

Date : September 13, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22I07-PTH01

Customer identification : Chamomile German ORGANIC - Hungary - CC1105R

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 : September 12, 2022

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: 1.5008 ± 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
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
2-Pentylfuran	0.01	Furan
Yomogi alcohol	0.01	Monoterpenic alcohol
α -Terpinene	0.02	Monoterpene
para-Cymene	0.04	Monoterpene
1,8-Cineole	0.03	Monoterpenic ether
Limonene	0.03	Monoterpene
(Z)- β -Ocimene	0.02	Monoterpene
(E)- β -Ocimene	0.06	Monoterpene
γ -Terpinene	0.03	Monoterpene
Artemisia ketone	0.04	Monoterpenic ketone
Artemisia alcohol	0.01	Monoterpenic alcohol
Terpinolene	0.06	Monoterpene
Nonanal	0.01	Aliphatic aldehyde
<i>trans</i> -Chrysanthemal	0.01	Monoterpenic aldehyde
Borneol	0.03	Monoterpenic alcohol
Artemisyl acetate	0.01	Monoterpenic ester
Terpinen-4-ol	0.02	Monoterpenic alcohol
Nonanol	0.02	Aliphatic alcohol
α -Terpineol	0.14	Monoterpenic alcohol
Safranal	0.03	Monoterpenic aldehyde
Citronellol	0.02	Monoterpenic alcohol
(3Z)-Hexenyl isovalerate	0.05	Aliphatic ester
Carvone	0.02	Monoterpenic ketone
(2E)-Hexenyl isovalerate	0.01	Aliphatic ester
4,8-Dimethylnona-3,8-dien-2-one	0.09	Terpenic ketone
Bornyl acetate	0.01	Monoterpenic ester
Thymol	0.02	Monoterpenic alcohol
Tridecane	0.02	Alkane
δ -Elemene isomer	0.01	Sesquiterpene
7 β H-Silphiperfol-5-ene	0.01	Sesquiterpene
Bicycloelemene	0.05	Sesquiterpene
Silphin-1-ene	0.03	Sesquiterpene
α -Longipinene	0.03	Sesquiterpene
Dehydro-ar-ionene	0.02	Miscellaneous
Eugenol	0.02	Phenylpropanoid
α -Copaene	0.01	Sesquiterpene
Modhephene	0.03	Sesquiterpene
α -Isocomene	0.27	Sesquiterpene
β -Elemene	0.08	Sesquiterpene
Capric acid	0.08	Aliphatic acid
β -Isocomene	0.02	Sesquiterpene
Isocaryophyllene	0.06	Sesquiterpene
β -Caryophyllene	0.19	Sesquiterpene
β -Copaene	0.03	Sesquiterpene

Aromadendrene	0.11	Sesquiterpene
α -Humulene	0.06	Sesquiterpene
allo-Aromadendrene	0.03	Sesquiterpene
(<i>E</i>)- β -Farnesene	20.69	Sesquiterpene
Dehydrosesquicineole	0.19	Sesquiterpenic ether
γ -Muurolene	0.06	Sesquiterpene
Germacrene D	1.67	Sesquiterpene
ar-Curcumene	0.08	Sesquiterpene
β -Selinene	0.27	Sesquiterpene
Bicyclogermacrene	0.99	Sesquiterpene
Viridiflorene	0.16	Sesquiterpene
α -Zingiberene	0.44	Sesquiterpene
α -Muurolene	0.15	Sesquiterpene
(3 <i>Z</i> ,6 <i>E</i>)- α -Farnesene	0.33	Sesquiterpene
γ -Cadinene	0.05	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	3.19	Sesquiterpene
3,6-Dihydrochamazulene	0.05	Azulene
Dihydrochamazulene isomer I	0.10	Azulene
δ -Cadinene	0.22	Sesquiterpene
β -Sesquiphellandrene	0.07	Sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
(2 <i>Z</i> ?,8 <i>Z</i> ?) <i>-</i> Matricaria ester	0.09	Polyene ester
α -Cadinene	0.02	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.41	Sesquiterpene
Salviadienol?	0.06	Sesquiterpenic alcohol
Sesquirosefuran?	0.11	Sesquiterpenic ether
(<i>E</i>)-Nerolidol	0.32	Sesquiterpenic alcohol
Dendrolasin	0.16	Sesquiterpenic ether
Spathulenol	0.69	Sesquiterpenic alcohol
Globulol	0.09	Sesquiterpenic alcohol
Unknown	0.11	Oxygenated sesquiterpene
Caryophyllene oxide	0.03	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Viridiflorol	0.12	Sesquiterpenic alcohol
Ledol	0.09	Sesquiterpenic alcohol
5,6-Dihydrochamazulene	0.22	Azulene
(2,7 <i>Z</i>)-Bisaboladien-4-ol	0.15	Sesquiterpenic alcohol
Unknown	0.15	Unknown
τ -Muurolol	0.10	Sesquiterpenic alcohol
τ -Cadinol	0.06	Sesquiterpenic alcohol
α -Bisabolol oxide B, epimer 1	4.02	Sesquiterpenic alcohol
α -Bisabolol oxide B, epimer 2	0.12	Sesquiterpenic alcohol
Ageratochromene	0.01	Chromane
epi- β -Bisabolol	0.10	Sesquiterpenic alcohol
(<i>E</i>)-Bisabol-11-ol	0.48	Sesquiterpenic alcohol
β -Bisabolol	0.08	Sesquiterpenic alcohol
Bisabolone oxide A	1.84	Sesquiterpenic ketone
Eudesma-4(15),7-dien-1 β -ol	0.08	Sesquiterpenic alcohol
α -Bisabolol	44.69	Sesquiterpenic alcohol
(2 <i>E</i> ,6 <i>Z</i>)-Farnesol	0.07	Sesquiterpenic alcohol
Chamazulene	2.38	Azulene
α -Bisabolol oxide A	3.28	Sesquiterpenic alcohol

