

Date : January 13, 2023

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23A10-PTH08

Customer identification : Chamomile German ORGANIC - Egypt - CC1106R

Type : Essential oil

Source : *Matricaria chamomilla*

Customer : Plant Therapy

ANALYSIS

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

Analyst : Amélie Simard, Analyste

Analysis date : January 12, 2023

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Dark blue liquid

Refractive index: 1.5030 ± 0.0003 (20 °C; method PC-MAT-016)

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
Isobutyral	0.01	Aliphatic aldehyde
3-Buten-2-one	0.01	Aliphatic ketone
Isovaleral	0.05	Aliphatic aldehyde
2-Methylbutyral	0.06	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
2-Vinylfuran	tr	Furan
Toluene	tr	Simple phenolic
Hexanal	0.02	Aliphatic aldehyde
Octane	0.01	Alkane
Ethyl 2-methylbutyrate	0.10	Aliphatic ester
Ethyl isovalerate	0.01	Aliphatic ester
Heptanal	0.01	Aliphatic aldehyde
Santolinatriene	0.01	Monoterpene
α -Pinene	0.02	Monoterpene
Camphene	0.02	Monoterpene
Propyl 2-methylbutyrate	0.05	Aliphatic ester
Benzaldehyde	0.01	Simple phenolic
Sabinene	0.02	Monoterpene
β -Pinene	0.01	Monoterpene
6-Methyl-5-hepten-2-one	0.05	Aliphatic ketone
2-Pentylfuran	0.04	Furan
Myrcene	0.02	Monoterpene
Unknown	0.01	Monoterpene
Pseudolimonene	0.01	Monoterpene
α -Phellandrene	0.02	Monoterpene
Octanal	0.08	Aliphatic aldehyde
Yomogi alcohol	0.05	Monoterpenic alcohol
Δ^3 -Carene	0.01	Monoterpene
α -Terpinene	0.01	Monoterpene
para-Cymene	0.08	Monoterpene
Limonene	0.06	Monoterpene
β -Phellandrene	0.01	Monoterpene
1,8-Cineole	0.02	Monoterpenic ether
(Z)- β -Ocimene	0.05	Monoterpene
Seudenone?	0.02	Aliphatic ketone
(E)- β -Ocimene	0.27	Monoterpene
γ -Terpinene	0.10	Monoterpene
Artemisia ketone	0.26	Monoterpenic ketone
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.01	Monoterpene
Artemisia alcohol	0.09	Monoterpenic alcohol
Linalool	0.03	Monoterpenic alcohol
Nonanal	0.14	Aliphatic aldehyde
Unknown	0.01	Oxygenated monoterpene
Camphor	0.01	Monoterpenic ketone

<i>trans</i> -Chrysanthemal	0.01	Monoterpenic aldehyde
<i>trans</i> -Chrysanthemol	0.01	Monoterpenic alcohol
Borneol	0.08	Monoterpenic alcohol
Artemisyl acetate	0.02	Monoterpenic ester
Nonanol	0.02	Aliphatic alcohol
Terpinen-4-ol	0.02	Monoterpenic alcohol
α -Terpineol	0.02	Monoterpenic alcohol
Creosol	0.01	Simple phenolic
Safranal	0.04	Monoterpenic aldehyde
Decanal	0.02	Aliphatic aldehyde
Unknown	0.02	Unknown
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
Citronellol	0.04	Monoterpenic alcohol
(3 <i>Z</i>)-Hexenyl isovalerate	0.04	Aliphatic ester
Carvone	0.02	Monoterpenic ketone
(2 <i>E</i>)-Hexenyl isovalerate	0.02	Aliphatic ester
Hexyl isovalerate	0.04	Aliphatic ester
Geraniol	0.01	Monoterpenic alcohol
α -Ionene	0.02	Terpene derivative
4,8-Dimethylnona-3,8-dien-2-one	0.07	Terpenic ketone
(<i>E</i>)-4,8-Dimethylnona-3,8-dien-2-one	0.01	Terpenic ketone
Thymol	0.02	Monoterpenic alcohol
(2 <i>E</i> ,4 <i>E</i>)-Decadienal	0.01	Aliphatic aldehyde
Bicycloelemene	0.03	Sesquiterpene
7 β H-Silphiperfol-5-ene	0.02	Sesquiterpene
α -Longipinene	0.05	Sesquiterpene
Dehydro-ar-ionene	0.03	Miscellaneous
Eugenol	0.01	Phenylpropanoid
α -Ylangene	0.01	Sesquiterpene
α -Copaene	0.06	Sesquiterpene
α -Isocomene	0.06	Sesquiterpene
<i>cis</i> - β -Elemene	0.04	Sesquiterpene
β -Elemene	0.07	Sesquiterpene
Capric acid	0.58	Aliphatic acid
β -Isocomene	0.04	Sesquiterpene
β -Caryophyllene	0.11	Sesquiterpene
β -Copaene	0.05	Sesquiterpene
Aromadendrene	0.10	Sesquiterpene
Striatene?	0.04	Sesquiterpene
α -Humulene	0.06	Sesquiterpene
allo-Aromadendrene	0.12	Sesquiterpene
(<i>E</i>)- β -Farnesene	17.15	Sesquiterpene
Dehydrosesquicineole	0.20	Sesquiterpenic ether
γ -Muurolene	0.11	Sesquiterpene
Germacrene D	0.97	Sesquiterpene
β -Selinene	0.12	Sesquiterpene
ar-Curcumene	0.24	Sesquiterpene
Viridiflorene	0.09	Sesquiterpene
Bicyclogermacrene	0.55	Sesquiterpene
α -Zingiberene	0.15	Sesquiterpene
α -Muurolene	0.01	Sesquiterpene
(3 <i>Z</i> ,6 <i>E</i>)- α -Farnesene	0.10	Sesquiterpene

