

## GC/MS BATCH NUMBER: GI0100

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**ESSENTIAL OIL:** GERANIUM EGYPTIAN ORGANIC  
**BOTANICAL NAME:** PELARGONIUM X ASPERUM  
**ORIGIN:** EGYPT

KEY CONSTITUENTS PRESENT IN THIS BATCH OF GERANIUM EGYPTIAN ORGANIC OIL	%
CITRONELLOL	32.9
GERANIOL	16.3
CITRONELLYL FORMATE	7.1
ISOMENTHONE	5.7
10-epi- $\gamma$ -EUDESMOL	5.3
LINALOOL	4.4
GERANYL FORMATE	2.9
GERMACRENE D	1.7
GERANYL TIGLATE	1.3
GERANYL BUTYRATE	1.3
$\beta$ -CARYOPHYLLENE	1.2
$\beta$ -BOURBONENE	1.0
GERANIAL	1.0
$\beta$ -PHENYLETHYL TIGLATE	0.9
(Z)-ROSE OXIDE	0.9
MENTHONE	0.7
(E)-ROSE OXIDE	0.4
$\alpha$ -TERPINEOL	0.3

GUAIA-6,9-DIENE	0.2
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Comments from Robert Tisserand: One of the best Geranium oils I have ever seen, with a sophisticated fresh, rose-mint odor. Conforms to all 15 key ISO constituents. Extremely complex.

**Date :** May 24, 2016

*SAMPLE IDENTIFICATION*

**Internal code :** 16E04-PTH3-1-SM

**Customer identification :** Organic Geranium Egyptian - Egypt - GI0100512

**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).

**Analyst :** Alexis St-Gelais, M. Sc., chimiste

**Analysis date :** 2016-05-05

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	1.11	726	0.02	0.02	1154	2.51	Aliphatic alcohol
3-Methylpentanol	2.27	851	0.04	0.04	1278	4.09	Aliphatic alcohol
<i>cis</i> -Hex-3-en-1-ol	2.40	861	0.03	0.04	1330	4.83	Aliphatic alcohol
$\alpha$ -Pinene	3.33	928	0.51	0.49	951	0.91	Monoterpene
Geranic oxide	4.00	968	0.05	0.04	1053	1.52	Monoterp. ether
$\beta$ -Pinene	4.10	974	0.01				Monoterpene
Myrcene	4.37*	991	0.15	0.09	1119	2.08	Monoterpene
<i>trans</i> -Dehydroxylinalool oxide	4.37*	991	[0.15]	0.04	1156	2.52	Monoterp. ether
6-Methyl-5-hepten-2-one	4.45	995	0.05	0.05	1280	4.13	Aliphatic ketone
$\alpha$ -Phellandrene	4.64	1007	0.08	0.06	1112	2.01	Monoterpene
$\Delta^3$ -Carene	4.67	1008	0.03	0.02	1094	1.84	Monoterpene
<i>para</i> -Cymene	5.00	1027	0.07	0.09	1212	3.18	Monoterpene
Limonene	5.05	1029	0.16	0.14	1143	2.37	Monoterpene
$\beta$ -Phellandrene	5.08	1031	0.05	0.06	1149	2.44*	Monoterpene
1,8-Cineole	5.13	1034	0.01	[0.06]	1149	2.44*	Monoterp. ether
<i>cis</i> - $\beta$ -Ocimene	5.23	1040	0.09	0.14	1190	2.92*	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	5.41	1049	0.12	0.11	1208	3.11	Monoterpene
$\gamma$ -Terpinene	5.54	1057	0.04	[0.14]	1190	2.92*	Monoterpene
<i>cis</i> -Linalool oxide (fur.)	5.87	1075	0.20	0.20	1384	5.62	Monoterp. alcohol
Terpinolene	6.06	1086	0.03	0.03	1228	3.40	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	6.18	1092	0.11	0.11	1412	6.03	Monoterp. alcohol
6,7-Epoxymenthene	6.25	1096	0.02	0.02	1364	5.32	Monoterp. ether
Perillene	6.38	1103	0.01				Monoterp. ether
Linalool	6.52	1108	4.44	4.62	1502	7.74	Monoterp. alcohol
<i>cis</i> -Rose oxide	6.65	1113	0.91	0.89	1301	4.41	Monoterp. ether
<i>trans</i> -Rose oxide	6.99	1126	0.39	0.40	1312	4.57	Monoterp. ether
Isopulegol	7.58*	1148	0.08	0.03	1511	7.90	Monoterp. ketone
Camphor	7.58*	1148	[0.08]	0.20	1421	6.20*	Monoterp. ketone
Menthone	7.80*	1156	0.94	0.75	1395	5.77	Monoterp. ketone
Citronellal	7.80*	1156	[0.94]	5.91	1419	6.16*	Monoterp. aldehyde
Isomenthone	8.08	1166	5.72	[5.91]	1419	6.16*	Monoterp. ketone
<i>cis</i> -Hex-3-en-1-yl butyrate	8.77	1192	0.14	[5.91]	1419	6.16*	Aliphatic ester
$\alpha$ -Terpineol	9.08	1203	0.33	2.07	1630	11.67*	Monoterp. alcohol
Nerol	10.19	1228	0.35	0.39	1735	16.65	Monoterp. alcohol
Citronellol	10.68	1239	32.92	33.79	1722	15.83	Monoterp. alcohol
Neral	10.85	1243	0.52	0.62	1604	10.71*	Monoterp. aldehyde
<i>cis</i> -Isogeraniol	11.37	1255	0.01	0.39	1748	17.38*	Monoterp. alcohol
Geraniol	11.68	1262	16.30	16.41	1791	19.93	Monoterp. alcohol
Citronellyl formate	12.44*	1279	7.42	7.12	1562	9.44	Monoterp. ester
Geranial	12.44*	1279	[7.42]	1.02	1652	12.69	Monoterp. aldehyde

