



**PLANT THERAPY**  
100% PURE ESSENTIAL OILS

## GC/MS BATCH NUMBER: H90101

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**ESSENTIAL OIL:** HELICHRYSUM ITALICUM ORGANIC

**BOTANICAL NAME:** HELICHRYSUM ITALICUM

**ORIGIN:** FRANCE

KEY CONSTITUENTS PRESENT IN THIS BATCH OF HELICHRYSUM ITALICUM ORGANIC OIL	%
$\alpha$ -PINENE	20.1
$\gamma$ -CURCUMENE	15.8
NERYL ACETATE	11.8
$\alpha$ -SELINENE	4.9
$\beta$ -CARYOPHYLLENE	4.3
ITALICENE	3.9
$\beta$ -SELINENE	3.2
$\alpha$ -CURCUMENE	3.0
LIMONENE	2.8
ISOITALICENE + $\alpha$ -COPAENE	2.7
ITALIDIONE I	1.9
$\gamma$ -SELINENE	1.2
ITALIDIONE II ISOMER	1.1
ITALIDIONE II	1.1

Comments from Robert Tisserand: Excellent "warm bread" odor profile. This is an  $\alpha$ -pinene chemotype with 7% total italidiones, constituents that are unique to *Helichrysum italicum* oil.

**Date :** December 22, 2016

*SAMPLE IDENTIFICATION*

**Internal code :** 16L12-PTH2-1-DM

**Customer identification :** Helichrysum Italicum Organic – H9010165R

**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).

**Analyst :** Sylvain Mercier, M. Sc., chimiste

**Analysis date :** 2016-12-20

Checked and approved by :



Sylvain Mercier, M. Sc., chimiste 2014-005

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IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
2-Methyl-3-pentanone	1.17	731	0.06	0.04	907	0.70	Aliphatic ketone
2,4-Dimethyl-3-pentanone	1.56	786	0.09	0.05	900	0.69	Aliphatic ketone
4-Methyl-3-hexanone	2.10	835	0.13	0.49	1003	1.10*	Aliphatic ketone
$\alpha$ -Thujene	3.28	920	0.01	21.85	959	0.91*	Monoterpene
$\alpha$ -Pinene	3.42	928	20.08	[21.85]	959	0.91*	Monoterpene
$\alpha$ -Fenchene	3.65	942	0.39	0.43	993	1.06	Monoterpene
Camphene	3.67	943	0.20	[0.49]	1003	1.10*	Monoterpene
Thuja-2,4(10)-diene	3.77	949	0.02	0.03	1054	1.48*	Monoterpene
Sabinene	4.10	970	0.01	[0.03]	1054	1.48*	Monoterpene
$\beta$ -Pinene	4.16	973	0.34	0.34	1042	1.39	Monoterpene
Myrcene	4.45	991	0.07	0.04	1116	1.99	Monoterpene
<i>trans</i> -Dehydroxylinalool oxide	4.49	993	0.01	3.28	1143	2.31*	Monoterp. ether
6-Methyl-5-hepten-2-one	4.53	996	0.02	0.02	1253	3.67	Aliphatic ketone
$\alpha$ -Phellandrene	4.71*	1006	0.06	0.02	1111	1.94	Monoterpene
$\Delta$ 3-Carene	4.71*	1006	[0.06]	0.01	1108	1.91	Monoterpene
<i>cis</i> -Dehydroxylinalool oxide	4.85	1013	0.02				Monoterp. ether
$\alpha$ -Terpinene	4.91	1017	0.13	0.09	1125	2.09	Monoterpene
Limonene	5.14*	1030	3.00	[3.28]	1143	2.31*	Monoterpene
para-Cymene	5.14*	1030	[3.00]	0.17	1206	3.04	Monoterpene
1,8-Cineole	5.19	1032	0.30	[3.28]	1143	2.31*	Monoterp. ether
<i>cis</i> - $\beta$ -Ocimene	5.32	1040	0.01	0.30	1190	2.86*	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	5.50	1050	0.04	0.03	1203	3.00	Monoterpene
Isobutyl angelate	5.62	1056	0.26	0.39	1235	3.43*	Aliphatic ester
$\gamma$ -Terpinene	5.69	1060	0.29	[0.30]	1190	2.86*	Monoterpene
Terpinolene	6.16	1085	0.15	0.16	1226	3.30	Monoterpene
2,4-Dimethyl-heptane-3,5-dione	6.54	1103	0.04	0.04	1462	6.84	Aliphatic ketone
2-Methylbutyl 2-methylbutyrate	6.57	1104	0.10	[0.39]	1235	3.43*	Aliphatic ester
Linalool	6.72	1109	0.56	0.59	1483	7.24	Monoterp. alcohol
Nonanal	6.75	1111	0.05	0.06	1331	4.76	Aliphatic aldehyde
endo-Fenchol	7.17	1127	0.07	0.06	1514	7.81	Monoterp. alcohol
<i>trans</i> -Pinocarveol	7.63	1144	0.05	0.07	1556	8.99	Monoterp. alcohol
Camphor	7.72	1147	0.04	0.04	1438	6.39	Monoterp. ketone
Isoamyl angelate	7.83	1151	0.91	0.92	1343	4.94	Aliphatic ester
Borneol	8.68	1183	0.09	0.13	1607	10.53	Monoterp. alcohol
Terpinen-4-ol	8.79	1187	0.15	0.17	1526	8.09	Monoterp. alcohol
Dimethyl octanedione isomer	8.84	1189	0.23	1.06	1528	8.16*	$\beta$ -diketone

