

Date: January 28, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code: 22A05-PTH02

Customer identification: Organic Chamomile German - Egypt - CC1104212R

Type: Essential oil

Source: *Matricaria chamomilla* **Customer**: Plant Therapy

ANALYSIS

Method: PC-MAT-014 SISO - Analysis of the composition of an essential oil or other volatile liquid by

FAST GC-FID (in French); identifications validated by GC-MS.

Analyst: Pamela Lavoie, M.Sc., Chimiste

Analysis date: January 17, 2022

Checked and approved by:

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

This report is an update from the first version issued on January 18, 2022, to update the customer identification.





PHYSICOCHEMICAL DATA

Physical aspect: Dark blue liquid

Refractive index: 1.5066 ± 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	tr	Aliphatic ketone
Isovaleral	0.02	Aliphatic aldehyde
2-Methylbutyral	0.03	Aliphatic aldehyde
2-Vinylfuran	tr	Furan
Hexanal	0.01	Aliphatic aldehyde
Octane	0.01	Alkane
Ethyl 2-methylbutyrate	0.17	Aliphatic ester
Ethyl isovalerate	0.02	Aliphatic ester
Heptanal	tr	Aliphatic aldehyde
Santolinatriene	0.01	Monoterpene
α-Pinene	0.02	Monoterpene
Unknown	tr	Monoterpene
Camphene	0.02	Monoterpene
α-Fenchene	0.01	Monoterpene
Propyl 2-methylbutyrate	0.07	Aliphatic ester
Benzaldehyde	0.01	Simple phenolic
Sabinene	0.03	Monoterpene
6-Methyl-5-hepten-2-one	0.06	Aliphatic ketone
Myrcene	0.01	Monoterpene
2-Pentylfuran	0.04	Furan
Unknown	0.01	Monoterpene
α-Phellandrene	0.02	Monoterpene
Octanal	0.03	Aliphatic aldehyde
Yomogi alcohol	0.04	Monoterpenic alcohol
Δ3-Carene	tr	Monoterpene
α-Terpinene	0.01	Monoterpene
para-Cymene	0.08	Monoterpene
Limonene	0.04	Monoterpene
1,8-Cineole	0.03	Monoterpenic ether
(Z)-β-Ocimene	0.07	Monoterpene
(E)-β-Ocimene	0.36	Monoterpene
γ-Terpinene	0.14	Monoterpene
Artemisia ketone	0.34	Monoterpenic ketone
Octanol	0.02	Aliphatic alcohol
Artemisia alcohol	0.13	Monoterpenic alcohol
para-Cymenene	0.01	Monoterpene
Terpinolene	0.01	Monoterpene
Linalool	0.02	Monoterpenic alcohol
Nonanal	0.07	Aliphatic aldehyde
Unknown	0.07	Oxygenated monoterpene
Camphor	0.01	Monoterpenic ketone
Borneol	0.06	Monoterpenic alcohol
Artemisyl acetate	0.02	Monoterpenic aconor
Terpinen-4-ol	0.02	Monoterpenic alcohol





