

GC/MS BATCH NUMBER: B50104

ESSENTIAL OIL: BLUE TANSY
BOTANICAL NAME: TANACETUM ANNUUM
ORIGIN: MOROCCO

KEY CONSTITUENTS PRESENT IN THIS BATCH OF BLUE TANSY OIL	%
SABINENE	20.8
CHAMAZULENE	13.7
1,9-DIHYDROCHAMAZULENE	12.2
MYRCENE	5.2
β-PINENE	4.3
α-PHELLANDRENE	3.7
CAMPHOR	3.0
4,10-DIHYDROCHAMAZULENE	2.5
p-CYMENE	2.5
5,6-DIHYDROCHAMAZULENE	2.0
β-CARYOPHYLLENE	1.9
α-PINENE	1.8
GERMACRENE D	1.8
γ-TERPINENE	1.7
TERPINEN-4-OL	1.5
7,8-DIHYDROCHAMAZULENE	1.5
LIMONENE	1.1
BORNEOL	1.1

α -Terpinene	1.0
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Comments from Robert Tisserand: A very good quality blue tansy oil, with constituents in expected amounts, and a total of over 15% chamazulenes.

Date : September 23, 2016

SAMPLE IDENTIFICATION

Internal code : 16I16-PTH6-1-DM

Customer identification : Blue Tansy - Morocco - B5010467R

Type : Essential oil

Source : *Tanacetum annuum*

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 : 2016-09-22

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	0.57	582	0.01	0.02	790	0.51	Aliphatic aldehyde
Hexanal	1.67	801	0.01	0.02	1012	1.15	Aliphatic aldehyde
Ethyl 2-methylbutyrate	2.21	843	0.03	0.04	978	0.99	Aliphatic ester
Hexanol	2.69	880	0.01	0.01	1306	4.41	Aliphatic alcohol
Tricyclene	3.16	913	0.04	0.02	925	0.78	Monoterpene
α -Thujene	3.25	918	0.38	0.59	952	0.89	Monoterpene
α -Pinene	3.36	924	1.81	1.66	945	0.86	Monoterpene
Camphene	3.64	941	0.42	0.42	995	1.07	Monoterpene
Sabinene	4.12	971	20.76	21.59	1061	1.54	Monoterpene
β -Pinene	4.16	973	4.31	4.21	1039	1.37	Monoterpene
Myrcene	4.44	990	5.18	5.52	1117	2.00	Monoterpene
Octen-3-ol	4.50	994	0.03	0.02	1413	5.94	Aliphatic alcohol
α -Phellandrene	4.70*	1005	4.07	3.71	1109	1.92	Monoterpene
Δ^3 -Carene	4.70*	1005	[4.07]	0.09	1092	1.79	Monoterpene
Octanal	4.81	1011	0.06	0.05	1233	3.41	Aliphatic aldehyde
α -Terpinene	4.87	1015	1.03	1.48	1122	2.06	Monoterpene
para-Cymene	5.08	1026	2.47	2.51	1206	3.04	Monoterpene
Limonene	5.10	1028	1.09	1.00	1138	2.26	Monoterpene
β -Phellandrene	5.13	1029	0.41	0.90	1144	2.32*	Monoterpene
1,8-Cineole	5.16	1031	0.25	[0.90]	1144	2.32*	Monoterp. ether
cis- β -Ocimene	5.28	1037	0.02	1.75	1186	2.81*	Monoterpene
trans- β -Ocimene	5.46	1047	0.02	0.03	1200	2.97	Monoterpene
γ -Terpinene	5.65	1058	1.73	[1.75]	1186	2.81*	Monoterpene
cis-Sabinene hydrate	6.00	1076	0.09	3.27	1422	6.09*	Monoterp. alcohol
Terpinolene	6.12	1083	0.64	0.64	1222	3.24	Monoterpene
6,7-Epoxymyrcene	6.36	1096	0.41	0.40	1348	5.01	Monoterp. ether
2-Methylbutyl 2-methylbutyrate	6.53	1103	0.06	0.05	1230	3.36	Aliphatic ester
Linalool	6.64	1107	0.13	0.13	1490	7.36	Monoterp. alcohol
Nonanal	6.70	1109	0.02	0.01	1344	4.95	Aliphatic aldehyde
Unknown (m/z = 71, 43 (86), 81 (86), 79 (69), 67 (67), 41 (56), 53 (38)... 152 (7))	6.91	1117	0.22				Oxygenated monoterpene
cis-para-Menth-2-en-1-ol	7.22	1128	0.01	0.02	1513	7.79	Monoterp. alcohol
Limona ketone	7.32	1132	0.25	0.27	1463	6.86	Simple phenolic
trans-Pinocarveol	7.52	1140	0.02	0.03	1565	9.23	Monoterp. alcohol
Camphor	7.67	1145	3.00	[3.27]	1422	6.09*	Monoterp. ketone
Isoborneol	8.08	1161	0.07	0.07	1598	10.25	Monoterp. alcohol
Borneol	8.60	1180	1.06	2.18	1628	11.16*	Monoterp. alcohol
Terpinen-4-ol	8.71	1184	1.47	2.29	1528	8.17*	Monoterp. alcohol

