

**Date :** November 1, 2017

*SAMPLE IDENTIFICATION*

**Internal code :** 17J30-PTH3-1-CC

**Customer identification :** Geranium Egyptian - Egypt - G3010571R

**Type :** Essential oil

**Source :** *Pelargonium graveolens*

**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 :** 2017-10-31

Checked and approved by :

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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	739	0.01	0.04	1156	3.07	Aliphatic alcohol
3-Methylpentanol	2.39	856	0.06	0.07	1277	4.79	Aliphatic alcohol
<i>cis</i> -Hex-3-en-1-ol	2.52	866	0.02	0.03	1322	5.48	Aliphatic alcohol
Heptanal	3.05	905	0.01	0.03	1131	2.76	Aliphatic aldehyde
$\alpha$ -Pinene	3.43	927	0.55	0.55	953	1.17	Monoterpene
Geranic oxide	4.10	967	0.06	0.05	1049	1.92*	Monoterp. ether
$\beta$ -Pinene	4.21	973	0.01	[0.05]	1049	1.92*	Monoterpene
Myrcene	4.49	990	0.08	0.08	1118	2.58*	Monoterpene
<i>trans</i> -Dehydroxylinalool oxide	4.51	991	0.04	0.07	1148	2.98*	Monoterp. ether
6-Methyl-5-hepten-2-one	4.57	994	0.05	0.04	1271	4.70	Aliphatic ketone
$\alpha$ -Phellandrene	4.77*	1005	0.06	0.04	1111	2.49	Monoterpene
$\Delta$ 3-Carene	4.77*	1005	[0.06]	0.02	1096	2.30	Monoterpene
6-Methyl-5-hepten-2-ol	4.80	1007	0.03	5.45	1413	7.01*	Aliphatic alcohol
$\alpha$ -Terpinene	4.96	1016	0.01	[0.08]	1118	2.58*	Monoterpene
para-Cymene	5.15	1026	0.08	0.11	1211	3.81	Monoterpene
Limonene	5.18	1028	0.16	0.15	1142	2.90	Monoterpene
$\beta$ -Phellandrene	5.22	1030	0.04	[0.07]	1148	2.98*	Monoterpene
1,8-Cineole	5.25	1031	0.01	[0.07]	1148	2.98*	Monoterp. ether
<i>cis</i> - $\beta$ -Ocimene	5.37	1038	0.06	0.11	1189	3.52*	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	5.55	1048	0.11	0.07	1205	3.73	Monoterpene
$\gamma$ -Terpinene	5.74	1058	0.04	[0.11]	1189	3.52*	Monoterpene
<i>cis</i> -Linalool oxide (fur.)	6.02	1073	0.24	0.22	1376	6.34	Monoterp. alcohol
Terpinolene	6.22	1084	0.05	0.02	1226	4.04	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	6.34	1091	0.12	0.12	1406	6.84	Monoterp. alcohol
6,7-Epoxygeranyl	6.56	1101	0.02	0.01	1347	5.86	Monoterp. ether
Linalool	6.77	1109	4.70	4.80	1497	8.99*	Monoterp. alcohol
<i>cis</i> -Rose oxide	6.83	1111	1.18	1.17	1296	5.07	Monoterp. ether
<i>trans</i> -Rose oxide	7.18	1124	0.49	0.50	1308	5.25	Monoterp. ether
Isopulegol	7.87	1149	0.11	[4.80]	1497	8.99*	Monoterp. alcohol
Citronellal	8.02	1154	0.07	[5.45]	1413	7.01*	Monoterp. aldehyde
Menthone	8.08	1156	2.19	2.18	1390	6.55	Monoterp. ketone
Isomenthone	8.36	1166	5.08	[5.45]	1413	7.01*	Monoterp. ketone
Terpinen-4-ol	8.81	1183	0.03	1.60	1522	9.85*	Monoterp. alcohol
Isomenthol	9.19	1196	0.13	0.40	1550	10.83*	Monoterp. alcohol
$\alpha$ -Terpineol	9.54	1205	0.35	2.41	1623	13.81*	Monoterp. alcohol
Nerol	10.68	1230	0.31	0.21	1737	20.17	Monoterp. alcohol
Citronellol	11.26*	1243	33.51	33.53	1715	18.70	Monoterp. alcohol
Neral	11.26*	1243	[33.51]	0.58	1599	12.67	Monoterp. aldehyde
Geraniol	12.28	1265	13.65	13.84	1784	23.25*	Monoterp. alcohol
Geranial	12.42	1268	0.12	1.15	1647	15.07*	Monoterp. aldehyde