Nonanol	0.03	Aliphatic alcohol
α-Terpineol	0.04	Monoterpenic alcohol
Safranal	0.07	Monoterpenic aldehyde
Decanal	0.01	Aliphatic aldehyde
Citronellol	0.03	Monoterpenic alcohol
Carvone	0.04	Monoterpenic ketone
(2 <i>E</i>)-Hexenyl isovalerate	0.02	Aliphatic ester
Hexyl isovalerate	0.03	Aliphatic ester
α-lonene	0.01	Terpene derivative
4,8-Dimethylnona-3,8-dien-2-one	0.05	Terpenic ketone
(E)-4,8-Dimethylnona-3,8-dien-2-one	0.01	Terpenic ketone
Pelargonic acid	0.07	Aliphatic acid
Tridecane	0.01	Alkane
(2 <i>E</i> ,4 <i>E</i>)-Decadienal	0.01	Aliphatic aldehyde
Bicycloelemene	0.04	Sesquiterpene
α-Longipinene	0.03	Sesquiterpene
Dehydro-ar-ionene	0.02	Miscellaneous
α-Copaene	0.05	Sesquiterpene
α-lsocomene	0.05	Sesquiterpene
β-Elemene	0.05	Sesquiterpene
Capric acid	0.76	Aliphatic acid
Capric acid Isocaryophyllene		·
, , ,	tr 0.02	Sesquiterpene
β-Isocomene		Sesquiterpene
β-Caryophyllene	0.08	Sesquiterpene
β-Copaene	0.03	Sesquiterpene
Aromadendrene	0.09	Sesquiterpene
Striatene?	0.03	Sesquiterpene
α-Humulene	0.04	Sesquiterpene
allo-Aromadendrene	0.11	Sesquiterpene
(<i>E</i>)-β-Farnesene	15.94	Sesquiterpene
Dehydrosesquicineole	0.22	Sesquiterpenic ether
Germacrene D	1.37	Sesquiterpene
β-Selinene	0.17	Sesquiterpene
ar-Curcumene	0.05	Sesquiterpene
α-Selinene	0.07	Sesquiterpene
Viridiflorene	0.15	Sesquiterpene
Bicyclogermacrene	0.77	Sesquiterpene
α-Zingiberene	0.07	Sesquiterpene
α-Muurolene	0.11	Sesquiterpene
(3 <i>Z</i> ,6 <i>E</i>)-α-Farnesene	0.09	Sesquiterpene
3,6-Dihydrochamazulene	0.56	Azulene
γ-Cadinene	0.20	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)-α-Farnesene	0.70	Sesquiterpene
Dihydrochamazulene isomer I	0.15	Azulene
δ-Cadinene	0.29	Sesquiterpene
β-Sesquiphellandrene	0.05	Sesquiterpene
(2Z?,8Z?)-Matricaria ester	0.04	Polyyne ester
(E)-α-Bisabolene	0.04	Sesquiterpene
Sesquirosefuran?	0.07	Sesquiterpenic ether
(E)-Nerolidol	0.07	Sesquiterpenic alcohol
Spathulenol	0.06	Sesquiterpenic alcohol
(2 <i>Z</i> ?,8 <i>E</i> ?)-Matricaria ester	0.05	Polyyne ester



Consolidated total	93.30%			
Unknown	0.20	Oxygenated triterpene		
Unknown	0.52	Oxygenated triterpene		
Unknown	0.03	Unknown		
Unknown	0.01	Unknown		
Heptacosane	0.17	Alkane		
Hexacosane	0.09	Alkane		
Pentacosane	0.76	Alkane		
Tetracosane	0.09	Alkane		
Tricosane	0.25	Alkane		
Docosane	0.03	Alkane		
(9Z)-18-Octadecenolide?	0.10	Aliphatic lactone		
cis-Vaccenic acid?	0.04	Aliphatic acid		
Oleic acid	0.35	Aliphatic acid		
Linoleic acid	0.35	Aliphatic acid		
Phytol	0.13	Diterpenic alcohol		
Heneicosane	0.02	Alkane		
Methyl linoleate	0.02	Aliphatic ester		
Eicosane	0.03	Alkane		
Palmitic acid	1.27	Aliphatic acid		
(E)-Tibetin spiroether	0.12	Polyyne		
Methyl palmitate	0.04	Aliphatic ester		
(Z)-Tibetin spiroether	0.03	Polyyne		
(E)-Spiroether	0.56	Polyyne		
(Z)-Spiroether	4.11	Polyyne		
Phytone	0.26	Terpenic ketone		
α-Costol?	0.16	Sesquiterpenic alcohol		
Benzyl benzoate	0.07	Phenolic ester		
α-Bisabolol oxide A	42.13	Sesquiterpenic alcohol		
Chamazulene	2.44	Azulene		
Germacra-4(15),5,10(14)-trien-1α-ol	0.14	Sesquiterpenic alcohol		
α-Bisabolol	1.21	Sesquiterpenic alcohol		
Bisabolone oxide A	4.05	Sesquiterpenic ketone		
α-Bisabolol analog	0.03	Sesquiterpenic alcohol		
β-Bisabolol	0.06	Sesquiterpenic alcohol		
epi-β-Bisabolol	0.07	Sesquiterpenic alcohol		
Ageratochromene	0.16	Chromane		
α-Bisabolol oxide B, epimer 2	5.45	Sesquiterpenic alcohol		
α-Bisabolol oxide B, epimer 1	0.48	Sesquiterpenic alcohol		
Unknown	0.13	Unknown		
τ-Muurolol	0.07	Sesquiterpenic alcohol		
τ-Cadinol	0.62	Sesquiterpenic alcohol		
Unknown	0.15	Unknown		
(2,7 <i>Z</i>)-Bisaboladien-4-ol	0.18	Sesquiterpenic alcohol		
5,6-Dihydrochamazulene	0.18	Azulene		
Ledol	0.07	Sesquiterpenic alcohol		
Viridiflorol	0.14	Sesquiterpenic alcohol		
Globulol	0.12	Sesquiterpenic alcohol		
Dendrolasin	0.12	Sesquiterpenic ether		
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether		
		Sesquiterpenic ether		

