

GC/MS BATCH NUMBER: C90109

ESSENTIAL OIL: ROMAN CHAMOMILE
BOTANICAL NAME: CHAMAEMELUM NOBILE
ORIGIN: CHINA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF ROMAN CHAMOMILE OIL	%
METHALLYL ANGELATE	11.0
ISOBUTYL ANGELATE	10.5
2-METHYLBUTYL ANGELATE	10.2
3-METHYLAMYL ANGELATE	9.5
α-PINENE	7.5
ISOAMYL ANGELATE	5.4
PINOCARVONE	3.8
GERMACRENE D	3.0
3-METHYLAMYL METHACRYLATE	3.0
PRENYL ANGELATE	2.7
trans-PINOCARVEOL	2.3
2-METHYLBUTYL METHACRYLATE	1.9
ISOBUTYL ISOBUTYRATE	1.8
ISOBUTYL METHACRYLATE	1.6
METHALLYL METHACRYLATE	1.5
PRENYL ISOBUTYRATE	1.4
PRENYL ISOBUTYRATE	1.4
3-METHYLAMYL ISOBUTYRATE	1.2

BUTYL ANGELATE	1.1
ISOBUTYL 2-METHYLBUTYRATE	1.1
ISOAMYL METHACRYLATE	1.1
2-METHYLBUTYL 2- METHYLBUTYRATE	1.0

Comments from Robert Tisserand: Very pleasant oil with a tinge of blue. The odor has a hint of dried Roman chamomile flowers. No sign of adulteration.

Date : December 14, 2016

SAMPLE IDENTIFICATION

Internal code : 16L01-PTH5-1-DM

Customer identification : Roman Chamomile - C9010969R

Type : Essential oil

Source : *Chamaemelum nobile*

Customer : Plant Therapy

ANALYSIS

Method : PC-PA-001-15E06, "Analysis of the composition of a liquid essential oil by GC-FID" (in French).

Analyst : Sylvain Mercier, M. Sc., chimiste

Analysis date : 2016-12-13

Checked and approved by :