Bisabolol oxide, epimer I	0.06	Sesquiterpenic alcohol
Benzyl benzoate	0.03	Phenolic ester
Bisabolol oxide, epimer II	0.08	Sesquiterpenic alcohol
Myristic acid	0.07*	Aliphatic acid
Myristic acid	0.07*	Aliphatic acid
α -Costol?	0.18	Sesquiterpenic alcohol
Phytone	0.25	Terpenic ketone
(Z)-Spiroether	1.13	Polyene
(E)-Spiroether	0.12	Polyene
(Z)-Tibetin spiroether	0.06	Polyene
Methyl palmitate	0.06	Aliphatic ester
(E)-Tibetin spiroether	0.06	Polyene
Unknown	0.03	Unknown
Palmitic acid	0.24	Aliphatic acid
Ethyl palmitate	0.03	Aliphatic ester
Eicosane	0.01	Alkane
Methyl petroselinate?	0.04	Aliphatic ester
Phytol	0.09	Diterpenic alcohol
Linoleic acid	0.02	Aliphatic acid
Oleic acid	0.02	Aliphatic acid
(9Z)-18-Octadecenolide?	0.01	Aliphatic lactone
Tricosane	0.05	Alkane
Tetracosane	0.02	Alkane
Pentacosane	0.14	Alkane
Hexacosane	0.01	Alkane
Heptacosane	0.04	Alkane
Unknown	0.10	Unknown
Unknown	0.10	Unknown
Sabinene	tr	Monoterpene
Unknown	2.01	Oxygenated triterpene
Linoleic acid	0.22	Aliphatic acid
Unknown	0.97	Oxygenated triterpene
Consolidated total	97.21%	

