

Date : September 14, 2017

SAMPLE IDENTIFICATION

Internal code : 17I07-ORA12-1-DM

Customer identification : Egyptian Geranium

Type : Essential oil

Source : *Pelargonium Graveolens*

Customer : Organic Aromas

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 : Benoit Roger Ph. D.

Analysis date : 2017-09-13

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	739	0.01	0.04	1150	3.12*	Aliphatic alcohol
3-Methylpentanol	2.37	855	0.04				Aliphatic alcohol
cis-Hex-3-en-1-ol	2.50	865	0.01	0.03	1322	5.61	Aliphatic alcohol
α -Pinene	3.42	926	0.22	0.21	940	1.20	Monoterpene
Geranic oxide	4.09	966	0.04	0.03	1047	1.96	Monoterp. ether
Myrcene	4.48	989	0.06	0.06	1113	2.64	Monoterpene
trans-Dehydroxylinalool oxide	4.50	990	0.04	[0.04]	1150	3.12*	Monoterp. ether
Octen-3-ol	4.52	991	0.05	5.93	1409	7.13*	Aliphatic alcohol
6-Methyl-5-hepten-2-one	4.55	993	0.05	1.04	1294	5.16*	Aliphatic ketone
α -Phellandrene	4.76	1005	0.02	0.01	1106	2.55	Monoterpene
Δ^3 -Carene	4.78	1006	0.03	0.02	1092	2.38	Monoterpene
para-Cymene	5.13	1025	0.08	0.10	1209	3.89	Monoterpene
Limonene	5.17	1027	0.14	0.18	1138	2.97*	Monoterpene
β -Phellandrene	5.20	1029	0.03	[0.18]	1138	2.97*	Monoterpene
1,8-Cineole	5.23	1031	0.02	[0.18]	1138	2.97*	Monoterp. ether
cis- β -Ocimene	5.35	1037	0.04	0.07	1183	3.59*	Monoterpene
trans- β -Ocimene	5.53	1047	0.06	0.05	1204	3.81	Monoterpene
γ -Terpinene	5.72	1057	0.01	[0.07]	1183	3.59*	Monoterpene
cis-Linalool oxide (fur.)	6.00	1072	0.25	0.20	1375	6.45	Monoterp. alcohol
Terpinolene	6.20	1083	0.04	0.01	1224	4.12	Monoterpene
trans-Linalool oxide (fur.)	6.32	1090	0.13	[5.93]	1409	7.13*	Monoterp. alcohol
para-Cymenene	6.42	1095	0.01	0.03	1361	6.22	Monoterpene
Linalool	6.73	1108	5.05	5.07	1495	9.19*	Monoterp. alcohol
cis-Rose oxide	6.81	1110	0.95	[1.04]	1294	5.16*	Monoterp. ether
trans-Rose oxide	7.16	1123	0.40	0.41	1306	5.35	Monoterp. ether
Isopulegol	7.83	1147	0.09	[5.07]	1495	9.19*	Monoterp. alcohol
Menthone	8.04	1155	1.50	1.38	1387	6.64	Monoterp. ketone
Isomenthone	8.32	1165	5.59	[5.93]	1409	7.13*	Monoterp. ketone
Terpinen-4-ol	8.81	1183	0.02	0.21	1534	10.64*	Monoterp. alcohol
Isomenthol	9.13	1195	0.12	8.18	1557	11.47*	Monoterp. alcohol
α -Terpineol	9.48	1204	0.36	3.84	1634	14.94*	Monoterp. alcohol
Nerol	10.61	1228	0.30	0.35	1726	20.19	Monoterp. alcohol
Citronellol	11.17	1241	32.19	32.40	1710	19.15	Monoterp. alcohol
Neral	11.22	1242	0.60	0.55	1596	12.97	Monoterp. aldehyde
Geraniol	12.22	1264	16.50	16.79	1780	23.87*	Monoterp. alcohol
trans-Myrtanol	12.35	1267	0.07	0.35	1760	22.49*	Monoterp. alcohol
Citronellyl formate	12.84*	1277	8.68	[8.18]	1557	11.47*	Monoterp. ester
Geranial	12.84*	1277	[8.68]	1.14	1643	15.43*	Monoterp. aldehyde
Neryl formate	12.91	1279	0.07				Monoterp. ester
Geranyl formate	14.15	1304	3.63	[3.84]	1634	14.94*	Monoterp. ester

