

GC/MS BATCH NUMBER: G20105

ESSENTIAL OIL: GERANIUM BOURBON
BOTANICAL NAME: PELARGONIUM X ASPERUM
ORIGIN: MADAGASCAR

KEY CONSTITUENTS PRESENT IN THIS BATCH OF GERANIUM BOURBON OIL	%
CITRONELLOL	24.1
GERANIOL	12.9
CITRONELLYL FORMATE	10.4
6,9-GUAIADIENE	7.2
ISOMENTHONE	6.1
LINALOOL	4.9
GERANYL FORMATE	4.7
GERANYL TIGLATE	1.6
β-CARYOPHYLLENE	1.5
MENTHONE	1.5
cis-ROSE OXIDE	1.4
β-BOURBONENE	1.2
GERANYL BUTYRATE	1.1
GERMACRENE D	1.0
GERANYL PROPIONATE	1.0

Comments from Robert Tisserand: Fresh, rosy-minty odor quality. All 15 key ISO constituents are within range for Magagascan Geranium oil.

Date : July 31, 2017

SAMPLE IDENTIFICATION

Internal code : 17G28-PTH3-1-CC

Customer identification : Geranium Bourbon - Madagascar - G2010565R

Type : Essential oil

Source : *Pelargonium x asperum*

Customer : Plant Therapy

ANALYSIS

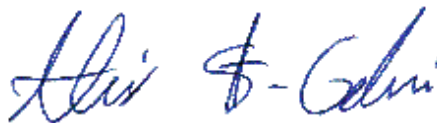
Method : PC-PA-001-15E06, "Analysis of the composition of a liquid essential oil by GC-FID" (in French).

Identifications double-checked by GC-MS

Analyst : Sylvain Mercier, M. Sc., chimiste

Analysis date : 2017-07-30

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.	
Isoamyl alcohol	1.17	740	0.01	0.07	1141	2.61*	Aliphatic alcohol
3-Methylpentanol	2.39	858	0.04	0.03	1259	4.19	Aliphatic alcohol
cis-Hex-3-en-1-ol	2.50	867	0.07	0.07	1310	4.91	Aliphatic alcohol
trans-Hex-2-en-1-ol	2.66	879	0.01	0.01	1338	5.33	Aliphatic alcohol
α-Pinene	3.44	930	0.48	0.49	939	1.01	Monoterpene
Camphene	3.73	947	0.01	0.01	995	1.25	Monoterpene
Geranic oxide	4.11	970	0.05	0.05	1047	1.64*	Monoterp. ether
Sabinene	4.15	973	tr	[0.05]	1047	1.64*	Monoterpene
β-Pinene	4.22	976	0.02	0.01	1039	1.56	Monoterpene
Myrcene	4.50*	993	0.18	0.15	1109	2.23	Monoterpene
trans-Dehydroxylinalool oxide	4.50*	993	[0.18]	[0.07]	1141	2.61*	Monoterp. ether