Citronellyl formate	12.90	1279	8.01	7.91	1560	11.23	Monoterp. ester
Neryl formate	12.96	1280	0.07				Monoterp. ester
Geranyl formate	14.21	1304	2.68	3.06	1638	14.58	Monoterp. ester
$\alpha$ -Cubebene	16.08	1333	0.17	[5.45]	1413	7.01*	Sesquiterpene
Citronellic acid	17.08	1348	0.05	0.14	2178	41.95	Monoterp. acid
Citronellyl acetate	17.36	1352	0.31	0.60	1608	13.00*	Monoterp. ester
Neryl acetate	17.81	1359	0.53	0.69	1671	16.32*	Monoterp. ester
$\beta$ -Bourbonene	18.25	1365	1.09	1.09	1455	8.00	Sesquiterpene
$\beta$ -Cubebene	18.78	1373	0.04	0.04	1484	8.69	Sesquiterpene
$\beta$ -Elemene	19.03	1377	0.06	[1.60]	1522	9.85*	Sesquiterpene
Geranyl acetate	19.47*	1384	0.54	0.45	1694	17.52*	Monoterp. ester
Geranic acid	19.47*	1384	[0.54]	0.14	2255	43.84	Monoterp. acid
$\beta$ -Caryophyllene	20.73	1402	1.31	[1.60]	1522	9.85*	Sesquiterpene
$\beta$ -Copaene	21.65	1413	0.13	0.16	1509	9.33	Sesquiterpene
Aromadendrene	22.11	1418	0.08	[1.60]	1522	9.85*	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	22.26	1420	0.02	[1.60]	1522	9.85*	Sesquiterpene
6,9-Guaiadiene	22.70	1425	0.40	0.31	1540	10.48	Sesquiterpene
Seychellene	23.18	1431	0.48	[0.40]	1550	10.83*	Sesquiterpene
$\alpha$ -Humulene	23.53	1435	0.30	0.52	1586	12.18	Sesquiterpene
allo-Aromadendrene	23.79	1438	0.21	[0.40]	1550	10.83*	Sesquiterpene
Citronellyl propionate	24.13	1442	0.37				Monoterp. ester
Neryl propionate	25.19	1455	0.30	0.31	1730	19.67	Monoterp. ester
$\gamma$ -Muurolene	25.63	1460	0.08	[0.60]	1608	13.00*	Sesquiterpene
Germacrene D	25.78	1462	1.13	[2.41]	1623	13.81*	Sesquiterpene
$\beta$ -Selinene	26.38	1469	0.12	[2.41]	1623	13.81*	Sesquiterpene
Viridiflorene	26.57	1471	0.29	[0.60]	1608	13.00*	Sesquiterpene
Geranyl propionate	26.77	1474	0.61	0.67	1757	21.52	Monoterp. ester
Bicyclgermacrene	27.01	1477	0.37	[1.15]	1647	15.07*	Sesquiterpene
$\alpha$ -Muurolene	27.80	1486	0.27	[1.15]	1647	15.07*	Sesquiterpene
$\gamma$ -Cadinene	28.86	1499	0.27	[0.69]	1671	16.32*	Sesquiterpene
( <i>E,E</i> )- $\alpha$ -Farnesene	29.25	1504	0.09	[0.45]	1694	17.52*	Sesquiterpene
$\delta$ -Cadinene	29.52	1508	0.94	1.04	1679	16.71*	Sesquiterpene
Zonarene	29.69	1511	0.16	[0.69]	1671	16.32*	Sesquiterpene
Geranyl isobutyrate	29.90	1513	0.33	[13.84]	1784	23.25*	Monoterp. ester
<i>trans</i> - $\gamma$ -Bisabolene	30.42	1521	0.10	[1.04]	1679	16.71*	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	30.66	1524	0.12	[0.45]	1694	17.52*	Sesquiterpene
$\alpha$ -Agarofuran	31.38	1534	0.27	0.27	1766	22.08	Sesquiterp. ether
Citronellyl butyrate	31.57	1537	0.55	0.44	1745	20.67	Monoterp. ester
Caryophyllene oxide	33.87*	1569	1.09	0.19	1848	27.75	Sesquiterp. ether
Geranyl butyrate	33.87*	1569	[1.09]	0.97	1833	26.65	Monoterp. ester
Spathulenol	34.13	1573	0.22	0.23	2016	37.19*	Sesquiterp. alcohol
Phenylethyl tiglate	35.38	1590	0.82	0.87	2078	39.16	Phenolic ester
Geranyl isovalerate	35.99	1600	0.11	0.15	1839	27.09	Monoterp. ester
10-epi- $\gamma$ -Eudesmol	36.31	1608	4.51	4.72	1983	35.71	Sesquiterp. alcohol

1,10-diepi-Cubenol	36.53	1613	0.04	0.38	1955	34.45*	Sesquiterp. alcohol
1-epi-Cubenol	36.75	1618	0.11	[0.38]	1955	34.45*	Sesquiterp. alcohol
Hinesol	37.11	1627	0.23	0.23	2104	39.98	Sesquiterp. alcohol
Cubenol	37.21	1630	0.20	[0.38]	1955	34.45*	Sesquiterp. alcohol
τ-Cadinol	37.65	1641	0.24	0.26	2071	38.92	Sesquiterp. alcohol
α-Eudesmol	37.97*	1649	0.67	0.39	2123	40.53*	Sesquiterp. alcohol
β-Eudesmol	37.97*	1649	[0.67]	0.29	2110	40.15	Sesquiterp. alcohol
α-Muurolol	37.97*	1649	[0.67]	0.22	2101	39.88	Sesquiterp. alcohol
α-Cadinol	38.20	1654	0.16	[0.39]	2123	40.53*	Sesquiterp. alcohol
Geranyl valerate	38.47	1661	0.15	0.09	1933	33.43	Monoterp. ester
Citronellyl tiglate	38.78	1668	0.30	0.28	1942	33.88	Monoterp. ester
Geranyl tiglate	40.12	1702	1.10	1.25	2037	37.89	Monoterp. ester
Geranyl caproate isomer	40.66	1719	0.15	[0.23]	2016	37.19*	Monoterp. ester
Geranyl caproate	41.82	1756	0.08	0.07	2029	37.63	Monoterp. ester
Geranyl caprylate	47.20	1950	0.04	0.08	2229	43.27	Monoterp. ester
<b>Total identified</b>			<b>96.91%</b>	<b>98.16%</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 :** Yellow liquid

**Refractive index :** 1.4668 ± 0.0003 (20 °C)

#### CONCLUSION

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

17J30-PTH3-1-CC\_BP5