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





Note: no correction factor was applied

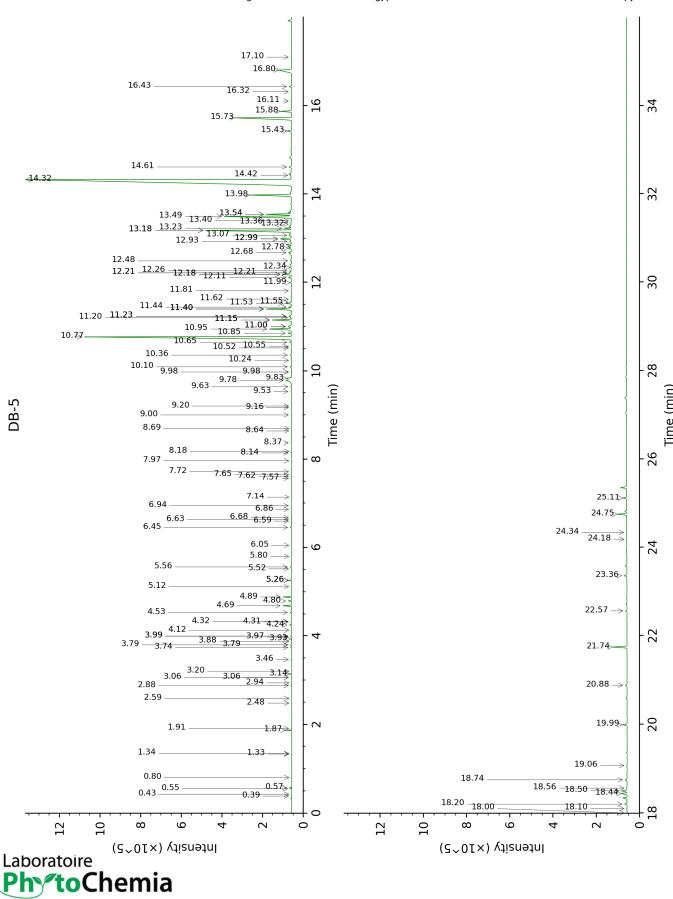
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