*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered

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

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

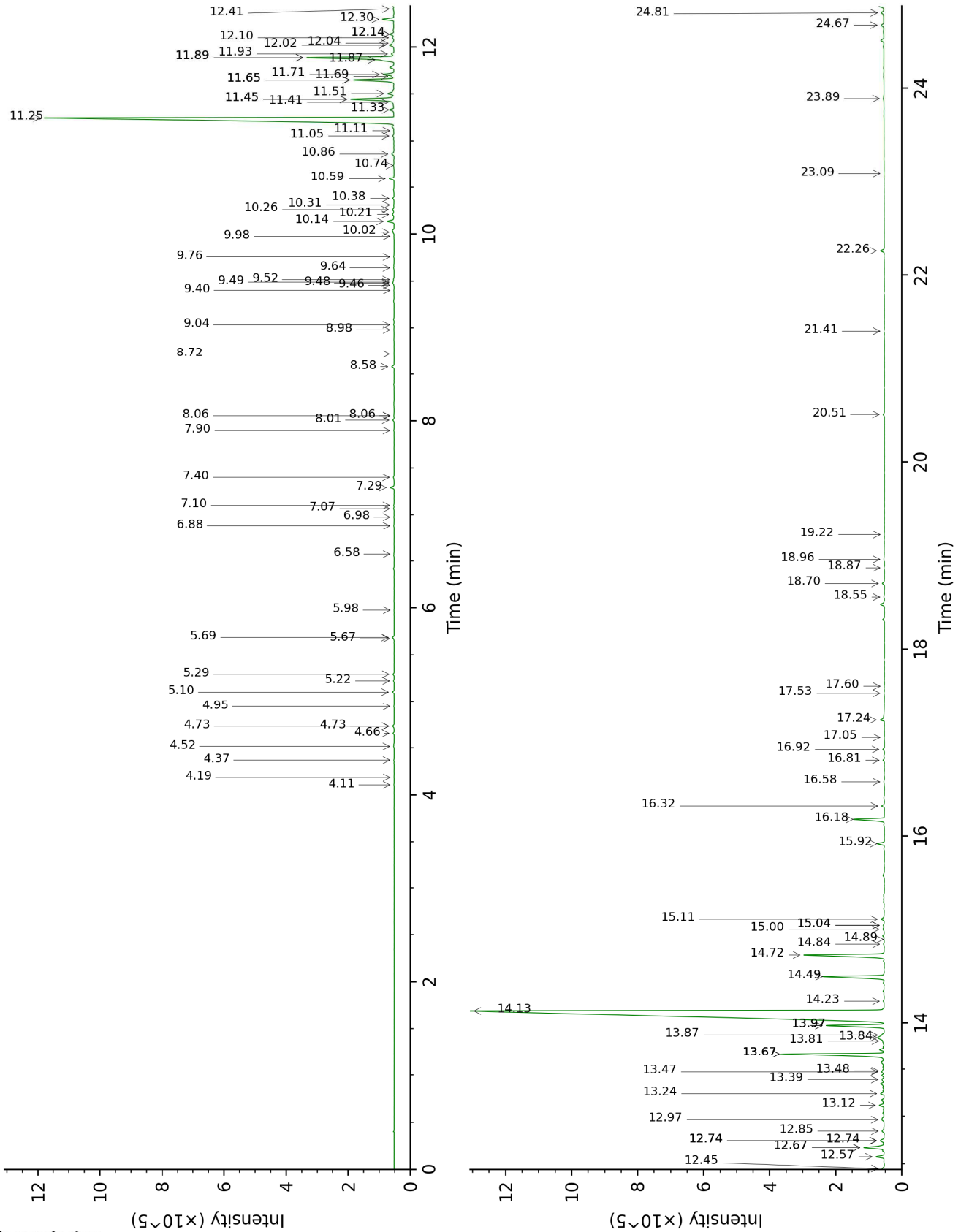
Note: no correction factor was applied

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.