α -Terpineol	9.35	1203	0.12	[2.18]	1628	11.16*	Monoterp. alcohol
γ -Terpineol	9.67	1210	0.08	0.08	1638	11.58	Monoterp. alcohol
Decanal	9.87	1215	0.07	0.07	1452	6.64	Aliphatic aldehyde
Bornyl formate	10.19	1222	0.07	0.10	1456	6.73	Monoterp. ester
(Z)-Hex-3-en-1-yl isovalerate	10.43	1228	0.05	0.05	1448	6.56	Aliphatic ester
Cuminal	11.37	1249	0.15	0.13	1671	13.07	Monoterp. aldehyde
para-Menth-1(7)-en-2-one?	11.68	1256	0.02	0.04	1566	9.28	Monoterp. ketone
Bornyl acetate	12.95	1283	0.01	0.01	1506	7.67	Monoterp. ester
Thymol	15.51	1326	0.39	0.51	2118	37.50	Monoterp. alcohol
Carvacrol	16.30	1338	0.03	0.03	2146	38.45	Monoterp. alcohol
α -Copaene	17.38	1355	0.11	0.14	1436	6.36	Sesquiterpene
β -Elemene	18.61	1374	0.15	[2.29]	1528	8.17*	Sesquiterpene
β -Caryophyllene	20.28	1399	1.92	1.28	1526	8.09	Sesquiterpene
Aromadendrene	21.73	1416	0.27	[2.29]	1528	8.17*	Sesquiterpene
cis- β -Farnesene	22.56	1426	0.22	0.27	1578	9.66	Sesquiterpene
α -Humulene	23.01	1432	0.19	0.24	1585	9.82	Sesquiterpene
allo-Aromadendrene	23.25	1435	0.03	0.03	1553	8.92	Sesquiterpene
trans- β -Farnesene	24.21	1446	0.08	0.07	1610	10.58	Sesquiterpene
Germacrene D	25.25	1459	1.75	1.45	1616	10.77	Sesquiterpene
β -Selinene	25.83	1466	0.33	[2.18]	1628	11.16*	Sesquiterpene
Bicyclogermacrene	26.44*	1472	0.44	0.30	1646	11.93	Sesquiterpene
α -Selinene	26.44*	1472	[0.44]	0.07	1642	11.75	Sesquiterpene
Valencene	27.21	1482	0.10	0.07	1667	12.84	Sesquiterpene
α -Muurolene	27.36	1483	0.11	0.10	1649	12.11	Sesquiterpene
γ -Cadinene	28.26	1494	0.14	0.22	1676	13.30	Sesquiterpene
1,9-Dihydrochamazulene	29.04*	1505	12.37	12.17	1811	20.34	Azulene
δ -Cadinene	29.04*	1505	[12.37]	0.36	1680	13.47	Sesquiterpene
β -Sesquiphellandrene	29.85	1516	0.48	0.50	1697	14.20	Sesquiterpene
3,6-Dihydrochamazulene	30.26	1522	0.09				Azulene
Himachalene oxide	32.72	1555	0.04	0.03	1872	24.24	Sesquiterp. ether
Caryophyllene oxide	33.49*	1566	0.25	0.18	1851	22.80	Sesquiterp. ether
Spathulenol	33.49*	1566	[0.25]	0.05	2022	33.66	Sesquiterp. alcohol
4,10-Dihydrochamazulene	35.92	1603	2.48	2.55	2015	33.27	Azulene
5,6-Dihydrochamazulene	36.36	1613	2.01	1.94	1972	30.77	Azulene
γ -Eudesmol	36.60	1619	0.19	0.17	2071	35.93	Sesquiterp. alcohol
τ -Cadinol	37.35	1637	0.03	0.03	2075	36.07	Sesquiterp. alcohol
7,8-Dihydrochamazulene	37.48*	1641	1.74	1.47	2011	33.06	Azulene
τ -Muurolol	37.48*	1641	[1.74]	0.10	2093	36.67	Sesquiterp. alcohol
β -Eudesmol	37.69	1646	0.54	0.45	2111	37.30	Sesquiterp. alcohol
α -Cadinol	37.90	1651	0.11	0.12	2142	38.32	Sesquiterp. alcohol
α -Bisabolol	39.29	1683	0.04	0.06	2132	37.98	Sesquiterp. alcohol
Chamazulene	40.57	1721	13.65	13.93	2242	40.98	Azulene

Unknown (m/z = 119, 121 (70), 105 (49), 93 (48), 91 (45), 109 (44), 41 (42)... 366?(4))	47.96	1986	0.23	0.12	2194	39.74	
Unknown (m/z = 119, 121 (78), 132 (68), 93 (56)... 366? (2))	48.16	1994	1.25	1.23	2198	39.87	
Total identified			92.22%	94.37%			

*: 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 : Dark blue liquid

Refractive index : N/A (too dark)

CONCLUSION

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