4,6-Dimethyl-3,5-octanedione	8.90	1191	0.25	0.30	1532	8.24	β-diketone
α-Terpineol	9.49	1206	0.24	1.46	1613	10.68*	Monoterp. alcohol
Unknown (m/z = 81, 168 (64), 67 (59), 140 (49) 41 (46))	9.74	1212	0.04				
Unknown (m/z = 81, 168 (53), 67 (49), 140 (47), 41 (44))	10.37	1226	0.20				
Nerol	10.66	1233	0.52	0.69	1720	15.22*	Monoterp. alcohol
Neral	11.27	1246	0.10	0.13	1577	9.63	Monoterp. aldehyde
cis-Isogeraniol	11.51	1252	0.09	0.07	1744	16.46	Monoterp. alcohol
Hexyl angelate	13.17	1288	0.40	0.36	1604	10.41	Aliphatic ester
α-Terpinyl acetate	17.00	1349	0.33	0.31	1619	10.85	Monoterp. ester
2,6-Dimethyl-1,7-octadiene-3,6-diol	17.11	1351	0.17	0.24	2009	32.93	Monoterp. alcohol
Isoitalicene + α-Copaene	17.60	1358	2.72	2.96	1453	6.66	Sesquiterpenes
Neryl acetate	18.04	1365	11.75	12.78	1662	12.62*	Monoterp. ester
Geranyl acetate	19.34	1385	0.23	3.13	1704	14.52*	Monoterp. ester
Italicene	19.58	1389	3.87	4.65	1494	7.45	Sesquiterpene
β-Caryophyllene	20.57*	1402	5.00	4.32	1538	8.42	Sesquiterpene
cis-α-Bergamotene	20.57*	1402	[5.00]	0.11	1506	7.66	Sesquiterpene
Aromadendrene	22.05	1420	0.85	[1.06]	1528	8.16*	Sesquiterpene
trans-α-Bergamotene	22.44	1425	0.15	[1.06]	1528	8.16*	Sesquiterpene
Italidione I	23.26*	1435	2.33	3.13	1804	19.90*	β-diketone
α-Humulene	23.26*	1435	[2.33]	0.45	1597	10.20*	Sesquiterpene
β-Acoradiene	24.08	1445	0.37	[0.45]	1597	10.20*	Sesquiterpene
trans-β-Farnesene	24.43	1449	0.57	0.86	1629	11.22*	Sesquiterpene
Neryl propionate	24.74	1453	0.89	0.90	1728	15.56	Monoterp. ester
γ-Selinene	25.03	1456	1.15	[1.46]	1613	10.68*	Sesquiterpene
Germacrene D	25.37	1460	0.22	[0.86]	1629	11.22*	Sesquiterpene
Italidione isomer	25.69	1464	0.31	0.52	1822	20.94	β-diketone
γ-Curcumene	26.25	1470	15.78	14.69	1644	11.83	Sesquiterpene
β-Selinene	26.37	1471	3.22	3.35	1652	12.21*	Sesquiterpene
Italidione II	26.53	1473	1.07	[3.13]	1804	19.90*	β-diketone
ar-Curcumene	26.70	1475	2.95	[3.13]	1704	14.52*	Sesquiterpene
α-Selinene	26.94	1478	4.85	4.60	1646	11.96	Sesquiterpene
α-Murolene	27.59	1486	0.37	[3.35]	1652	12.21*	Sesquiterpene
δ-Amorphene	27.72	1488	0.26	[3.35]	1652	12.21*	Sesquiterpene
γ-Cadinene	28.62	1499	0.47	0.78	1684	13.58*	Sesquiterpene
Italidione II isomer	28.85	1502	1.11	0.93	1810	20.30	β-diketone
β-Curcumene	28.94	1504	0.37	[12.78]	1662	12.62*	Sesquiterpene
δ-Cadinene	29.28	1508	0.87	0.95	1689	13.81*	Sesquiterpene
trans-γ-Bisabolene	30.13	1520	0.22	[0.78]	1684	13.58*	Sesquiterpene

β-Sesquiphellandrene	30.46	1524	0.23	[0.95]	1689	13.81*	Sesquiterpene
α-Cadinene	30.74	1528	0.07	0.08	1696	14.16	Sesquiterpene
trans-α-Bisabolene	31.29	1536	0.09	[0.69]	1720	15.22*	Sesquiterpene
Italicene ether	31.77	1542	0.13				Sesquiterp. ether
α-Elemol	32.17	1548	0.10	0.07	1998	32.28	Sesquiterp. alcohol
Italidione III	33.75	1569	0.58				β-diketone
Italidione III isomer	34.07	1574	0.22				β-diketone
Italidione III isomer II	34.16	1575	0.22				β-diketone
Italidione III isomer III	34.33	1577	0.27				β-diketone
Italidione III isomer IV	34.88	1585	0.10				β-diketone
Guaiol	35.39	1592	0.15	0.19	1993	32.02	Sesquiterp. alcohol
Rosifoliol analog?	35.88	1602	0.59	0.28	2020	33.59	Sesquiterp. alcohol
γ-Eudesmol	36.75	1623	0.08	0.07	2073	36.00	Sesquiterp. alcohol
Neryl angelate?	36.95	1628	0.18				Monoterp. ester
β-Eudesmol	37.91	1651	0.16	0.20	2115	37.38	Sesquiterp. alcohol
Selin-11-en-4-α-ol	38.09	1655	0.23	0.14	2135	38.08	Sesquiterp. alcohol
Unknown dione (m/z = 98, 41 (50), 83 (46), 82 (43), 137 (43)... 202 (5), 220 (3), 238 (1), 281 (2))	43.01	1798	0.26				β-diketone
<b>Total identified</b>			<b>95.43%</b>	<b>94.58%</b>			

\*: 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 yellow liquid

**Refractive index :** 1.4778 ± 0.0003 (20 °C)

#### CONCLUSION

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