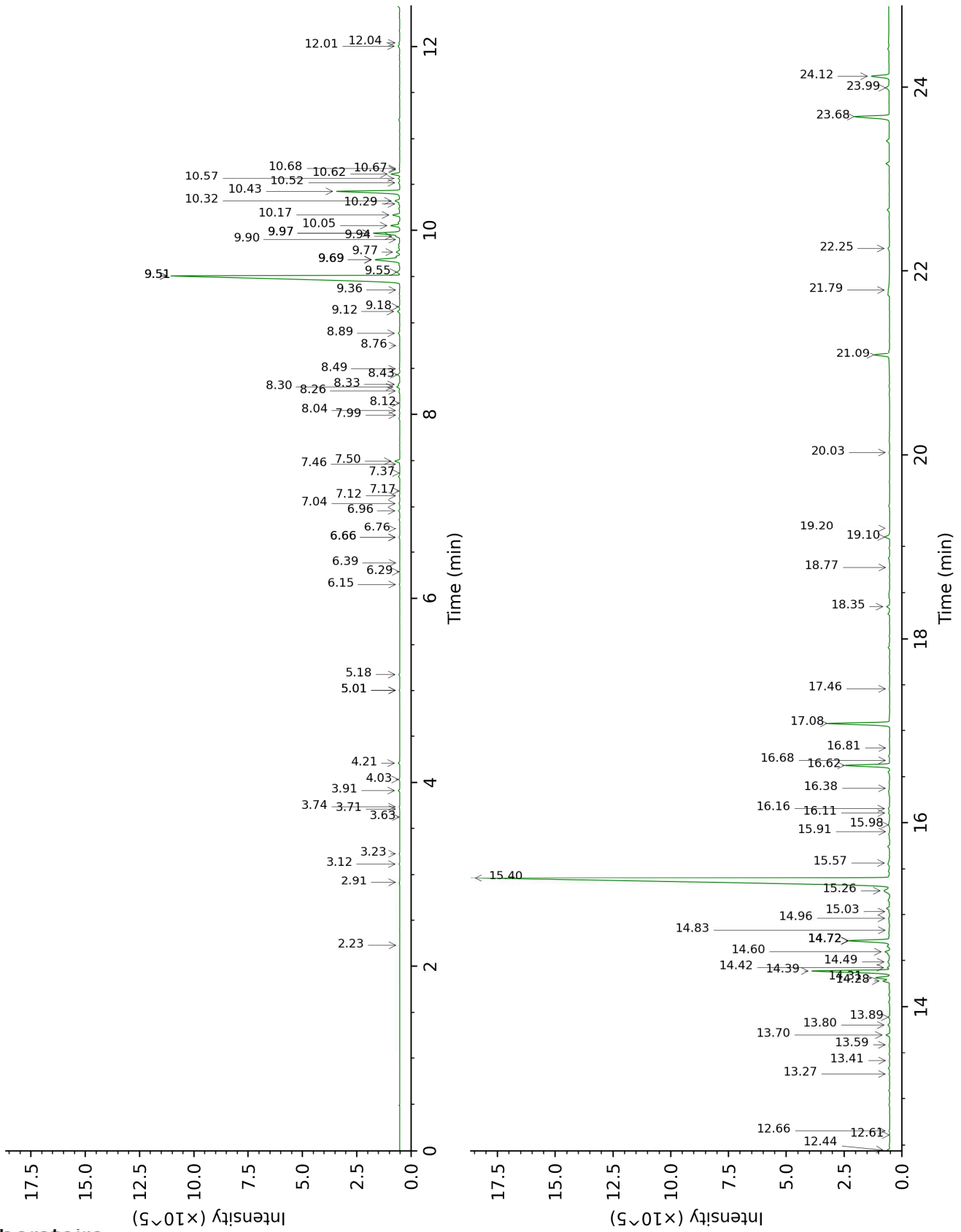
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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

DB-5



DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
6-Methyl-5-hepten-2-one	4.11	987	0.01	5.01*	1297	0.03
2-Pentylfuran	4.19	992	0.01	3.63	1197	0.01
Yomogi alcohol	4.37	1005	0.01	6.15	1380	0.02
α -Terpinene	4.52	1014	0.02	2.91	1140	0.02
para-Cymene	4.66	1022	0.04	4.03	1226	0.04
1,8-Cineole	4.73*	1027	0.07	3.23	1166	0.03
Limonene	4.73*	1027	[0.07]	3.12	1157	0.03
(Z)- β -Ocimene	4.95	1041	0.02	3.71	1203	0.01
(E)- β -Ocimene	5.10	1050	0.06	3.91	1218	0.06
γ -Terpinene	5.22	1058	0.03	3.74	1205	0.02
Artemisia ketone	5.29	1062	0.04	5.18	1309	0.04
Artemisia alcohol	5.67	1086	0.01	7.46	1477	0.02
Terpinolene	5.69	1087	0.06	4.21	1239	0.06
Nonanal	5.98	1105	0.01			
<i>trans</i> -Chrysanthemal	6.58	1143	0.01	7.12	1452	0.02
Borneol	6.88	1163	0.03	9.68*†	1651	1.84
Artemisyl acetate	6.98	1169	0.01	6.29	1390	0.01
Terpinen-4-ol	7.07	1175	0.02	8.50	1556	0.02
Nonanol	7.10	1177	0.02	9.36	1624	0.02
α -Terpineol	7.29	1189	0.14	9.68*†	1651	[1.84]
Safranal	7.40	1196	0.03	8.76	1576	0.01
Citronellol	7.90	1229	0.02	10.67	1732	0.01
(3Z)-Hexenyl isovalerate	8.01	1237	0.05			
Carvone	8.06*	1240	0.02	9.90	1668	0.02
(2E)-Hexenyl isovalerate	8.06*	1240	[0.02]	7.17	1456	0.01
4,8-Dimethylnona-3,8-dien-2-one	8.58	1274	0.09	9.12	1606	0.11
Bornyl acetate	8.72	1284	0.01	8.12	1528	0.01
Thymol	8.98	1301	0.02	15.03	2129	0.06
Tridecane	9.04	1305	0.02	5.01*	1297	[0.03]
δ -Elemene isomer	9.40	1331	0.01	6.76	1425	0.01
7 β H-Silphiperfol-5-ene	9.46	1334	0.01	6.39	1397	0.01
Bicycloelemene	9.48	1336	0.05	6.96	1440	0.06
Silphin-1-ene	9.49	1337	0.03	6.66*	1418	0.04
α -Longipinene	9.52	1339	0.03	6.66*	1418	[0.04]
Dehydro-ar-ionene	9.64	1348	0.02			
Eugenol	9.76	1356	0.02	14.72*	2098	2.21
α -Copaene	9.98	1371	0.01	7.04	1446	0.04
Modhephene	10.02	1374	0.03	7.37	1470	0.01
α -Isocomene	10.14	1382	0.27	7.50	1480	0.24
β -Elemene	10.21	1387	0.08	8.33†	1543	[0.22]
Capric acid	10.26	1391	0.08	16.11	2238	0.07
β -Isocomene	10.31	1395	0.02	7.99	1518	0.02
Isocaryophyllene	10.38	1400	0.06	8.04	1522	0.04