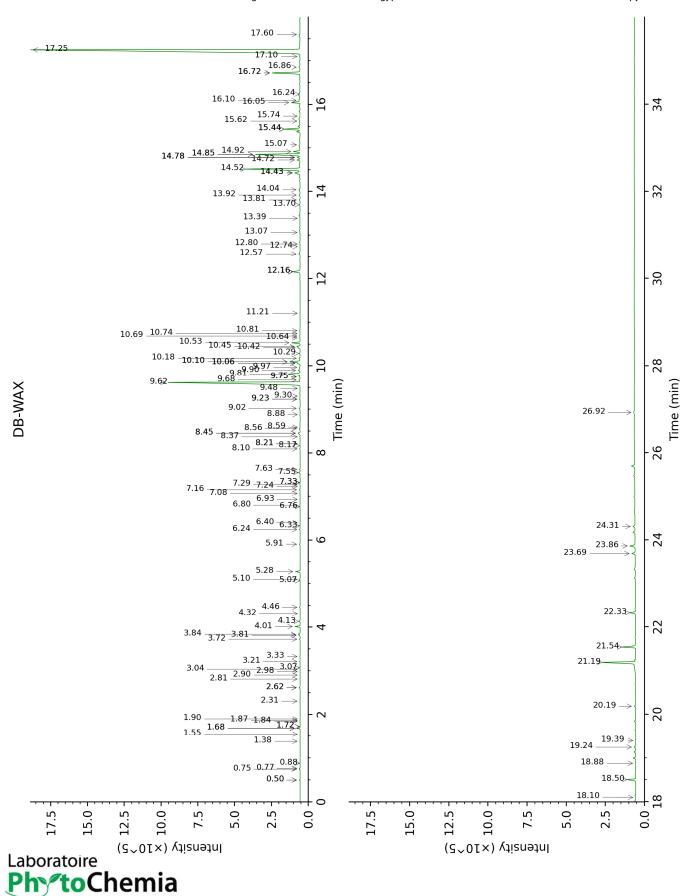
Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.



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Plus que des analyses... des conseils

FULL ANALYSIS DATA

lalomtification	Column DB-5			C	Column DB-WAX		
Identification	R.T	R.I	%	R.T	R.I	%	
Isobutyral	0.39	537	0.01	0.50*	785	0.03	
3-Buten-2-one	0.43	577	tr	0.88	912	tr	
sovaleral	0.55	640	0.02	0.77	888	0.02	
2-Methylbutyral	0.57	651	0.03	0.75	882	0.03	
2-Vinylfuran	0.80	718	tr	1.84	1039	0.01	
Hexanal	1.33	800	0.01	1.90	1044	0.01	
Octane	1.34	802	0.01	0.50*	785	[0.03]	
Ethyl 2-	1.07	050	0.17	1.60*	1022		
methylbutyrate	1.87	850	0.17	1.68*	1023	0.18	
Ethyl isovalerate	1.91	853	0.02	1.87	1041	0.01	
Heptanal	2.48	903	tr	3.04	1145	0.01	
Santolinatriene	2.59	911	0.01	1.55	1010	0.01	
α-Pinene	2.88	930	0.02	1.38	992	0.03	
Jnknown [m/z 93, 91							
(50), 92 (37), 79 (36),	2.04	024		1 72*	1007	0.00	
77 (35), 121 (19) 136	2.94	934	tr	1.72*	1027	0.02	
(t)]							
Camphene	3.06*	943	0.02	1.72*	1027	[0.02]	
α-Fenchene	3.06*	943	[0.02]	1.68*	1023	[0.18]	
Propyl 2-				0 40 V			
methylbutyrate	3.14	948	0.07	2.62*	1111	0.07	
Benzaldehyde	3.20	952	0.01	7.32*	1459	0.01	
Sabinene	3.46	970	0.03	2.31	1085	0.03	
6-Methyl-5-hepten-2-							
one	3.74	988	0.06	5.10	1302	0.05	
Myrcene	3.79*	992	0.06	2.90	1134	0.01	
2-Pentylfuran	3.79*	992	[0.06]	3.72	1199	0.04	
Unknown [m/z 93, 91							
(46), 80 (44), 79 (42),							
77 (33), 92 (20) 136	3.88	998	0.01	3.07	1147	0.01	
(4)]							
α-Phellandrene	3.93	1002	0.02	2.81	1127	0.02	
Octanal	3.97	1004	0.03	4.46	1254	0.05	
Yomogi alcohol	3.99*	1006	0.05	6.24	1379	0.04	
Δ3-Carene	3.99*	1006	[0.05]	2.62*	1111	[0.07]	
g-Terpinene	4.12	1014	0.01	2.98	1140	0.01	
oara-Cymene	4.24	1022	0.08	4.13	1229	0.09	
Limonene	4.31†	1026	0.06	3.21	1158	0.04	
1,8-Cineole	4.32†	1026	[0.06]	3.33	1168	0.03	
(<i>Z</i>)-β-Ocimene	4.53	1040	0.07	3.81	1206	0.08	
(E)-β-Ocimene	4.69	1050	0.36	4.01	1221	0.36	
γ-Terpinene	4.80	1057	0.14	3.84	1208	0.14	
Artemisia ketone	4.89	1062	0.34	5.28	1310	0.35	
Octanol	5.12	1077	0.02	8.21*	1526	0.02	
Artemisia alcohol	5.26*	1086	0.02	7.56	1476	0.02	
para-Cymenene	5.26*	1086	[0.13]	6.32	1385	0.13	
Terpinolene	5.26*	1086	[0.13]	4.32	1243	0.01	



