



PLANT THERAPY
100% PURE ESSENTIAL OILS

GC/MS BATCH NUMBER: H20104

ESSENTIAL OIL: HELICHRYSUM ITALICUM
BOTANICAL NAME: HELICHRYSUM ITALICUM
ORIGIN: FRANCE

KEY CONSTITUENTS PRESENT IN THIS BATCH OF HELICHRYSUM ITALICUM OIL	%
α -PINENE	25.0
NERYL ACETATE	23.7
γ -CURCUMENE	8.7
LIMONENE	2.8
α -SELINENE	1.9
ITALICENE	2.7
β -CARYOPHYLLENE	2.3
TERPINOLENE	2.2
α -TERPINEOL	1.8
β -SELINENE	1.8
α -CURCUMENE	1.6
β -PINENE	1.3

Comments from Robert Tisserand: : Excellent "warm bread" odor quality, and constituents all look fine. Contains 3% italdiones.

Date : February 28, 2017

SAMPLE IDENTIFICATION

Internal code : 17B13-PTH2-1-DM

Customer identification : Helichrysum Italicum - Montenegro - H20104612R

Type : Essential oil

Source : *Helichrysum italicum*

Customer : Plant Therapy

ANALYSIS

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

Identifications double-checked by GC-MS

Analyst : Sylvain Mercier, M. Sc., chimiste

Analysis date : 2017-02-27

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.	
2,4-Dimethyl-3-pentanone	1.65	793	0.04	0.03	884	0.96	Aliphatic ketone
4-Methyl-3-hexanone	2.20	836	0.16	0.16	1008	1.67	Aliphatic ketone
Tricyclene	3.31	914	0.09	0.11	931	1.16	Monoterpene
α -Thujene	3.40	920	0.04	24.95	965	1.31*	Monoterpene
α -Pinene	3.54*	928	25.01	[24.95]	965	1.31*	Monoterpene
Irid-2-ene?	3.54*	928	[25.01]				Monoterpene
β -Citronellene	3.71	938	0.14				Monoterpene
α -Fenchene	3.77	942	0.38	0.55	992	1.52	Monoterpene
Camphene	3.79	943	0.79	0.76	999	1.58	Monoterpene
Thuja-2,4(10)-diene	3.88	948	0.03	0.03	1059	2.13*	Monoterpene
Unknown (m/z = 95, 67 (13), 138 (9))	4.18	966	0.20				Monoterpene
Sabinene	4.22	968	0.01	[0.03]	1059	2.13*	Monoterpene
β -Pinene	4.28	972	1.30	1.26	1042	1.96	Monoterpene
Myrcene	4.55	988	0.09	0.08	1118	2.73	Monoterpene
<i>trans</i> -Dehydroxylinalool oxide	4.57	990	0.04	0.03	1157	3.26	Monoterp. ether
6-Methyl-5-hepten-2-one	4.64	993	0.01	0.01	1289	5.16	Aliphatic ketone
Δ 3-Carene	4.83*	1004	0.48	0.40	1097	2.45	Monoterpene
α -Phellandrene	4.83*	1004	[0.48]	0.04	1111	2.64	Monoterpene
α -Terpinene	5.01	1014	0.88	0.86	1125	2.83	Monoterpene
<i>para</i> -Cymene	5.19	1024	0.86	0.76	1211	4.00	Monoterpene
Limonene	5.25	1027	2.79	2.70	1144	3.08	Monoterpene
β -Phellandrene	5.27	1028	0.27	0.92	1149	3.15*	Monoterpene
1,8-Cineole	5.31	1030	0.61	[0.92]	1149	3.15*	Monoterp. ether
<i>cis</i> - β -Ocimene	5.42	1036	0.03	0.80	1192	3.72*	Monoterpene
<i>trans</i> - β -Ocimene	5.60	1046	0.05	0.05	1204	3.89	Monoterpene
Isobutyl angelate	5.72	1053	0.15	0.14	1238	4.41	Aliphatic ester
γ -Terpinene	5.79	1056	0.80	[0.80]	1192	3.72*	Monoterpene
<i>cis</i> -Linalool oxide (fur.)	6.10	1073	0.01	0.01	1385	6.71	Monoterp. alcohol
Terpinolene	6.28	1083	2.19	2.01	1226	4.23	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	6.42	1091	0.08	0.09	1407	7.22	Monoterp. alcohol
<i>para</i> -Cymenene	6.56	1096	0.04	0.04	1368	6.46	Monoterpene
2,4-Dimethyl-heptane-3,5- dione	6.61	1098	0.07	0.07	1475	8.88	Aliphatic ketone
Linalool	6.70	1101	0.46	0.44	1496	9.46	Monoterp. alcohol
2-Methylbutyl 2- methylbutyrate	6.72	1102	0.05	0.06	1234	4.35	Aliphatic ester
Nonanal	6.82	1106	0.04	0.05	1336	5.93	Aliphatic aldehyde
endo-Fenchol	7.12	1117	0.21	0.59	1521	10.40*	Monoterp. alcohol
1-Terpineol	7.56	1133	0.13	0.10	1510	9.99	Monoterp. alcohol