β-Caryophyllene	10.59	1415	0.19	8.30†	1541	0.22
β-Copaene	10.74	1426	0.03	8.26	1538	0.03
Aromadendrene	10.86	1435	0.11	8.43	1552	0.11
α-Humulene	11.06	1449	0.06	9.18	1610	0.05
allo-Aromadendrene	11.11	1453	0.03	8.89	1587	0.08
(E)-β-Farnesene	11.25	1464	20.69	9.51*	1637	20.25
Dehydrosesquicineole	11.33	1470	0.19	9.94†	1671	1.57
γ-Murolene	11.41	1476	0.06	9.51*	1637	[20.25]
Germacrene D	11.45*	1478	1.82	9.68*†	1651	[1.84]
ar-Curcumene	11.45*	1478	[1.82]	10.57	1724	0.08
β-Selinene	11.51	1483	0.27	9.77	1658	0.19
Bicyclogermacrene	11.65*	1494	1.59	9.97*†	1674	[1.57]
Viridiflorene	11.65*	1494	[1.59]	9.55	1640	0.16
α-Zingiberene	11.65*	1494	[1.59]	10.05	1681	0.44
α-Murolene	11.69†	1497	0.48	9.97*†	1674	[1.57]
(3Z,6E)-α-Farnesene	11.71†	1498	[0.48]	10.17	1690	0.33
γ-Cadinene	11.87†	1510	3.67	10.29	1700	0.05
(3E,6E)-α-Farnesene	11.89*†	1512	[3.67]	10.42	1712	3.19
3,6-Dihydrochamazulene	11.89*†	1512	[3.67]	12.04	1850	0.05
Dihydrochamazulene isomer I	11.93	1515	0.10	12.00	1847	0.10
δ-Cadinene	12.02	1522	0.22	10.32	1703	0.25
β-Sesquiphellandrene	12.04	1524	0.07	10.52	1719	0.06
Unknown [m/z 93, 91 (59), 43 (55), 79 (49), 105 (40)... 220? (t)]	12.10	1528	0.07	13.41	1975	0.04
(2Z?,8Z?)-Matricaria ester	12.14*	1531	0.18	16.16	2243	0.09
α-Cadinene	12.14*	1531	[0.18]	10.68	1733	0.02
(E)-α-Bisabolene	12.30	1544	0.41	10.62	1728	0.40
Salviadienol?	12.41	1552	0.06	14.28	2056	0.34
Sesquirosefuran?	12.45	1555	0.11			
(E)-Nerolidol	12.57	1565	0.32	13.70	2001	0.19
Dendrolasin	12.67*	1573	0.86	12.44	1885	0.16
Spathulenol	12.67*	1573	[0.86]	14.32	2060	0.69
Globulol	12.74*	1578	0.25	13.80	2011	0.09
Unknown [m/z 109, 43 (95), 81 (81), 93 (76), 69 (75), 95 (74), 107 (71)... 204 (22), 220 (6)]	12.74*	1578	[0.25]			
Caryophyllene oxide	12.74*	1578	[0.25]	12.66	1906	0.03
Caryophyllene oxide isomer	12.74*	1578	[0.25]	12.61	1902	0.01
Viridiflorol	12.84	1586	0.12	13.89	2019	0.06
Ledol	12.97	1596	0.09	13.27	1962	0.04
5,6-Dihydrochamazulene	13.12	1608	0.22	14.42†	2070	[4.24]
(2,7Z)-Bisaboladien-4-ol	13.24	1618	0.15	14.72*	2098	[2.21]