Nonanal	5.56	1105	0.07	5.91	1355	0.07
Unknown [m/z 43, 81						
(62), 59 (60), 85 (49),	5.80	1121	0.01			
82 (38) 154 (2)]						
Camphor	6.05	1137	0.01	7.24	1453	0.01
Borneol	6.45	1163	0.06	9.75*	1647	0.10
Artemisyl acetate	6.60	1172	0.02	6.40	1390	0.02
Terpinen-4-ol	6.63	1174	0.03	8.59	1556	0.01
Nonanol	6.68	1177	0.03	9.48	1626	0.03
α-Terpineol	6.86	1189	0.04	9.75*	1647	[0.10]
Safranal	6.94	1194	0.07	8.88	1578	0.03
Decanal	7.14	1207	0.01	7.32*	1459	[0.01]
Citronellol	7.57	1236	0.03	10.81	1735	0.03
Carvone	7.62	1239	0.04	10.06*†	1673	1.14
(2 <i>E</i>)-Hexenyl						
isovalerate	7.65	1241	0.02	7.29	1456	0.03
Hexyl isovalerate	7.72	1246	0.03	6.76	1417	0.01
α-lonene	7.97	1262	0.01	6.93	1430	0.02
4,8-Dimethylnona-						
3,8-dien-2-one	8.14	1274	0.05	9.23*	1606	0.06
(E)-4,8-Dimethylnona-						
3,8-dien-2-one	8.18	1277	0.01	9.23*	1606	[0.06]
Pelargonic acid	8.37	1289	0.07	15.44*	2163	1.41
Tridecane	8.64	1308	0.01	5.07	1299	0.01
(2E,4E)-Decadienal	8.69	1312	0.01	11.21	1769	0.02
Bicycloelemene	9.00	1333	0.04	7.08	1440	0.04
α-Longipinene	9.16	1345	0.03	6.80	1420	0.03
Dehydro-ar-ionene	9.20	1348	0.02			
α-Copaene	9.53	1371	0.05	7.16	1447	0.08
α-Isocomene	9.64	1378	0.05	7.63	1481	0.06
β-Elemene	9.78†	1388	0.96	8.45*	1545	0.23
Capric acid	9.83†	1392	[0.96]	16.05	2224	0.76
Isocaryophyllene	9.98*	1402	0.03	8.21*	1526	[0.02]
β-Isocomene	9.98*	1402	[0.03]	8.17	1523	0.02
β-Caryophyllene	10.10	1411	0.08	8.45*	1545	[0.23]
β-Copaene	10.24	1422	0.03	8.37	1538	0.02
Aromadendrene	10.36	1431	0.09	8.56	1553	0.11
Striatene?	10.52	1443	0.03	0.00		
α-Humulene	10.55	1446	0.04	9.30	1611	0.02
allo-Aromadendrene	10.65	1453	0.11	9.02	1589	0.11
(<i>E</i>)-β-Farnesene	10.77	1462	15.94	9.62	1637	16.13
Dehydrosesquicineole	10.85	1468	0.22	10.10*†	1676	[1.14]
Germacrene D	10.95	1475	1.37	9.81	1652	1.31
β-Selinene	11.00*	1479	0.35	9.90	1660	0.17
ar-Curcumene	11.00*	1479	[0.35]	10.69	1725	0.05
α-Selinene	11.15*	1490	1.01	9.97	1665	0.07
Viridiflorene	11.15*	1490	[1.01]	9.68	1642	0.15
Bicyclogermacrene	11.15*	1490	[1.01]	10.10*†	1676	[1.14]
α-Zingiberene	11.20	1494	0.07	10.18	1682	0.10
α-Muurolene	11.23*	1496	0.19	10.06*†	1673	[1.14]
$(3Z,6E)$ - α -Farnesene	11.23*	1496	[0.19]	10.29	1691	0.09
(JL,UL) U-I allieselle	11.43	1770	[0.17]	10.23	1091	0.09



