0.01	4.83	1039.9	0.01
( <i>E</i> )- $\beta$ -Ocimene	4.21	1218.6	0.06	4.98	1049.5	0.05
$\gamma$ -Terpinene	4.04	1206.2	0.01	5.10	1056.9	0.01
Artemisia ketone	5.48	1309.3	0.04	5.17	1061.2	0.04
Artemisia alcohol	7.73*	1472.0	[0.08]	5.55	1085.3	0.02
<i>cis</i> -Chrysanthemol	10.08*	1654.8	[1.73]	6.85	1167.9	0.01
Artemisyl acetate	6.61	1389.5	0.01	6.94	1173.4	0.01
Terpinen-4-ol	8.83*	1555.9	[0.09]	6.97	1175.1	0.02
$\alpha$ -Terpineol	10.08*	1654.8	[1.73]	7.17	1188.1	0.02
Safranal	9.15	1580.4	0.01	7.25	1193.0	0.01
(3 <i>Z</i> )-Hexenyl isovalerate	7.43*	1449.9	[0.05]	7.88	1234.5	0.04
Carvone	10.24	1667.6	0.04	7.92	1237.3	0.02
Hexyl isovalerate	7.06*	1422.3	[0.03]	8.05	1246.0	0.02
Geraniol	11.88	1805.2	0.02	8.26	1260.1	0.01
( <i>E</i> )-4,8-Dimethylnona-3,8-dien-2-one	9.46	1604.4	0.09	8.45	1272.6	0.08
Thymol	15.38	2129.7	0.02	8.89	1302.4	0.02
(2 <i>E</i> ,4 <i>E</i> )-Decadienal	11.44	1767.4	0.02	9.01	1310.7	0.02
Bicycloelemene	7.33	1442.3	0.05	9.33*	1333.1	[0.07]
$\delta$ -Elemene isomer	7.17	1430.8	0.01	9.33*	1333.1	[0.07]
7 $\beta$ H-Silphiperfol-5-ene	6.53	1384.2	0.01	9.33*	1333.1	[0.07]
$\delta$ -Elemene	7.23	1435.2	0.03	9.35*	1334.7	[0.03]
Silphin-1-ene	7.06*	1422.3	[0.03]	9.35*	1334.7	[0.03]
$\alpha$ -Longipinene				9.50	1345.2	0.03
Dehydro-ar-ionene				9.52	1346.9	0.01
Eugenol	15.09*	2101.2	[2.17]	9.64	1355.2	0.01
$\alpha$ -Copaene	7.43*	1449.9	[0.05]	9.87	1371.4	0.03
Modhephene	7.73*	1472.0	[0.08]	9.88	1372.3	0.07
$\alpha$ -Isocomene	7.90	1484.1	0.24	9.98	1379.2	0.24
Capric acid				10.06*†	1384.4	[0.01]
$\beta$ -Elemene	8.70*	1545.6	[0.21]	10.11*†	1388.3	[0.09]
( <i>Z</i> )-Jasmone	12.67	1874.2	0.03	10.14*†	1390.5	[0.01]

β-Isocomene	8.37	1520.0	0.04	10.23	1396.4	0.05
Isocaryophyllene	8.44	1525.5	0.03	10.32	1402.8	0.04
β-Caryophyllene	8.70*	1545.6	[0.21]	10.44	1411.9	0.18
β-Copaene	8.65	1541.5	0.03	10.58	1422.5	0.02
α-Maaliene	8.90	1560.9	0.01	10.63	1426.3	0.01
Aromadendrene	8.83*	1555.9	[0.09]	10.71	1431.9	0.10
Striatene?				10.87	1444.0	0.01
α-Humulene	9.57	1613.6	0.04	10.90	1446.2	0.06
allo-Aromadendrene	9.29	1591.1	0.08	11.00	1453.2	0.10
(E)-β-Farnesene	9.88	1638.8	32.36	11.11	1461.9	32.05
Dehydrosesquiceneol	10.31	1672.9	0.17	11.19	1467.6	0.20
Germacrene D	10.08*	1654.8	[1.73]	11.30	1475.5	1.85
β-Selinene	10.17	1662.0	0.15	11.36*	1480.1	[0.20]
ar-Curcumene	10.94	1725.2	0.06	11.36*	1480.1	[0.20]
Viridiflorene	9.95	1644.2	0.15	11.50*	1490.6	[1.54]
Bicyclogermacrene	10.37*	1677.7	[1.51]	11.50*	1490.6	[1.54]
epi-Cubebol	12.30	1841.7	0.01	11.50*	1490.6	[1.54]
α-Zingiberene	10.44*	1683.2	[0.18]	11.54	1493.4	0.09
(3Z,6E)-α-Farnesene	10.53	1691.1	0.34	11.56*	1495.3	[0.40]
α-Muurolene	10.37*	1677.7	[1.51]	11.56*	1495.3	[0.40]
γ-Cadinene	10.62	1698.6	0.01	11.71*	1506.5	[0.11]
β-Bisabolene	10.44*	1683.2	[0.18]	11.71*	1506.5	[0.11]
Cubebol	12.85	1890.3	0.03	11.74*	1508.9	[3.23]
(3E,6E)-α-Farnesene	10.79	1712.5	3.19	11.74*	1508.9	[3.23]
3,6-Dihydrochamazulene	12.41*	1851.5	[0.07]	11.74*	1508.9	[3.23]
Dihydrochamazulene isomer I	12.41*	1851.5	[0.07]	11.76	1510.8	0.03
δ-Cadinene	10.71	1705.8	0.22	11.87	1518.9	0.19
β-Sesquiphellandrene	10.90	1722.2	0.06	11.89	1520.7	0.06
(2Z?,8Z?)-Matricaria ester	16.48	2242.0	0.06	11.96	1525.7	0.04
Unknown CULO XIV [m/z 93, 91 (59), 43 (55), 79 (49), 105 (40)... 220? (t)]	13.80	1977.6	0.03	11.99	1528.4	0.03
α-Cadinene	11.07	1736.5	0.04	12.03	1531.9	0.04
(E)-α-Bisabolene	11.00	1730.1	0.05	12.15	1540.7	0.04
Salviadienol?	14.65*	2059.0	[0.96]	12.26	1549.3	0.04
Sesquirosefuran?	12.36	1847.3	0.07	12.31	1553.4	0.03
(E)-Nerolidol	14.02	1998.8	0.18	12.43	1563.0	0.28
Spathulenol	14.65*	2059.0	[0.96]	12.52	1570.2	0.89
Dendrolasin	12.80	1886.3	0.17	12.60*	1575.8	[0.21]
Caryophyllene oxide	13.04	1908.2	0.03	12.60*	1575.8	[0.21]
Globulol	14.16	2011.3	0.08	12.60*	1575.8	[0.21]