<i>trans</i> -Pinocarveol	7.71	1138	0.04	0.03	1575	12.44	Monoterp. alcohol
Isoamyl angelate	7.98*	1148	0.65	0.50	1340	5.99	Aliphatic ester
Camphor	7.98*	1148	[0.65]	0.30	1419	7.51*	Monoterp. ketone
Camphene hydrate	8.09	1152	0.03	0.07	1534	10.90	Monoterp. alcohol
Borneol	8.60	1171	0.14	0.14	1613	14.17	Monoterp. alcohol
Terpinen-4-ol	8.83	1179	0.19	[0.59]	1521	10.40*	Monoterp. alcohol
Dimethyl octanedione isomer	8.95	1184	0.19	0.23	1532	10.81	β -diketone
4,6-Dimethyl-3,5-octanedione	9.00	1186	0.19	0.23	1526	10.60	β -diketone
α -Terpineol	9.46	1198	1.76	2.63	1624	14.76*	Monoterp. alcohol
γ -Terpineol	9.60	1201	0.27	1.88	1630	15.09*	Monoterp. alcohol
Unknown (m/z = 81, 168 (53), 67 (49), 140 (47), 41 (44))	10.55	1222	0.12				
Nerol	10.59	1223	0.73	0.72	1729	20.86	Monoterp. alcohol
Neral	11.29	1239	0.02	0.03	1600	13.51	Monoterp. aldehyde
<i>cis</i> -Isogeraniol	11.78	1250	0.04	0.04	1744	21.93	Monoterp. alcohol
Hexyl angelate	13.42	1286	0.17	0.54	1607	13.86*	Aliphatic ester
2,6-Dimethyl-1,7-octadiene-3,6-diol	17.37	1348	0.18	0.17	1995	37.23	Monoterp. alcohol
α -Ylangene	17.48	1350	0.12	[0.30]	1419	7.51*	Sesquiterpene
α -Copaene	17.97*	1357	1.59	0.65	1430	7.77	Sesquiterpene
Isoitalicene	17.97*	1357	[1.59]	0.96	1427	7.71	Sesquiterpene
Neryl acetate	18.42	1364	23.67	24.52	1664	16.92*	Monoterp. ester
Geranyl acetate	19.71	1384	0.14	1.69	1695	18.55*	Monoterp. ester
Italicene	19.95	1387	2.73	2.52	1471	8.79	Sesquiterpene
β -Caryophyllene	20.91	1400	2.31	2.39	1516	10.21	Sesquiterpene
<i>cis</i> - α -Bergamotene	20.99	1401	0.43	0.61	1507	9.85	Sesquiterpene
<i>trans</i> - α -Bergamotene	22.48	1419	0.52	[0.59]	1521	10.40*	Sesquiterpene
Italidione I	23.36	1429	0.92	2.82	1799	25.60*	β -diketone
α -Humulene	23.64	1432	0.16	0.20	1592	13.08	Sesquiterpene
β -Acoradiene	24.42	1442	0.20	0.27	1587	12.87	Sesquiterpene
<i>trans</i> - β -Farnesene	24.78	1446	0.29	0.32	1626	14.91	Sesquiterpene
Neryl propionate	25.09	1450	0.80	0.86	1721	20.35	Monoterp. ester
γ -Selinene	25.40	1454	0.64	0.71	1596	13.26	Sesquiterpene
Germacrene D	26.05	1461	0.22	[0.54]	1607	13.86*	Sesquiterpene
γ -Curcumene	26.51	1467	8.72	9.22	1622	14.69	Sesquiterpene
β -Selinene	26.56	1468	1.67	[2.63]	1624	14.76*	Sesquiterpene
α -Curcumene	26.89	1472	1.62	[1.69]	1695	18.55*	Sesquiterpene
α -Selinene	27.19*	1475	2.68	[1.88]	1630	15.09*	Sesquiterpene
Italidione II	27.19*	1475	[2.68]	[2.82]	1799	25.60*	β -diketone
α -Muurolene	27.88	1483	0.14	0.15	1633	15.26	Sesquiterpene
δ -Amorphene	28.06	1486	0.12	0.14	1641	15.71	Sesquiterpene