(3E,6E)- α -Farnesene	0.64	Sesquiterpene
γ -Cadinene	0.23	Sesquiterpene
3,6-Dihydrochamazulene	0.68	Azulene
Dihydrochamazulene isomer I	0.18	Azulene
<i>trans</i> -Calamenene	0.03	Sesquiterpene
δ -Cadinene	0.22	Sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
α -Cadinene	0.04	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.03	Sesquiterpene
Salviadienol?	0.03	Sesquiterpenic alcohol
Sesquirosefuran?	0.10	Sesquiterpenic ether
(<i>E</i>)-Nerolidol	0.28	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Dendrolasin	0.17	Sesquiterpenic ether
Spathulenol	0.64	Sesquiterpenic alcohol
Caryophyllene oxide	0.03	Sesquiterpenic ether
Globulol	0.18	Sesquiterpenic alcohol
Viridiflorol	0.10	Sesquiterpenic alcohol
Ledol	0.14	Sesquiterpenic alcohol
5,6-Dihydrochamazulene	0.18	Azulene
(2,7 <i>Z</i>)-Bisaboladien-4-ol	0.30	Sesquiterpenic alcohol
τ -Cadinol	0.51	Sesquiterpenic alcohol
τ -Muurolo	0.19	Sesquiterpenic alcohol
α -Bisabolol oxide B, epimer 1	0.17	Sesquiterpenic alcohol
α -Bisabolol oxide B, epimer 2	5.71	Sesquiterpenic alcohol
Ageratochromene	0.39	Chromane
epi- β -Bisabolol	0.05	Sesquiterpenic alcohol
(<i>E</i>)-Bisabol-11-ol	0.07	Sesquiterpenic alcohol
β -Bisabolol	0.07	Sesquiterpenic alcohol
Bisabolone oxide A	3.96	Sesquiterpenic ketone
Eudesma-4(15),7-dien-1 β -ol	0.03	Sesquiterpenic alcohol
α -Bisabolol	1.24	Sesquiterpenic alcohol
Germacra-4(15),5,10(14)-trien-1 α -ol	0.10	Sesquiterpenic alcohol
(2 <i>E</i> ,6 <i>Z</i>)-Farnesol	0.08	Sesquiterpenic alcohol
Herniarin	0.03	Coumarin
Chamazulene	2.35	Azulene
α -Bisabolol oxide A	43.42	Sesquiterpenic alcohol
Bisabolol oxide, epimer I	0.07	Sesquiterpenic alcohol
Benzyl benzoate	0.09	Phenolic ester
Myristic acid	0.04	Aliphatic acid
α -Costol?	0.13	Sesquiterpenic alcohol
Unknown	0.06	Oxygenated sesquiterpene
Phytone	0.33	Terpenic ketone
(<i>Z</i>)-Spiroether	3.07	Polyyne
(<i>E</i>)-Spiroether	0.50	Polyyne
(<i>Z</i>)-Tibetin spiroether	0.04	Polyyne
Methyl palmitate	0.05	Aliphatic ester
(<i>E</i>)-Tibetin spiroether	0.10	Polyyne
Palmitic acid	1.00	Aliphatic acid
Ethyl palmitate	0.04	Aliphatic ester
Eicosane	0.06	Alkane
Phytol	0.09	Diterpenic alcohol