Geranyl formate	13.69	1305	2.93	2.98	1640	12.14*	Monoterp. ester
$\alpha$ -Cubebene	15.56	1335	0.16	[0.20]	1421	6.20*	Sesquiterpene
Citronellyl acetate	16.80	1354	0.27	0.17	1610	10.87	Monoterp. ester
$\alpha$ -Copaene	17.21	1361	0.47	0.47	1442	6.59	Sesquiterpene
$\beta$ -Bourbonene	17.63	1367	1.03	0.99	1462	6.98	Sesquiterpene
1,5-diepi- $\beta$ -Bourbonene	17.74	1369	0.10				Sesquiterpene
$\beta$ -Cubebene	17.89*	1371	0.12	0.04	1488	7.46	Sesquiterpene
Neryl acetate	17.89*	1371	[0.12]	0.25	1674	13.62	Monoterp. ester
$\beta$ -Elemene	18.37	1378	0.05	0.06	1522	8.19	Sesquiterpene
Geranyl acetate	18.84	1386	0.39	0.36	1696	14.66	Monoterp. ester
$\beta$ -Caryophyllene	20.01	1403	1.16	1.29	1529	8.42*	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	20.90	1414	0.13	[1.29]	1529	8.42*	Sesquiterpene
Seychellene	21.97	1427	0.38	0.28	1555	9.22	Sesquiterpene
<i>cis</i> - $\beta$ -Farnesene	22.44*	1433	0.45	0.46	1592	10.33*	Sesquiterpene
6,9-Guaiadiene	22.44*	1433	[0.45]	0.25	1546	8.92	Sesquiterpene
$\alpha$ -Humulene	22.71	1436	0.24	[0.46]	1592	10.33*	Sesquiterpene
allo-Aromadendrene	22.97	1439	0.18	0.29	1569	9.62	Sesquiterpene
Citronellyl propionate	23.42	1445	0.27				Monoterp. ester
$\gamma$ -Muurolene	24.38	1456	0.27	[0.62]	1604	10.71*	Sesquiterpene
Germacrene D	24.91	1463	1.66	[2.07]	1630	11.67*	Sesquiterpene
Viridiflorene	25.16	1466	0.13				Sesquiterpene
Bicyclogermacrene	25.67	1472	0.24	0.28	1649	12.54	Sesquiterpene
Geranyl propionate	26.00	1476	0.70	0.83	1760	18.07	Monoterp. ester
$\alpha$ -Muurolene	26.09	1477	0.35	[2.98]	1640	12.14*	Sesquiterpene
Epizonarene	26.53	1482	0.10	[2.07]	1630	11.67*	Sesquiterpene
$\beta$ -Dihydroagarofuran	26.87	1486	0.17				Sesquiterp. ether
$\gamma$ -Cadinene	27.86	1498	0.23	0.33	1676	13.74*	Sesquiterpene
$\delta$ -Cadinene	28.56	1507	0.79	0.90	1682	14.02*	Sesquiterpene
Zonarene	28.75	1510	0.15	[0.33]	1676	13.74*	Sesquiterpene
<i>trans</i> -Calamenene	28.85	1511	0.22	0.19	1739	16.90	Sesquiterpene
Geranyl isobutyrate	29.23	1516	0.09	0.08	1794	20.07	Monoterp. ester
<i>trans</i> - $\gamma$ -Bisabolene	29.48	1520	0.10	[0.90]	1682	14.02*	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	29.62	1522	0.13	0.13	1701	14.85	Sesquiterpene
$\alpha$ -Agarofuran	30.31	1531	0.28	0.27	1770	18.69	Sesquiterp. ether
Citronellyl butyrate	30.76	1537	0.34	[0.39]	1748	17.38*	Monoterp. ester
Spathulenol	33.13*	1570	0.26	0.16	2021	34.76*	Sesquiterp. alcohol
Caryophyllene oxide	33.13*	1570	[0.26]	0.10	1850	23.77	Sesquiterp. ether
Geranyl butyrate	33.26	1572	0.85	0.85	1835	22.64	Monoterp. ester
Viridiflorol	33.59	1576	0.07	0.17	1990	32.93	Sesquiterp. alcohol
Phenylethyl tiglate	34.64	1590	0.88	0.92	2078	36.90	Phenolic ester
10-epi- $\gamma$ -Eudesmol	35.59	1604	5.25	5.39	1987	32.75	Sesquiterp. alcohol
1,10-diepi-Cubenol	35.86	1610	0.06	0.11	1960	31.12	Sesquiterp. alcohol
Hinesol	36.07	1615	0.12	0.15	2101	37.72	Sesquiterp. alcohol
$\gamma$ -Eudesmol	36.32	1621	0.10	0.08	2070	36.62	Sesquiterp. alcohol