α -Cubebene	16.01	1332	0.17	[5.93]	1409	7.13*	Sesquiterpene
Citronellyl acetate	17.28	1351	0.29	0.47	1602	13.26	Monoterp. ester
α -Copaene	17.74	1358	0.55	0.54	1429	7.59	Sesquiterpene
β -Bourbonene	18.18	1364	1.19	1.22	1451	8.10	Sesquiterpene
β -Cubebene	18.69	1372	0.09	0.04	1467	8.51	Sesquiterpene
β -Elemene	18.95	1376	0.08	1.21	1518	10.00*	Sesquiterpene
Geranyl acetate	19.39*	1383	0.51	0.46	1689	17.90*	Monoterp. ester
Geranic acid	19.39*	1383	[0.51]	0.21	2252	44.17	Monoterp. acid
β -Caryophyllene	20.64	1401	1.02	[1.21]	1518	10.00*	Sesquiterpene
β -Copaene	21.55	1412	0.14	0.16	1502	9.45	Sesquiterpene
Aromadendrene	22.02	1417	0.04	[1.21]	1518	10.00*	Sesquiterpene
<i>trans</i> - α -Bergamotene	22.18	1419	0.03	[1.21]	1518	10.00*	Sesquiterpene
6,9-Guaiadiene	22.61	1424	0.37	[0.21]	1534	10.64*	Sesquiterpene
Seychellene	23.08	1430	0.35	0.33	1544	11.02	Sesquiterpene
α -Humulene	23.43	1434	0.21	0.26	1581	12.37	Sesquiterpene
allo-Aromadendrene	23.69	1437	0.21	[8.18]	1557	11.47*	Sesquiterpene
Citronellyl propionate	24.03	1441	0.32				Monoterp. ester
Neryl propionate	25.07	1453	0.17	0.41	1732	20.60*	Monoterp. ester
γ -Murolene	25.51	1459	0.10	0.20	1608	13.53	Sesquiterpene
Germacrene D	25.66	1460	0.51	1.73	1618	14.09*	Sesquiterpene
β -Selinene	26.27	1468	0.12	[1.73]	1618	14.09*	Sesquiterpene
Viridiflorene	26.46	1470	0.18	0.17	1611	13.74	Sesquiterpene
Geranyl propionate	26.67	1473	0.68	0.85	1751	21.93	Monoterp. ester
Bicyclgermacrene	26.90	1475	0.07	[3.84]	1634	14.94*	Sesquiterpene
4-epi- <i>cis</i> - Dihydroagarofuran	27.29	1480	0.11				Sesquiterp. ether
α -Murolene	27.68*	1485	0.19	[1.14]	1643	15.43*	Sesquiterpene
β -Dihydroagarofuran	27.68*	1485	[0.19]				Sesquiterp. ether
γ -Cadinene	28.73	1497	0.27	0.57	1665	16.58	Sesquiterpene
(<i>E,E</i>)- α -Farnesene	29.13	1503	0.02	[0.46]	1689	17.90*	Sesquiterpene
Zonarene	29.40*	1506	0.71	0.81	1672	16.95*	Sesquiterpene
δ -Cadinene	29.40*	1506	[0.71]	0.07	1677	17.24	Sesquiterpene
<i>trans</i> -Calamenene	29.57	1509	0.07	[0.41]	1732	20.60*	Sesquiterpene
Geranyl isobutyrate	29.77	1512	0.43	[16.79]	1780	23.87*	Monoterp. ester
<i>trans</i> - γ -Bisabolene	29.90	1513	0.11	[0.81]	1672	16.95*	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	30.48	1522	0.08	[0.46]	1689	17.90*	Sesquiterpene
α -Agarofuran	31.25	1532	0.30	[0.35]	1760	22.49*	Sesquiterp. ether
Citronellyl butyrate	31.46	1535	0.47	0.45	1738	21.01	Monoterp. ester
Geranyl butyrate	33.78*	1568	1.19	0.91	1826	27.13	Monoterp. ester
Caryophyllene oxide	33.78*	1568	[1.19]	0.24	1841	28.24	Sesquiterp. ether
Spathulenol	34.00	1571	0.32	0.38	2010	37.50*	Sesquiterp. alcohol
Phenylethyl tiglate	35.27	1589	0.79	0.84	2073	39.47*	Phenolic ester
Geranyl isovalerate	35.91	1598	0.14	0.11	1830	27.40	Monoterp. ester
10-epi- γ -Eudesmol	36.20	1605	4.16	4.33	1976	36.05	Sesquiterp. alcohol