3,6-	11.40*	1509	1.55	12.16*	1852	0.77
Dihydrochamazulene						
γ-Cadinene	11.40*	1509	[1.55]	10.42†	1702	0.49
(3 <i>E</i> ,6 <i>E</i>)-α-Farnesene	11.40*	1509	[1.55]	10.53	1712	0.70
Dihydrochamazulene	11.44	1512	0.15	12.16*	1852	[0.77]
isomer I	11.44	1312	0.15	12.10	1032	[0.77]
δ-Cadinene	11.53	1519	0.29	10.45†	1704	[0.49]
β-Sesquiphellandrene	11.55	1521	0.05	10.64	1721	0.04
(2 <i>Z</i> ?,8 <i>Z</i> ?)-Matricaria	11.60	1526	0.04	16 24	2245	0.00
ester	11.62	1526	0.04	16.24	2245	0.09
(E)-α-Bisabolene	11.81	1541	0.04	10.74	1730	0.03
Sesquirosefuran?	11.99	1555	0.07	12.16*	1852	[0.77]
(E)-Nerolidol	12.11	1565	0.21	13.81	2003	0.10
Spathulenol	12.18*	1570	0.47	14.43*	2063	0.72
(2 <i>Z</i> ?,8 <i>E</i> ?)-Matricaria	12.10*	1570	[0.47]	17.10	2226	0.05
ester	12.18*	1570	[0.47]	17.10	2336	0.05
Caryophyllene oxide	12.21*	1573	0.15	12.80	1910	0.01
Caryophyllene oxide	12 21*	1572	[0.45]	12.74	1004	0.00
isomer	12.21*	1573	[0.15]	12.74	1904	0.02
Dendrolasin	12.21*	1573	[0.15]	12.57	1889	0.12
Globulol	12.26	1576	0.12	13.92	2014	0.12
Viridiflorol	12.34	1582	0.14	14.04	2026	0.13
Ledol	12.48	1594	0.07	13.39	1964	0.03
5,6-						
Dihydrochamazulene	12.68	1610	0.18	14.43*	2063	[0.72]
(2,7Z)-Bisaboladien-4-						
ol	12.78	1618	0.18	14.78*	2097	0.25
Unknown [m/z 93, 41						
(52), 79 (46), 91 (45),	12.93	1631	0.15			
43 (38), 67 (37)]						
τ-Cadinol	12.99*	1636	0.67	14.92	2110	0.62
τ-Muurolol	12.99*	1636	[0.67]	15.07	2126	0.07
Unknown [m/z 123,						
43 (86), 81 (75), 95	10.07			40.00		
(73), 82 (68), 161 (64),	13.07	1642	0.13	13.07	1934	0.04
105 (63) 220 (6)]						
α-Bisabolol oxide B,	40.40VI		4.00	4.4.0%	2242	[0 =0]
epimer 1	13.18*†	1652	6.08	14.43*	2063	[0.72]
α-Bisabolol oxide B,	12.10*1	1.550	[6.00]	1450	2074	5.45
epimer 2	13.18*†	1652	[6.08]	14.52	2071	5.45
Ageratochromene	13.23†	1655	[6.08]	16.86	2309	0.16
epi-β-Bisabolol	13.32	1663	0.07	14.85*	2104	4.09
β-Bisabolol	13.36	1666	0.06	14.78*	2097	[0.25]
α-Bisabolol analog	13.40	1669	0.03	15.44*	2163	[1.41]
Bisabolone oxide A	13.49	1677	4.05	14.85*	2104	[4.09]
α-Bisabolol	13.54*	1682	1.35	15.44*	2163	[1.41]
Germacra-						
4(15),5,10(14)-trien-	13.54*	1682	[1.35]	16.10	2230	0.14
1α-ol						
Chamazulene	13.98	1718	2.44	16.72*	2295	2.74
α-Bisabolol oxide A	14.32	1748	42.13	17.25	2352	42.94
Benzyl benzoate	14.42	1757	0.07	18.88	2534	0.04
	· -	-		-		