γ-Cadinene	28.89	1496	0.29	[24.52]	1664	16.92*	Sesquiterpene
β-Curcumene	29.16	1500	0.55	0.51	1667	17.09	Sesquiterpene
Italidione II isomer	29.29	1502	0.21	[2.82]	1799	25.60*	β-diketone
δ-Cadinene	29.58	1506	0.46	0.46	1671	17.33	Sesquiterpene
trans-γ-Bisabolene	29.78	1509	0.05	0.05	1689	18.21	Sesquiterpene
trans-Cadina-1,4-diene	30.32	1516	0.04	0.03	1699	18.81	Sesquiterpene
β-Sesquiphellandrene	30.51	1519	0.05	0.06	1702	19.03	Sesquiterpene
trans-α-Bisabolene	31.42	1531	0.04	[1.69]	1695	18.55*	Sesquiterpene
Italicene ether	32.09	1541	0.06				Sesquiterp. ether
Italidione III	33.89	1566	0.33	[2.82]	1799	25.60*	β-diketone
Italidione III isomer	34.20	1570	0.13				β-diketone
Italidione III isomer II	34.56	1575	0.08				β-diketone
Italidione III isomer III	34.67	1577	0.15				β-diketone
Guaiol	35.31	1586	0.11	0.33	2010	37.74*	Sesquiterp. alcohol
Italidione III isomer IV	35.62	1590	0.16				β-diketone
Rosifoliol analog?	35.83	1594	0.27	[0.33]	2010	37.74*	Sesquiterp. alcohol
10-epi-γ-Eudesmol	36.12	1601	0.14	0.11	1985	36.77	Sesquiterp. alcohol
Neryl angelate?	37.06	1624	0.07				Monoterp. ester
τ-Cadinol	37.43	1633	0.03	0.02	2083	40.02	Sesquiterp. alcohol
β-Eudesmol	37.77*	1641	0.13	0.09	2109	40.78	Sesquiterp. alcohol
α-Eudesmol	37.77*	1641	[0.13]	0.03	2123	41.15	Sesquiterp. alcohol
Selin-11-en-4-α-ol	37.95	1646	0.16	0.13	2132	41.40	Sesquiterp. alcohol
Total identified			96.13%	95.46%			

*: 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 : Faintly yellow liquid

Refractive index : 1.4720 ± 0.0003 (20 °C)

CONCLUSION

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