Salvia-4(14)-en-1-one	13.30	1931.5	0.02	12.70*	1583.6	[0.10]
Viridiflorol	14.24	2019.7	0.06	12.70*	1583.6	[0.10]
Ledol	13.64	1962.7	0.04	12.83	1594.0	0.11
5,6-Dihydrochamazulene	14.75*	2067.9	[4.20]	13.02	1609.4	0.14
(2,7Z)-Bisaboladien-4-ol	15.09*	2101.2	[2.17]	13.10	1616.0	0.14
Unknown UNKN CXCI [m/z 93, 41 (52), 79 (46), 91 (45), 43 (38), 67 (37)...]				13.25	1628.5	0.08
$\tau$ -Cadinol	15.15	2107.1	0.05	13.33*	1634.7	[0.15]
$\tau$ -Muurolol	15.31	2122.8	0.05	13.33*	1634.7	[0.15]
Unknown LYUN IV [m/z 123, 43 (86), 81 (75), 95 (73), 82 (68), 161 (64), 105 (63)... 220 (6)]	13.33	1934.3	0.06	13.43	1643.2	0.19
$\alpha$ -Bisabolol oxide B, epimer 2	14.83	2076.2	0.12	13.51*	1650.0	[4.46]
$\alpha$ -Eudesmol	15.59	2151.1	0.56	13.51*	1650.0	[4.46]
$\alpha$ -Bisabolol oxide B, epimer 1	14.75*	2067.9	[4.20]	13.51*	1650.0	[4.46]
Ageratochromene	17.19	2316.1	0.02	13.59	1656.8	0.05
$\beta$ -Bisabolol	15.03	2095.4	0.10	13.66	1662.3	0.08
(E)-Bisabol-11-ol	15.73*	2164.6	[37.34]	13.70	1665.2	0.45
$\alpha$ -Bisabolol analog	15.73*	2164.6	[37.34]	13.72	1667.1	0.07
Bisabolone oxide A	15.09*	2101.2	[2.17]	13.82	1675.3	2.13
$\alpha$ -Bisabolol	15.73*	2164.6	[37.34]	13.97	1687.8	37.14
(2E,6Z)-Farnesol	16.67	2261.5	0.21	14.08	1697.2	0.22
Herniarin	21.48	2814.8	0.04	14.19	1706.4	0.04
Chamazulene	16.99*	2294.8	[2.44]	14.34	1719.3	2.41
$\alpha$ -Bisabolol oxide A	17.42	2341.3	3.13	14.57	1739.2	3.19
Bisabolol oxide, epimer I				14.74	1753.9	0.02
Benzyl benzoate	19.12	2529.8	0.02	14.78	1757.3	0.05
Bisabolol oxide, epimer II				14.86	1763.8	0.04
Bisabolol oxide, epimer III				14.91	1768.3	0.03
Myristic acid				14.96	1772.9	0.10
Phytone	14.98	2090.3	0.26	15.76	1844.0	0.24
(Z)-Spiroether	21.41	2806.9	0.92	16.03	1868.3	1.04
(E)-Spiroether	22.56	2955.0	0.05	16.18	1882.2	0.10
(Z)-Tibetin spiroether				16.43	1905.3	0.03

(E)-Tibetin spiroether				16.77	1937.3	0.05
Palmitic acid				17.10	1968.7	0.25
Ethyl palmitate	16.27	2219.9	0.02	17.41	1998.2	0.01
Methyl linoleate	18.34	2441.7	0.05	18.39	2095.3	0.04
Phytol	19.49	2572.9	0.16	18.54	2110.3	0.08
Linoleic acid				18.79	2136.2	0.06
Oleic acid				18.86	2143.8	0.03
(9Z)-18-Octadecenolide?				19.06	2163.6	0.01
Tricosane	16.99*	2294.8	[2.44]	20.34	2299.8	0.05
Tetracosane	17.88	2390.4	0.01	21.23	2399.6	0.02
Pentacosane	18.77	2490.1	0.15	22.08	2499.4	0.13
Hexacosane	19.63	2589.1	0.01	22.92	2599.6	0.01
Heptacosane	20.46	2688.1	0.03	23.71	2698.9	0.05
6,8-Pentacosanedione?	24.72	3253.3	0.02	24.26	2770.1	0.03
Unknown MARE VI [m/z 69, 41 (46), 81 (31), 165 (29), 91 (20), 181 (18), 167 (15)...]				24.69	2826.8	0.35
Unknown MARE VII [m/z 69, 41 (42), 81 (31), 165 (25), 91 (18), 93 (15), 181 (15)...]				24.81	2842.1	0.02
Total reported		95.67%			97.27%	

\*: 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