α-Costol?						
a costor.	14.61	1773	0.16			
Phytone	15.43	1847	0.26	14.72	2091	0.27
(Z)-Spiroether	15.73	1874	4.11	21.19	2812	3.85
(E)-Spiroether	15.88	1887	0.56	22.33	2960	0.51
(Z)-Tibetin spiroether	16.11	1908	0.03			
Methyl palmitate	16.32	1928	0.04	15.62	2181	0.05
(E)-Tibetin spiroether	16.43	1939	0.12			
Palmitic acid	16.80	1975	1.27	21.54	2857	1.22
Eicosane	17.10	2002	0.03	13.70	1993	0.07
Methyl linoleate	18.00	2092	0.02	18.10	2446	0.02
Heneicosane	18.10	2102	0.02	14.78*	2097	[0.25]
Phytol	18.20	2113	0.13	19.24	2576	0.15
Linoleic acid	18.44	2137	0.35	23.69	3145	0.33
Oleic acid	18.50	2143	0.35			
cis-Vaccenic acid?	18.56	2150	0.04			
(9 <i>Z</i>)-18-	18.74	2169	0.10			
Octadecenolide?	10.74	2109	0.10			
Docosane	19.06	2202	0.03	15.74	2192	0.03
Tricosane	19.99	2302	0.25	16.72*	2295	[2.74]
Tetracosane	20.88	2402	0.09	17.60	2390	0.09
Pentacosane	21.74	2502	0.76	18.50	2491	0.75
Hexacosane	22.57	2602	0.09	19.40	2594	0.02
Heptacosane	23.36	2701	0.17	20.19	2688	0.13
Unknown [m/z 69, 41						
(41), 81 (41), 91 (22),	24.18	2808	0.01	26.92	3606	0.07
165 (22), 136 (20)]						
Unknown [m/z 69, 41						
(46), 81 (31), 165 (29),	24.34	2829	0.03			
91 (20), 181 (18), 167	2 1.5 1	2027	0.03			
(15)]						
Unknown [m/z 69, 81						
(32), 41 (31), 95 (16),	24.75	2884	0.52	23.86	3169	0.54
91 (14), 93 (13), 107	21.75	2001	0.52	25.00	3105	0.5 1
(12) 408? (3)]						
Unknown [m/z 69, 81						
(36), 41 (31), 93 (24),						
95 (19), 91 (14), 67	25.11	2933	0.20	24.31	3232	0.21
(13), 121 (12) 408?						
(2)]						
Total identified	92.87%			91.93%		
Total reported		93.94%			92.80%	

^{*:} Two or more compounds are coeluting on this column

Note: no correction factor was applied R.T.: Retention time (minutes) R.I.: Retention index



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

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

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