6-Methyl-5-hepten-2-one	4.57	997	0.11	0.07	1267	4.29	Aliphatic ketone
α-Phellandrene	4.77*	1009	0.09	0.06	1102	2.16	Monoterpene
Δ3-Carene	4.77*	1009	[0.09]	0.02	1082	1.97	Monoterpene
para-Cymene	5.15	1029	0.08	0.12	1198	3.35	Monoterpene
Limonene	5.19	1031	0.16	0.15	1135	2.54	Monoterpene
β-Phellandrene	5.22	1033	0.05	[0.07]	1141	2.61*	Monoterpene
1,8-Cineole	5.26	1035	0.02	[0.07]	1141	2.61*	Monoterp. ether
cis-β-Ocimene	5.37	1041	0.14	0.16	1178	3.09*	Monoterpene
trans-β-Ocimene	5.55	1051	0.13	0.11	1194	3.29	Monoterpene
γ-Terpinene	5.73	1061	0.02	[0.16]	1178	3.09*	Monoterpene
cis-Linalool oxide (fur.)	6.02	1077	0.20	0.18	1365	5.75	Monoterp. alcohol
Terpinolene	6.22*	1088	0.05	0.02	1216	3.58	Monoterpene
Octanol	6.22*	1088	[0.05]	0.05	1491	8.17	Aliphatic alcohol
trans-Linalool oxide (fur.)	6.34	1095	0.08	0.08	1392	6.16	Monoterp. alcohol
Linalool	6.76	1112	4.85	4.99	1481	7.93*	Monoterp. alcohol
cis-Rose oxide	6.83	1114	1.36	1.36	1288	4.59	Monoterp. ether
trans-Rose oxide	7.18	1127	0.54	0.53	1298	4.74	Monoterp. ether
Isopulegol	7.86	1152	0.07	[4.99]	1481	7.93*	Monoterp. alcohol
Citronellal	8.01	1157	0.05	0.03	1396	6.22	Monoterp. aldehyde
Menthone	8.05	1159	1.46	1.47	1380	5.99	Monoterp. ketone
Isomenthone	8.35	1170	6.08	6.39	1405	6.37*	Monoterp. ketone
Terpinen-4-ol	8.83	1187	0.02	0.94	1524	8.93*	Monoterp. alcohol
Isomenthol	9.16	1199	0.15	7.35	1544	9.47*	Monoterp. alcohol
α-Terpineol	9.51	1207	0.41	5.36	1629	12.57*	Monoterp. alcohol
Nerol	10.65	1233	0.65	0.68	1719	16.97	Monoterp. alcohol
Citronellol	11.17	1244	24.11	24.57	1703	16.15	Monoterp. alcohol
Neral	11.23	1246	0.43	0.66	1589	11.13*	Monoterp. aldehyde
Geraniol	12.21	1267	12.87	13.42	1776	20.25	Monoterp. alcohol
trans-Myrtanol	12.37	1271	0.14	1.34	1753	18.79*	Monoterp. alcohol