Alexis St-Gelais, M. Sc., chimiste 2013-174

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IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
2-Methylbutyral	0.59	589	0.01	0.01	766	0.47	Aliphatic aldehyde
Isoamyl alcohol	1.16	731	0.01	3.33	1147	2.36*	Aliphatic alcohol
2-Methylbutyl alcohol	1.18	734	0.02	[3.33]	1147	2.36*	Aliphatic alcohol
Methyl 2-methylbutyrate	1.38	761	0.02	0.01	921	0.76	Aliphatic ester
Isobutyl acetate	1.45	771	0.02				Aliphatic ester
Ethyl 2-methylbutyrate	2.23	844	0.05	0.14	977	0.99	Aliphatic ester
3-Methylpentanol	2.32	852	0.06	0.56	1291	4.19*	Aliphatic alcohol
Propyl isobutyrate	2.41	859	0.01	0.02	992	1.05	Aliphatic ester
Isoamyl acetate	2.67	878	0.04	0.05	1058	1.52	Aliphatic ester
Hexanol	2.69	880	0.05	[0.56]	1291	4.19*	Aliphatic alcohol
2-Methylbutyl acetate	2.72	882	0.07	0.09	1061	1.54	Aliphatic ester
Ethyl angelate?	2.95	900	0.03				Aliphatic ester
Isobutyl isobutyrate	3.20	915	1.84	1.84	1031	1.30	Aliphatic ester
α -Pinene	3.39	927	7.45	7.17	953	0.89	Monoterpene
Prenyl acetate	3.49	932	0.83	1.67	1194	2.91*	Aliphatic ester
Isobutyl methacrylate	3.64	941	1.58	1.55	1110	1.94	Aliphatic ester
Camphene	3.67	943	0.52	0.51	1003	1.10	Monoterpene
Propyl 2-methylbutyrate	3.72	947	0.08	0.06	1079	1.68	Aliphatic ester
Thuja-2,4(10)-diene	3.76	949	0.05	0.15	1053	1.47*	Monoterpene
Methallyl methacrylate	3.93	959	1.45	[1.67]	1194	2.91*	Aliphatic ester
Sabinene	4.10	969	0.06	[0.15]	1053	1.47*	Monoterpene
β -Pinene	4.16	973	0.73	0.74	1042	1.39	Monoterpene
Isoamyl propionate	4.18	974	0.02				Aliphatic ester
Methallyl isobutyrate	4.36	985	0.07	0.12	1175	2.68	Aliphatic ester
Myrcene	4.41	988	0.14	0.13	1116	1.99	Monoterpene
Propyl angelate	4.59	999	0.79	0.63	1191	2.87	Aliphatic ester
Isobutyl 2-methylbutyrate	4.71	1006	1.05	1.05	1127	2.12	Aliphatic ester
Isobutyl isovalerate	4.81	1011	0.16				Aliphatic ester
Isoamyl isobutyrate	4.91	1017	0.49	[3.33]	1147	2.36*	Aliphatic ester
2-Methylbutyl isobutyrate	4.97*	1020	2.45	[3.33]	1147	2.36*	Aliphatic ester
meta-Cymene	4.97*	1020	[2.45]	0.80	1122	2.06	Monoterpene
para-Cymene	5.01	1022	0.41	0.47	1208	3.06	Monoterpene
Limonene	5.11	1028	0.21	0.11	1132	2.18	Monoterpene
β -Phellandrene	5.13	1029	0.16	[3.33]	1147	2.36*	Monoterpene
1,8-Cineole	5.17	1031	0.11	[3.33]	1147	2.36*	Monoterp. ether
Isoamyl methacrylate	5.45	1047	1.05	3.11	1222	3.25*	Aliphatic ester
2-Methylbutyl methacrylate	5.47	1048	1.88	[3.11]	1222	3.25*	Aliphatic ester
Isobutyl angelate	5.65*	1058	10.74	12.24	1238	3.47*	Aliphatic ester
γ -Terpinene	5.65*	1058	[10.74]	0.28	1179	2.73	Monoterpene
Prenyl isobutyrate	5.74	1063	1.42	2.67	1261	3.78*	Aliphatic ester