Cubenol	36.46	1625	0.23	0.19	1957	30.96	Sesquiterp. alcohol
$\tau$ -Cadinol	36.69	1630	0.15	0.22	2075	36.77	Sesquiterp. alcohol
$\tau$ -Muurolol	36.92	1636	0.22	0.12	2095	37.49	Sesquiterp. alcohol
$\beta$ -Eudesmol	37.25*	1644	0.70	0.27	2114	38.13	Sesquiterp. alcohol
$\alpha$ -Eudesmol	37.25*	1644	[0.70]	0.18	2127	38.59	Sesquiterp. alcohol
$\alpha$ -Cadinol	37.47	1649	0.17	0.08	2128	38.65	Sesquiterp. alcohol
Geranyl valerate	38.03	1663	0.13	0.11	1932	29.39	Monoterp. ester
Citronellyl tiglate	38.31	1670	0.25	0.27	1942	30.03	Monoterp. ester
Geranyl tiglate	39.66	1702	1.25	1.41	2036	35.43	Monoterp. ester
Geranyl caproate isomer	40.24	1720	0.17	[0.16]	2021	34.76*	Monoterp. ester
Geranyl caproate	41.41	1757	0.08	0.13	2029	35.16	Monoterp. ester
Geranyl caprylate	46.80	1951	0.04	0.04	2232	41.46	Monoterp. ester
<b>Total identified</b>			<b>97.61%</b>	<b>98.25%</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 :**  $1.4675 \pm 0.0003$  (20 °C)

#### CONCLUSION

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