Geranial	12.55	1275	0.25	0.67	1646	13.20*	Monoterp. aldehyde
Citronellyl formate	12.89	1282	10.38	10.68	1554	9.84*	Monoterp. ester
Neryl formate	12.95	1284	0.22				Monoterp. ester
Geranyl formate	14.20	1308	4.68	[5.36]	1629	12.57*	Monoterp. ester
α -Cubebene	16.05	1336	0.08	[6.39]	1405	6.37*	Sesquiterpene
Citronellic acid	17.02	1351	0.04	0.03	2165	40.39	Monoterp. acid
Citronellyl acetate	17.33	1355	0.39	0.46	1594	11.32	Monoterp. ester
α -Copaene	17.78	1362	0.42	0.41	1436	6.87	Sesquiterpene
β -Bourbonene	18.22	1369	1.17	1.22	1453	7.28	Sesquiterpene
β -Cubebene	18.75	1377	0.03	0.03	1461	7.45	Sesquiterpene
β -Elemene	19.01	1381	0.12	[0.94]	1524	8.93*	Sesquiterpene
Geranyl acetate	19.44	1387	0.44	0.37	1683	15.14	Monoterp. ester
Geranic acid	19.74	1392	0.17	0.24	2237	42.22	Monoterp. acid
β -Caryophyllene	20.69	1405	1.48	1.52	1519	8.80	Sesquiterpene
Aromadendrene	21.60	1416	0.11	[7.35]	1544	9.47*	Sesquiterpene
<i>trans</i> - α -Bergamotene	22.20	1423	0.71	[0.94]	1524	8.93*	Sesquiterpene
6,9-Guaiadiene	22.79	1430	7.19	[7.35]	1544	9.47*	Sesquiterpene
Seychellene	23.16	1435	0.52	[10.68]	1554	9.84*	Sesquiterpene
α -Humulene	23.50	1439	0.37	0.51	1579	10.76	Sesquiterpene
allo-Aromadendrene	23.73	1442	0.14	[10.68]	1554	9.84*	Sesquiterpene
Citronellyl propionate	24.09	1446	0.44				Monoterp. ester
γ -Muuroolene	25.14	1459	0.22	[0.66]	1589	11.13*	Sesquiterpene
Germacrene D	25.71	1465	1.02	1.02	1620	12.26	Sesquiterpene
β -Selinene	26.30	1473	0.32	[5.36]	1629	12.57*	Sesquiterpene
Viridiflorene	26.49	1475	0.14	0.13	1606	11.74	Sesquiterpene
Geranyl propionate	26.73	1478	1.01	[1.34]	1753	18.79*	Monoterp. ester
Bicyclogermacrene	26.95	1480	0.09	[0.67]	1646	13.20*	Sesquiterpene
α -Muuroolene	27.73	1490	0.12	[0.67]	1646	13.20*	Sesquiterpene
δ -Guaiene	27.87	1491	0.15	[5.36]	1629	12.57*	Sesquiterpene
γ -Cadinene	28.78	1503	0.19	0.49	1664	14.20*	Sesquiterpene
δ -Cadinene	29.45	1512	0.70	0.69	1674	14.67	Sesquiterpene
Zonarene	29.62	1514	0.13	[0.49]	1664	14.20*	Sesquiterpene
<i>trans</i> -Calamenene	29.80	1517	0.18	0.16	1733	17.68	Sesquiterpene
<i>trans</i> - γ -Bisabolene	29.98	1519	0.32	0.39	1669	14.40	Sesquiterpene
Furopelargone A	30.56	1528	0.11				Sesquiterp. ketone
Citronellyl butyrate	31.53	1541	0.59	0.54	1743	18.21	Monoterp. ester
Neryl butyrate	32.18	1550	0.14				Monoterp. ester
Geranyl butyrate	33.84*	1573	1.38	1.14	1826	23.51	Monoterp. ester
Caryophyllene oxide	33.84*	1573	[1.38]	0.23	1844	24.70	Sesquiterp. ether
Furopelargone B	34.50	1582	0.78	0.75	1976	33.52	Sesquiterp. ketone
Phenylethyl tiglate	35.29	1593	0.64	0.62	2063	37.30	Phenolic ester
Geranyl isovalerate	35.91	1604	0.37	0.33	1833	23.99	Monoterp. ester
10-epi- γ -Eudesmol	36.09	1608	0.19	0.18	1980	33.72	Sesquiterp. alcohol
1,10-diepi-Cubenol	36.68	1622	0.11	0.18	1945	31.76*	Sesquiterp. alcohol

γ -Eudesmol	36.97	1630	0.02	0.02	2058	37.09	Sesquiterp. alcohol
Hinesol	37.07	1632	0.06	0.06	2091	38.14*	Sesquiterp. alcohol
Cubenol	37.29	1637	0.08	[0.18]	1945	31.76*	Sesquiterp. alcohol
α -Muurolol	37.68	1647	0.07	[0.06]	2091	38.14*	Sesquiterp. alcohol
Citronellyl tiglate	38.74	1673	0.38	0.34	1935	31.11	Monoterp. ester
Geranyl tiglate	40.08	1707	1.60	1.71	2034	36.02*	Monoterp. ester
Geranyl caproate isomer	40.61	1724	0.18	[1.71]	2034	36.02*	Monoterp. ester
Geranyl caproate	41.77	1760	0.08	0.08	2029	35.81	Monoterp. ester
Geranyl caprylate	47.14	1955	0.06	0.09	2226	41.94	Monoterp. ester
Total identified			95.97%	96.29%			

*: 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 green liquid

Refractive index : 1.4650 ± 0.0003 (20 °C)

CONCLUSION

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