Methallyl angelate	5.94	1073	10.96	11.10	1318	4.56	Aliphatic ester
3-Methylamyl propionate?	6.06	1080	0.10	0.11	1254	3.69	Aliphatic ester
Butyl angelate	6.28	1091	1.08	[2.67]	1261	3.78*	Aliphatic ester
Isobutyl tiglate	6.35	1095	0.46	[0.56]	1291	4.19*	Aliphatic ester
α -Pinene oxide	6.41	1098	0.14	0.17	1302	4.36	Monoterp. ether
Isoamyl 2-methylbutyrate	6.51	1102	0.22	0.22	1256	3.72	Aliphatic ester
2-Methylbutyl 2-methylbutyrate	6.58	1104	1.04	[12.24]	1238	3.47*	Aliphatic ester
Isoamyl isovalerate	6.72	1110	0.13	0.17	1250	3.63	Aliphatic ester
α -Thujone	6.75	1111	0.22	0.20	1364	5.24	Monoterp. ketone
Methallyl tiglate?	6.81	1113	0.18	0.14	1392	5.64	Aliphatic ester
3-Methylamyl isobutyrate	6.87	1115	1.18	[2.67]	1261	3.78*	Aliphatic ester
β -Thujone	6.95	1118	0.02	0.02	1378	5.44	Monoterp. ketone
α -Campholenal	7.23	1128	0.14				Monoterp. aldehyde
<i>trans</i> -Pinocarveol	7.64	1144	2.31	3.12	1558	9.01	Monoterp. alcohol
3-Methylamyl methacrylate	7.70	1146	2.95	3.01	1337	4.85	Aliphatic ester
Isoamyl angelate	7.75	1148	5.36	4.55	1343	4.94	Aliphatic ester
2-Methylbutyl angelate	7.89	1153	10.23	12.29	1348	5.00	Aliphatic ester
Camphene hydrate	8.06	1160	0.08	0.08	1514	7.82	Monoterp. alcohol
<i>C. nobile</i> biomarker	8.11	1161	0.53	0.48	1406	5.85	Aliphatic ester
Pinocarvone	8.21	1165	3.84	16.04	1450	6.60*	Monoterp. ketone
Isoborneol	8.32	1169	0.07	0.05	1587	9.88	Monoterp. alcohol
Isopinocampone	8.58	1179	0.41	0.20	1469	6.97	Monoterp. ketone
Borneol	8.68*	1183	0.09	0.09	1607	10.53*	Monoterp. alcohol
Terpinen-4-ol	8.78	1187	0.04	0.04	1532	8.25	Monoterp. alcohol
Isobutyl 3-hydroxy-2-methylenebutyrate	8.90	1191	0.13	0.21	1692	13.97	Aliphatic ester
Prenyl angelate	9.17	1199	2.65	[16.04]	1450	6.60*	Aliphatic ester
Myrtenal	9.27	1201	0.78	0.78	1526	8.09*	Monoterp. aldehyde
Myrtenol	9.40*	1204	0.58	0.52	1702	14.43*	Monoterp. alcohol
α -Terpineol	9.40*	1204	[0.58]	2.93	1637	11.52*	Monoterp. alcohol
Isoamyl tiglate	9.52	1207	0.23	0.26	1413	5.95	Aliphatic ester
Verbenone	9.74*	1212	0.16	0.05	1602	10.35	Monoterp. ketone
3-Methylamyl valerate	9.74*	1212	[0.16]	0.13	1387	5.56	Aliphatic ester
3-Methylamyl angelate	11.57	1253	9.53	[16.04]	1450	6.60*	Aliphatic ester
(<i>Z</i>)-Hex-3-en-1-yl angelate	12.79*	1280	0.15	0.12	1536	8.37	Aliphatic ester
Bornyl acetate	12.79*	1280	[0.15]	0.08	1493	7.42	Monoterp. ester
Isoamyl 3-hydroxy-2-methylenebutyrate	13.66	1298	0.08	0.06	1811	20.32	Aliphatic ester
2-Methylbutyl 3-hydroxy-2-methylenebutyrate	13.95	1302	0.09	0.06	1831	21.50	Aliphatic ester
α -Copaene	17.54	1357	0.06	0.10	1425	6.14	Sesquiterpene
β -Caryophyllene	20.17	1397	0.02	[0.78]	1526	8.09*	Sesquiterpene
Phenylethyl isobutyrate	20.44	1401	0.22	0.24	1790	19.14	Phenolic ester

α -Humulene	23.24	1434	0.03	0.01	1595	10.16	Sesquiterpene
<i>trans</i> - β -Farnesene	24.10	1445	0.04	0.03	1615	10.73	Sesquiterpene
Germacrene D	25.52	1462	2.97	[2.93]	1637	11.52*	Sesquiterpene
β -Selinene	26.04	1468	0.13	[2.93]	1637	11.52*	Sesquiterpene
Bicyclogermacrene	26.69	1475	0.13	0.12	1653	12.26	Sesquiterpene
(<i>E,E</i>)- α -Farnesene	28.99	1504	0.51	[0.52]	1702	14.43*	Sesquiterpene
<i>trans</i> -Cadinane-1,4-diene	29.19	1507	0.07	0.07	1686	13.70	Sesquiterpene
Spathulenol	33.64*	1568	0.10	0.04	2036	34.52	Sesquiterp. alcohol
Caryophyllene oxide	33.64*	1568	[0.10]	0.03	1864	23.68	Sesquiterp. ether
Copabornenol	35.84	1601	0.16				Sesquiterp. alcohol
Chamazulene	40.59	1721	0.02	0.03	2237	40.85	Azulene
Phytone	44.36	1847	0.11	0.17	2067	35.77	Aliphatic ketone
Total identified			96.86%	97.63%			

*: Two or more compounds are coeluting on this column

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

Note: no correction factor was applied

OTHER DATA

Physical aspect : Light blue liquid

Refractive index : 1.4463 \pm 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent were detected using this method.