Linoleic acid	0.30	Aliphatic acid
Oleic acid	0.20	Aliphatic acid
Docosane	0.03	Alkane
Tricosane	0.22	Alkane
Tetracosane	0.07	Alkane
Pentacosane	0.72	Alkane
Hexacosane	0.03	Alkane
Heptacosane	0.16	Alkane
Unknown	0.01	Unknown
Consolidated total	93.68%	

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

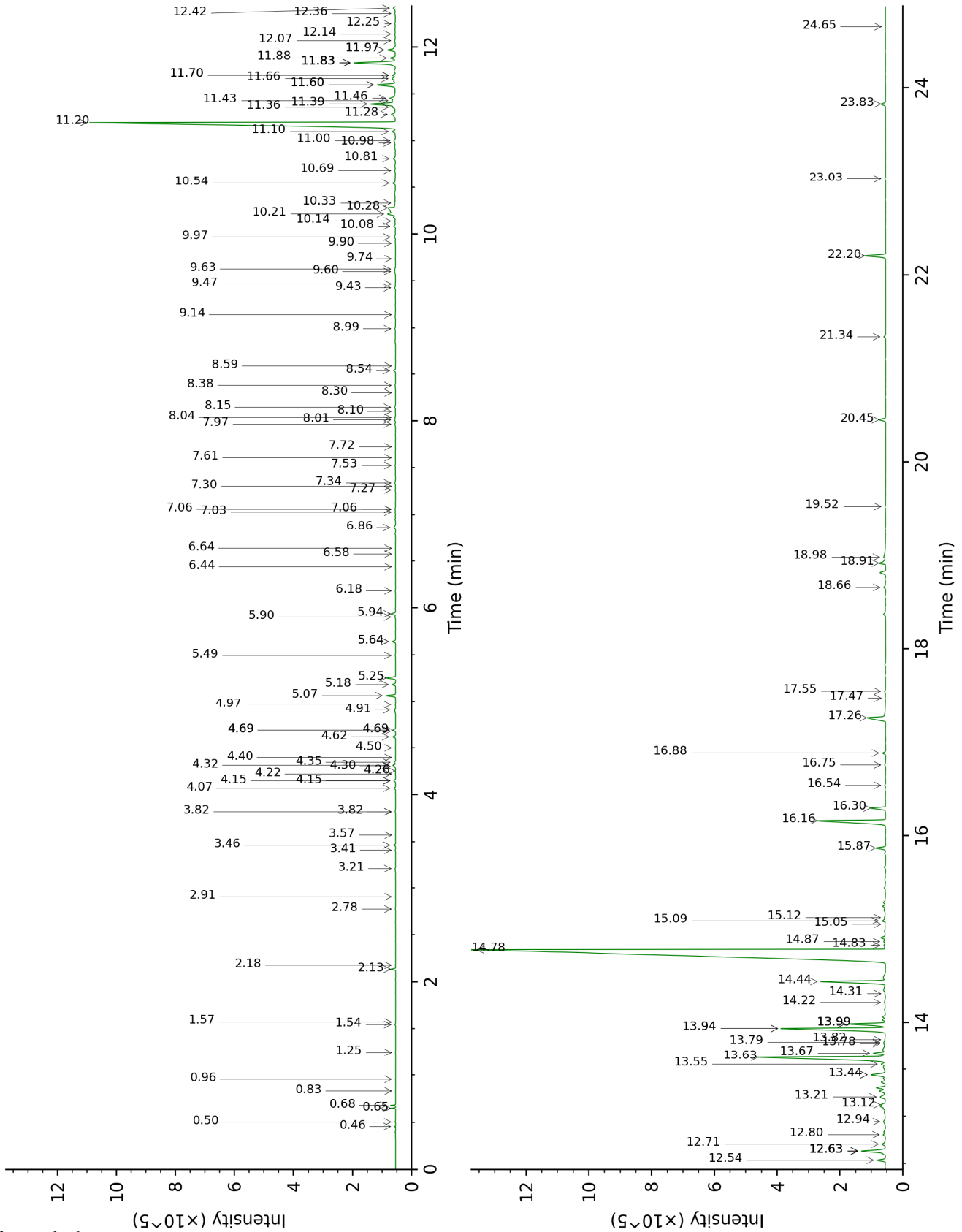
Note: no correction factor was applied

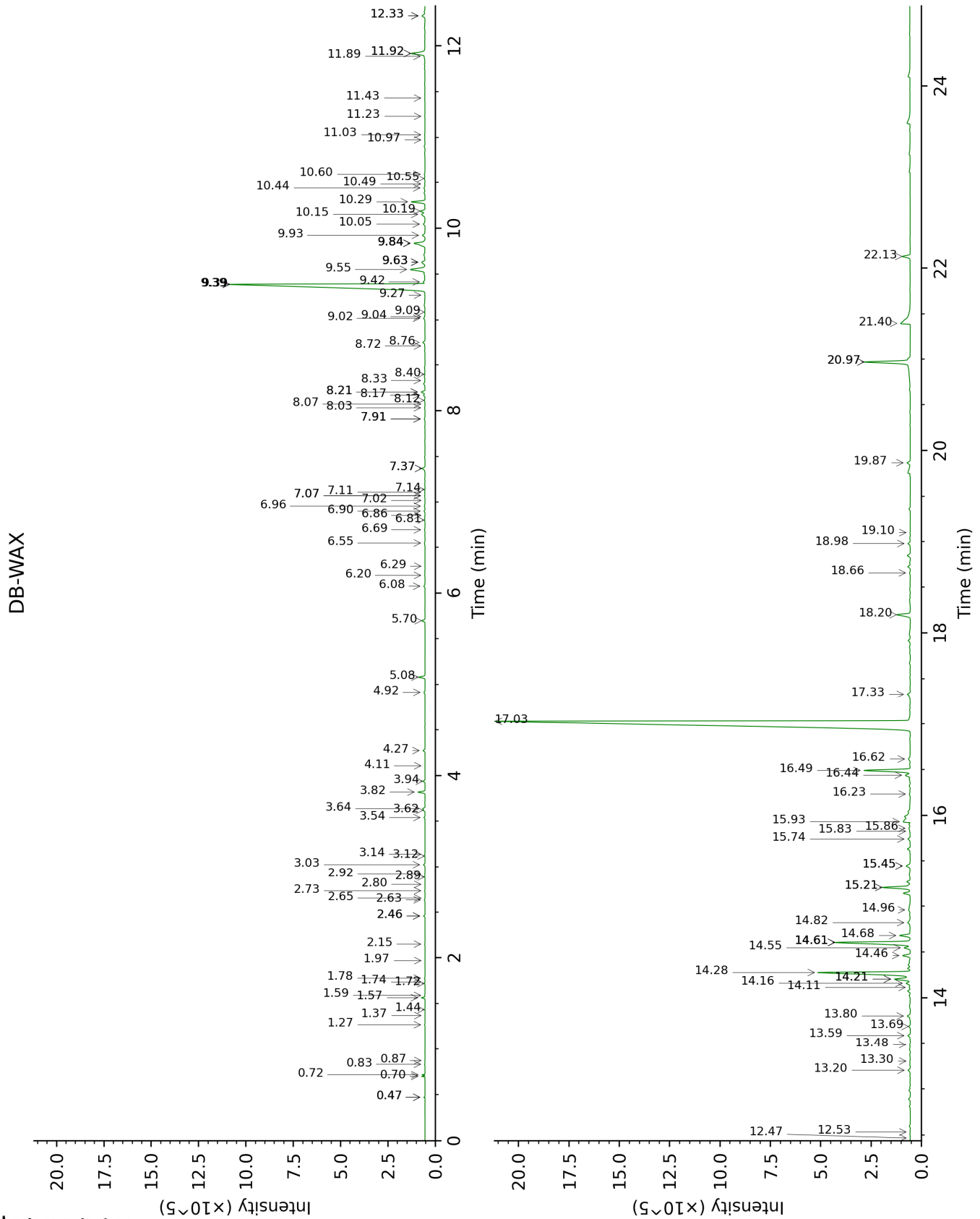
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