1,10-diepi-Cubenol	36.41	1610	0.06	0.39	1948	34.80	Sesquiterp. alcohol
1-epi-Cubenol	36.65	1616	0.08	0.06	1962	35.47	Sesquiterp. alcohol
Hinesol	37.10*	1627	0.28	0.18	2103	40.42*	Sesquiterp. alcohol
γ-Eudesmol	37.10*	1627	[0.28]	0.24	2065	39.21	Sesquiterp. alcohol
τ-Cadinol	37.55*	1638	0.17	[0.84]	2073	39.47*	Sesquiterp. alcohol
τ-Muurolool	37.55*	1638	[0.17]	0.11	2084	39.83	Sesquiterp. alcohol
α-Eudesmol	37.87*	1646	0.51	0.26	2117	40.80*	Sesquiterp. alcohol
β-Eudesmol	37.87*	1646	[0.51]	[0.18]	2103	40.42*	Sesquiterp. alcohol
α-Cadinol	38.10	1652	0.07	[0.26]	2117	40.80*	Sesquiterp. alcohol
Geranyl valerate	38.40	1659	0.12	0.14	1925	33.74	Monoterp. ester
Citronellyl tiglate	38.71	1667	0.22	0.22	1935	34.19	Monoterp. ester
Geranyl tiglate	40.04	1700	0.87	0.97	2030	38.12*	Monoterp. ester
Geranyl caproate isomer	40.59	1717	0.12	[0.38]	2010	37.50*	Monoterp. ester
Geranyl caproate	41.75	1753	0.04	[0.97]	2030	38.12*	Monoterp. ester
Total identified	96.80%		98.22%				