Unknown [m/z 93, 41 (52), 79 (46), 91 (45), 43 (38), 67 (37)...]	13.39	1630	0.15			
τ-Muurolol	13.47†	1637	0.18	14.96	2122	0.10
τ-Cadinol	13.48†	1638	[0.18]	14.83	2110	0.06
α-Bisabolol oxide B, epimer 1	13.67*	1653	4.66	14.39†	2067	4.24
α-Bisabolol oxide B, epimer 2	13.67*	1653	[4.66]	14.49	2076	0.12
Ageratochromene	13.67*	1653	[4.66]	16.81	2311	0.01
epi-β-Bisabolol	13.81	1665	0.10	14.72*	2098	[2.21]
(E)-Bisabol-11-ol	13.84	1668	0.48	15.26	2152	0.50
β-Bisabolol	13.87	1670	0.08	14.72*	2098	[2.21]
Bisabolone oxide A	13.97*	1678	2.18	14.72*	2098	[2.21]
Eudesma-4(15),7-dien-1β-ol	13.97*	1678	[2.18]	15.98	2225	0.08
α-Bisabolol	14.13	1691	44.69	15.40	2166	43.68
(2E,6Z)-Farnesol	14.23	1700	0.07	16.38	2265	0.04
Chamazulene	14.49	1722	2.38	16.62	2291	2.29
α-Bisabolol oxide A	14.72	1742	3.28	17.08	2340	3.10
Bisabolol oxide, epimer I	14.84	1752	0.06			
Benzyl benzoate	14.89	1756	0.03	18.77	2528	0.02
Bisabolol oxide, epimer II	15.00	1766	0.08			
Myristic acid	15.04*	1769	0.07			
Myristic acid	15.04*	1769	[0.07]			
α-Costol?	15.11	1775	0.18			
Phytone	15.92	1847	0.25	14.60	2086	0.25
(Z)-Spiroether	16.18	1871	1.13	21.08	2807	0.85
(E)-Spiroether	16.32	1884	0.12	22.24	2957	0.10
(Z)-Tibetin spiroether	16.58	1907	0.06			
Methyl palmitate	16.81	1929	0.06	15.57	2182	0.07
(E)-Tibetin spiroether	16.92	1940	0.06			
Unknown [m/z 143, 43 (83), 85 (47), 71 (47), 125 (37), 177 (32)...]	17.05	1952	0.03			
Palmitic acid	17.24	1970	0.24	21.79	2898	0.20
Ethyl palmitate	17.53	1997	0.03	15.91	2217	0.01
Eicosane	17.60	2004	0.01	13.59	1991	0.06
Methyl petroselinat?	18.56	2098	0.04			
Phytol	18.70	2113	0.09	19.10	2566	0.29
Linoleic acid	18.87	2130	0.02			
Oleic acid	18.96	2140	0.02			
(9Z)-18-Octadecenolide?	19.22	2167	0.01			
Tricosane	20.51	2304	0.05	16.68	2297	0.02
Tetracosane	21.40	2404	0.02	17.46	2380	0.02
Pentacosane	22.26	2503	0.14	18.35	2479	0.16
Hexacosane	23.09	2603	0.01	19.20	2577	0.01
Heptacosane	23.89	2703	0.04	20.03	2676	0.03

Unknown [m/z 69, 41 (41), 81 (41), 91 (22), 165 (22), 136 (20)...]	24.67	2804	0.10	
Unknown [m/z 69, 41 (46), 81 (31), 165 (29), 91 (20), 181 (18), 167 (15)...]	24.81	2821	0.10	
Sabinene	2.23	1084	tr	
Unknown [m/z 69, 81 (32), 41 (31), 95 (16), 91 (14), 93 (13), 107 (12)... 408? (3)]	23.68	3154	2.01	
Linoleic acid	23.99	3199	0.22	
Unknown [m/z 69, 81 (36), 41 (31), 93 (24), 95 (19), 91 (14), 67 (13), 121 (12)... 408? (2)]	24.12	3217	0.97	
Total identified		94.89%		91.07%
Total reported		95.33%		94.09%

*: 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