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DB-5





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isobutylal	0.46	538	0.01	0.47*	782	0.02
3-Buten-2-one	0.50	577	0.01	0.83	912	0.01
Isovaleral	0.65	641	0.05	0.72	889	0.05
2-Methylbutylal	0.68	651	0.06	0.70	882	0.06
2-Ethylfuran	0.83	701	tr	0.87	919	tr
2-Vinylfuran	0.96	720	tr	1.72	1038	0.01
Toluene	1.25	759	tr	1.37	1001	0.01
Hexanal	1.54	799	0.02	1.78	1044	0.02
Octane	1.57	803	0.01	0.47*	782	[0.02]
Ethyl 2-methylbutyrate	2.14	849	0.10	1.57	1022	0.10
Ethyl isovalerate	2.18	853	0.01	1.74	1039	0.01
Heptanal	2.78	902	0.01	2.92	1148	0.02
Santolinatriene	2.91	910	0.01	1.44	1008	tr
α-Pinene	3.22	931	0.02	1.27	989	0.02
Camphene	3.41	944	0.02	1.59	1024	0.01
Propyl 2-methylbutyrate	3.46	947	0.05	2.46*	1110	0.05
Benzaldehyde	3.57	954	0.01	7.14	1461	0.01
Sabinene	3.82*	970	0.02	2.15	1083	0.02
β-Pinene	3.82*	970	[0.02]	1.97	1064	0.01
6-Methyl-5-hepten-2-one	4.07	987	0.05	4.92	1298	0.05
2-Pentylfuran	4.15*	992	0.06	3.54	1199	0.04
Myrcene	4.15*	992	[0.06]	2.73	1133	0.02
Unknown [m/z 93, 91 (46), 80 (44), 79 (42), 77 (33), 92 (20)... 136 (4)]	4.22	997	0.01	2.89	1145	0.01
Pseudolimonene	4.26	999	0.01	2.65	1126	tr
α-Phellandrene	4.30	1002	0.02	2.63	1124	0.02
Octanal	4.32	1003	0.08	4.27	1254	0.08
Yomogi alcohol	4.35	1005	0.05	6.08	1382	0.05
Δ3-Carene	4.40	1008	0.01	2.46*	1110	[0.05]
α-Terpinene	4.50	1014	0.01	2.80	1138	0.01
para-Cymene	4.62	1022	0.08	3.94	1229	0.08
Limonene	4.69*	1026	0.08	3.03	1156	0.06
β-Phellandrene	4.69*	1026	[0.08]	3.12	1164	0.01
1,8-Cineole	4.69*	1026	[0.08]	3.14	1166	0.02
(Z)-β-Ocimene	4.91	1040	0.05	3.62	1205	0.05
Seudenone?	4.97	1044	0.02	8.07	1532	0.01
(E)-β-Ocimene	5.06	1050	0.27	3.82	1220	0.27
γ-Terpinene	5.18	1057	0.10	3.64	1206	0.09
Artemisia ketone	5.26	1061	0.26	5.08	1310	0.26
Octanol	5.49	1076	0.02	8.03	1528	0.03
Terpinolene	5.64*	1086	0.10	4.11	1241	0.01
Artemisia alcohol	5.64*	1086	[0.10]	7.37*	1478	0.16
Linalool	5.90	1102	0.03	7.91*	1519	0.04