*: 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

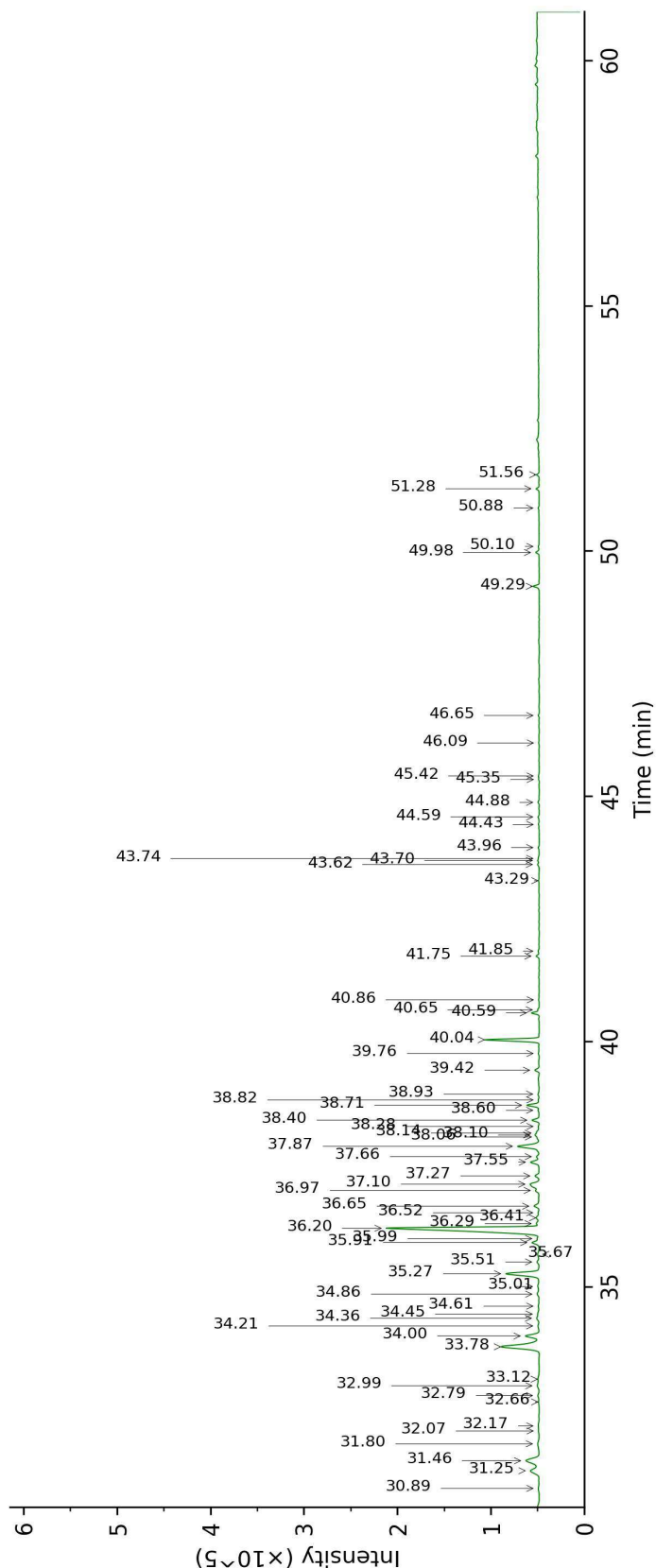
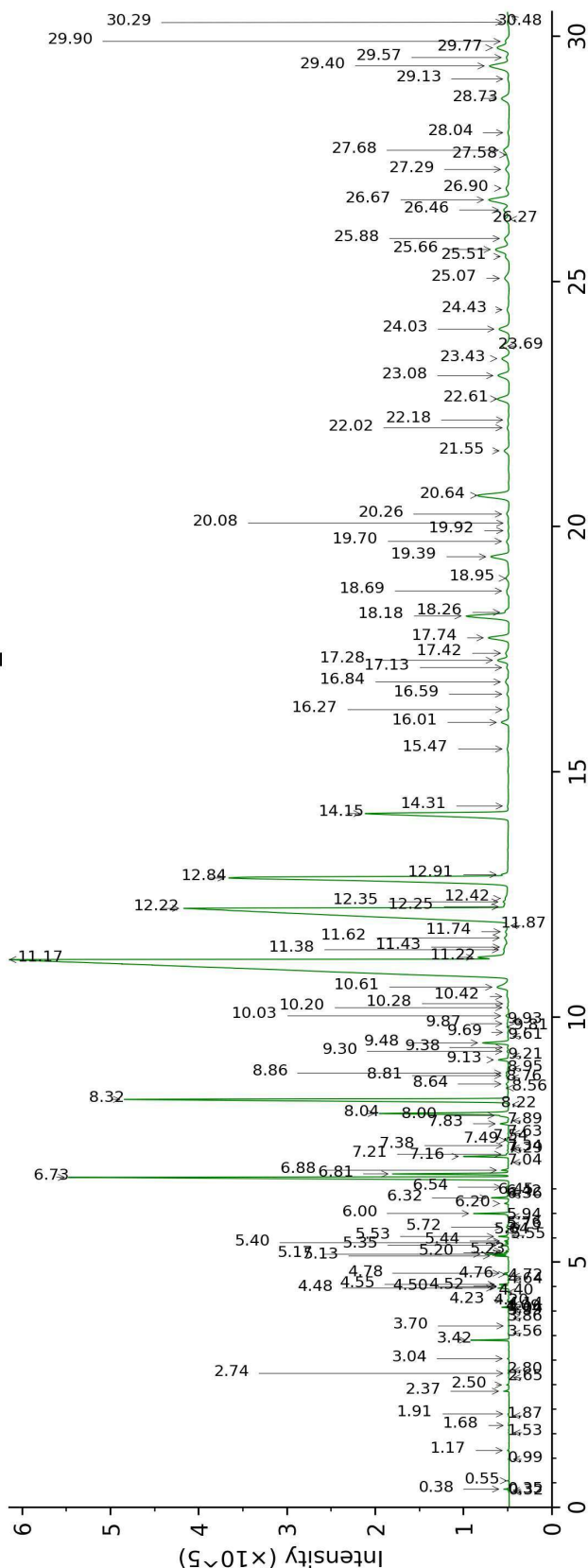
Physical aspect : Clear liquid

Refractive index : 1.4670 ± 0.0003 (20 °C)

CONCLUSION

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

17107-ORA12-1-DM_BP5



17107-ORA12-1-DM_WAX