Nonanal	5.94	1104	0.14	5.70	1354	0.13
Unknown [m/z 43, 81 (62), 59 (60), 85 (49), 82 (38)... 154 (2)]	6.18	1120	0.01			
Camphor	6.44	1136	0.01	7.02	1452	0.01
<i>trans</i> -Chrysanthemal	6.58	1144	0.01	7.07*	1456	0.03
<i>trans</i> -Chrysanthemol	6.64	1148	0.01	9.39*	1636	17.17
Borneol	6.86	1163	0.08	9.63*	1655	0.22
Artemisyl acetate	7.03	1173	0.02	6.20	1390	0.02
Nonanol	7.06*	1175	0.03	9.27	1626	0.02
Terpinen-4-ol	7.06*	1175	[0.03]	8.40	1557	0.02
α -Terpineol	7.27	1188	0.02	9.63*	1655	[0.22]
Creosol	7.30	1191	0.01	12.33*	1886	0.18
Safranal	7.34	1193	0.04	8.72	1582	0.03
Decanal	7.53	1205	0.02	7.11	1458	0.02
Unknown [m/z 109, 41 (42), 81 (39), 69 (32), 79 (25), 159 (23)... 174 (7)]	7.61	1210	0.02			
<i>trans</i> -Carveol	7.72	1218	0.01	11.23	1789	0.02
Citronellol	7.97	1234	0.04	10.55	1731	0.04
(3 <i>Z</i>)-Hexenyl isovalerate	8.01	1237	0.04	6.96	1447	0.04
Carvone	8.04	1239	0.02	9.84*	1672	0.78
(2 <i>E</i>)-Hexenyl isovalerate	8.10	1243	0.02	7.07*	1456	[0.03]
Hexyl isovalerate	8.15	1246	0.04			
Geraniol	8.30	1257	0.01	11.43	1806	0.02
α -Ionene	8.38	1262	0.02	6.69	1427	0.03
4,8-Dimethylnona-3,8-dien-2-one	8.54	1272	0.07	9.02	1606	0.08
(<i>E</i>)-4,8-Dimethylnona-3,8-dien-2-one	8.59	1276	0.01	9.04	1607	0.02
Thymol	8.99	1303	0.02	14.96	2135	0.26
(2 <i>E</i> ,4 <i>E</i>)-Decadienal	9.14	1313	0.01	11.03	1772	0.02
Bicycloelemene	9.43	1333	0.03	6.81	1436	0.02
7 β H-Silphiperfol-5-ene	9.47	1336	0.02	6.30	1398	0.01
α -Longipinene	9.60	1345	0.05	6.55	1416	0.04
Dehydro-ar-ionene	9.63	1347	0.03			
Eugenol	9.74	1355	0.01	14.61*	2100	4.09
α -Ylangene	9.90	1366	0.01	6.86	1440	0.01
α -Copaene	9.97	1371	0.06	6.90	1443	0.05
α -Isocomene	10.08	1379	0.06	7.37*	1478	[0.16]
<i>cis</i> - β -Elemene	10.14	1383	0.04	8.12	1535	0.04
β -Elemene	10.22†	1389	0.92	8.21*	1542	0.18
Capric acid	10.28†	1393	[0.92]	15.93	2234	0.58
β -Isocomene	10.33	1397	0.04	7.91*	1519	[0.04]
β -Caryophyllene	10.54	1412	0.11	8.21*	1542	[0.18]
β -Copaene	10.68	1423	0.05	8.17	1539	0.07
Aromadendrene	10.81	1432	0.10	8.33	1552	0.02
Striatene?	10.98	1444	0.04			

α-Humulene	11.00	1446	0.06	9.09	1611	0.02
allo-Aromadendrene	11.10	1454	0.12	8.76	1585	0.12
(E)-β-Farnesene	11.20	1461	17.15	9.39*	1636	[17.17]
Dehydrosesquicineole	11.28	1467	0.20	9.84*	1672	[0.78]
γ-Muurolene	11.36	1473	0.11	9.39*	1636	[17.17]
Germacrene D	11.39	1475	0.97	9.55	1649	0.96
β-Selinene	11.43	1478	0.12	9.63*	1655	[0.22]
ar-Curcumene	11.46	1480	0.24	10.44	1722	0.06
Viridiflorene	11.60*	1490	0.72	9.42	1638	0.09
Bicyclogermacrene	11.60*	1490	[0.72]	9.84*	1672	[0.78]
α-Zingiberene	11.66	1495	0.15	9.92	1679	0.14
α-Muurolene	11.70*	1498	0.10	9.84*	1672	[0.78]
(3Z,6E)-α-Farnesene	11.70*	1498	[0.10]	10.05	1689	0.10
(3E,6E)-α-Farnesene	11.83*	1508	1.58	10.29	1710	0.64
γ-Cadinene	11.83*	1508	[1.58]	10.15	1698	0.23
3,6-Dihydrochamazulene	11.83*	1508	[1.58]	11.92*	1850	0.86
Dihydrochamazulene isomer I	11.88	1512	0.18	11.92*	1850	[0.86]
trans-Calamenene	11.97*	1519	0.33	10.98	1767	0.03
δ-Cadinene	11.97*	1519	[0.33]	10.19	1701	0.22
Unknown [m/z 93, 91 (59), 43 (55), 79 (49), 105 (40)... 220? (t)]	12.07	1527	0.05	13.30	1975	0.03
α-Cadinene	12.14	1532	0.04	10.60	1736	0.04
(E)-α-Bisabolene	12.25	1541	0.03	10.49	1726	0.02
Salviadienol?	12.36	1549	0.03	14.11	2052	0.06
Sesquirosefuran?	12.42	1554	0.10	11.89	1847	0.06
(E)-Nerolidol	12.54	1563	0.28	13.59	2002	0.15
Caryophyllene oxide isomer	12.63*	1571	1.00	12.47	1898	0.02
Dendrolasin	12.63*	1571	[1.00]	12.33*	1886	[0.18]
Spathulenol	12.63*	1571	[1.00]	14.20*	2061	0.82
Caryophyllene oxide	12.63*	1571	[1.00]	12.53	1904	0.03
Globulol	12.71	1577	0.18	13.69	2011	0.09
Viridiflorol	12.80	1584	0.10	13.80	2022	0.16
Ledol	12.94	1595	0.14	13.20	1966	0.13
5,6-Dihydrochamazulene	13.12	1609	0.18	14.20*	2061	[0.82]
(2,7Z)-Bisaboladien-4-ol	13.20	1616	0.30	14.55	2094	0.30
τ-Cadinol	13.44*	1636	0.61	14.68	2107	0.51
τ-Muurolol	13.44*	1636	[0.61]	14.82	2121	0.19
α-Bisabolol oxide B, epimer 1	13.55	1645	0.17	14.16	2056	0.22
α-Bisabolol oxide B, epimer 2	13.63	1651	5.71	14.28	2068	5.26
Ageratochromene	13.67	1655	0.39	16.62	2305	0.14
epi-β-Bisabolol	13.78	1663	0.05	14.61*	2100	[4.09]
(E)-Bisabol-11-ol	13.79	1664	0.07	15.21*	2160	1.37
β-Bisabolol	13.82	1667	0.07	14.61*	2100	[4.09]
Bisabolone oxide A	13.94*	1677	4.14	14.61*	2100	[4.09]

Eudesma-4(15),7-dien-1 β -ol	13.94*	1677	[4.14]	15.83	2223	0.03
α -Bisabolol	13.99*	1681	1.34	15.21*	2160	[1.37]
Germacra-4(15),5,10(14)-trien-1 α -ol	13.99*	1681	[1.34]	15.86	2226	0.10
(2E,6Z)-Farnesol	14.22	1700	0.08	16.23	2265	0.07
Herniarin	14.31	1708	0.03	20.97*	2808	3.00
Chamazulene	14.44	1719	2.35	16.49	2292	2.31
α -Bisabolol oxide A	14.78	1748	43.42	17.03	2349	43.08
Bisabolol oxide, epimer I	14.83	1752	0.07			
Benzyl benzoate	14.86	1755	0.09	18.66	2530	0.04
Myristic acid	15.05	1771	0.04			
α -Costol?	15.08	1774	0.13			
Unknown [m/z 94, 109 (54), 43 (53), 69 (48), 79 (40)...]	15.12	1778	0.06			
Phytone	15.87	1844	0.33	14.46	2086	0.38
(Z)-Spiroether	16.16	1871	3.07	20.97*	2808	[3.00]
(E)-Spiroether	16.30	1883	0.50	22.13	2956	0.39
(Z)-Tibetin spiroether	16.54	1905	0.04			
Methyl palmitate	16.76	1926	0.05	15.45*	2184	0.27
(E)-Tibetin spiroether	16.88	1938	0.10			
Palmitic acid	17.26	1973	1.00	21.40	2862	1.13
Ethyl palmitate	17.47	1994	0.04	15.74	2214	0.14
Eicosane	17.55	2001	0.06	13.48	1992	0.04
Phytol	18.66	2111	0.09	18.98	2567	0.12
Linoleic acid	18.91	2137	0.30			
Oleic acid	18.98	2144	0.20			
Docosane	19.52	2200	0.03	15.45*	2184	[0.27]
Tricosane	20.45	2300	0.22	16.44	2286	0.28
Tetracosane	21.34	2400	0.07	17.33	2382	0.15
Pentacosane	22.20	2500	0.72	18.20	2478	0.74
Hexacosane	23.03	2599	0.03	19.10	2581	0.02
Heptacosane	23.83	2699	0.16	19.87	2672	0.18
Unknown [m/z 69, 41 (41), 81 (41), 91 (22), 165 (22), 136 (20)...]	24.65	2805	0.01			
Total identified		94.15%			91.57%	
Total reported		94.32%			91.62%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not 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