

**Date :** September 13, 2017

*SAMPLE IDENTIFICATION*

**Internal code :** 17I07-ORA4-1-DM

**Customer identification :** Bergamot

**Type :** Essential oil

**Source :** *Citrus aurantium ssp. bergamia*

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

**Analysis date :** 2017-09-12

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.	
$\alpha$ -Thujene	3.31	920	0.16	0.43	949	1.24	Monoterpene
$\alpha$ -Pinene	3.42	927	1.28	0.95	940	1.20	Monoterpene
Camphene	3.71	944	0.03	0.02	991	1.50	Monoterpene
Sabinene	4.14	969	1.06	1.38	1057	2.05	Monoterpene
$\beta$ -Pinene	4.22	974	6.77	6.33	1037	1.88	Monoterpene
Myrcene	4.48	989	1.10	1.17	1113	2.65*	Monoterpene
Pseudolimonene	4.71	1002	0.03	[1.17]	1113	2.65*	Monoterpene
$\alpha$ -Phellandrene	4.76*	1005	0.03	0.01	1109	2.59	Monoterpene
$\Delta^3$ -Carene	4.76*	1005	[0.03]	0.01	1091	2.37	Monoterpene
Octanal	4.88	1012	0.03	0.04	1230	4.21	Aliphatic aldehyde
$\alpha$ -Terpinene	4.95	1015	0.07	[1.17]	1113	2.65*	Monoterpene
Limonene	5.25*	1032	40.94	40.09	1145	3.06*	Monoterpene
para-Cymene	5.25*	1032	[40.94]	0.87	1210	3.91	Monoterpene
1,8-Cineole	5.27	1033	0.23	[40.09]	1145	3.06*	Monoterp. ether
cis- $\beta$ -Ocimene	5.36	1038	0.02	6.82	1193	3.65*	Monoterpene
trans- $\beta$ -Ocimene	5.54	1047	0.13	0.13	1202	3.79	Monoterpene
$\gamma$ -Terpinene	5.75	1059	6.89	[6.82]	1193	3.65*	Monoterpene
cis-Linalool oxide (fur.)	6.01	1073	0.03	0.06	1374	6.44*	Monoterp. alcohol
cis-Sabinene hydrate	6.07	1076	0.02	0.06	1402	6.96*	Monoterp. alcohol
Terpinolene	6.21*	1084	0.33	0.30	1225	4.13	Monoterpene
Octanol	6.21*	1084	[0.33]	29.35	1506	9.59*	Aliphatic alcohol
trans-Linalool oxide (fur.)	6.33	1090	0.02	[0.06]	1402	6.96*	Monoterp. alcohol
Linalool	6.76	1108	8.06	7.72	1496	9.23	Monoterp. alcohol
Nonanal	6.80	1110	0.02	0.01	1336	5.81	Aliphatic aldehyde
cis-Limonene oxide	7.37	1131	0.03	[0.06]	1374	6.44*	Monoterp. ether
trans-Limonene oxide	7.49	1135	0.02	0.02	1385	6.60	Monoterp. ether
Terpinen-4-ol	8.82	1183	0.02	0.23	1525	10.27*	Monoterp. alcohol
$\alpha$ -Terpineol	9.50	1204	0.11	0.13	1618	14.10	Monoterp. alcohol
Decanal	9.95	1214	0.06	0.03	1435	7.73	Aliphatic aldehyde
Unknown (m/z = 43, 71 (67), 68 (65), 81 (54), 93 (37), 67 (37), 121 (34)... 154? (1))	10.57	1227	0.35	0.33	1483	8.89	Oxygenated monoterp.
Nerol	10.68	1230	0.06	0.04	1733	20.66	Monoterp. alcohol
Neral	11.27	1243	0.23	0.19	1596	12.99	Monoterp. aldehyde
Linalyl acetate	11.64	1251	28.12	[29.35]	1506	9.59*	Monoterp. ester
Geraniol	11.89	1257	0.25	0.30	1777	23.65	Monoterp. alcohol
Geranial	12.71	1275	0.32	0.93	1657	16.18*	Monoterp. aldehyde
$\alpha$ -Terpinyl acetate	16.70	1342	0.40	0.34	1614	13.87	Monoterp. ester
Neryl acetate	17.91	1360	0.66	[0.93]	1657	16.18*	Monoterp. ester
Geranyl acetate	19.40	1383	0.54	0.56	1690	17.91	Monoterp. ester

$\beta$ -Caryophyllene	20.63	1401	0.18	0.19	1521	10.12	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	22.20	1419	0.14	[0.23]	1525	10.27*	Sesquiterpene
<i>trans</i> - $\beta$ -Farnesene	24.54	1447	0.03	0.02	1625	14.47	Sesquiterpene
$\beta$ -Bisabolene	28.89	1499	0.22	[0.93]	1657	16.18*	Sesquiterpene
Caryophyllene oxide	33.87	1569	0.03	0.02	1841	28.27	Sesquiterp. ether
$\alpha$ -Bisabolol	39.57	1688	0.01	0.03	2131	41.16	Sesquiterp. alcohol
Bergapten	49.83	2059	0.14				Furanocoumarin
Bergaptol?	54.47	2271	0.12				Furanocoumarin
<b>Total identified</b>			<b>98.94%</b>	<b>98.78%</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

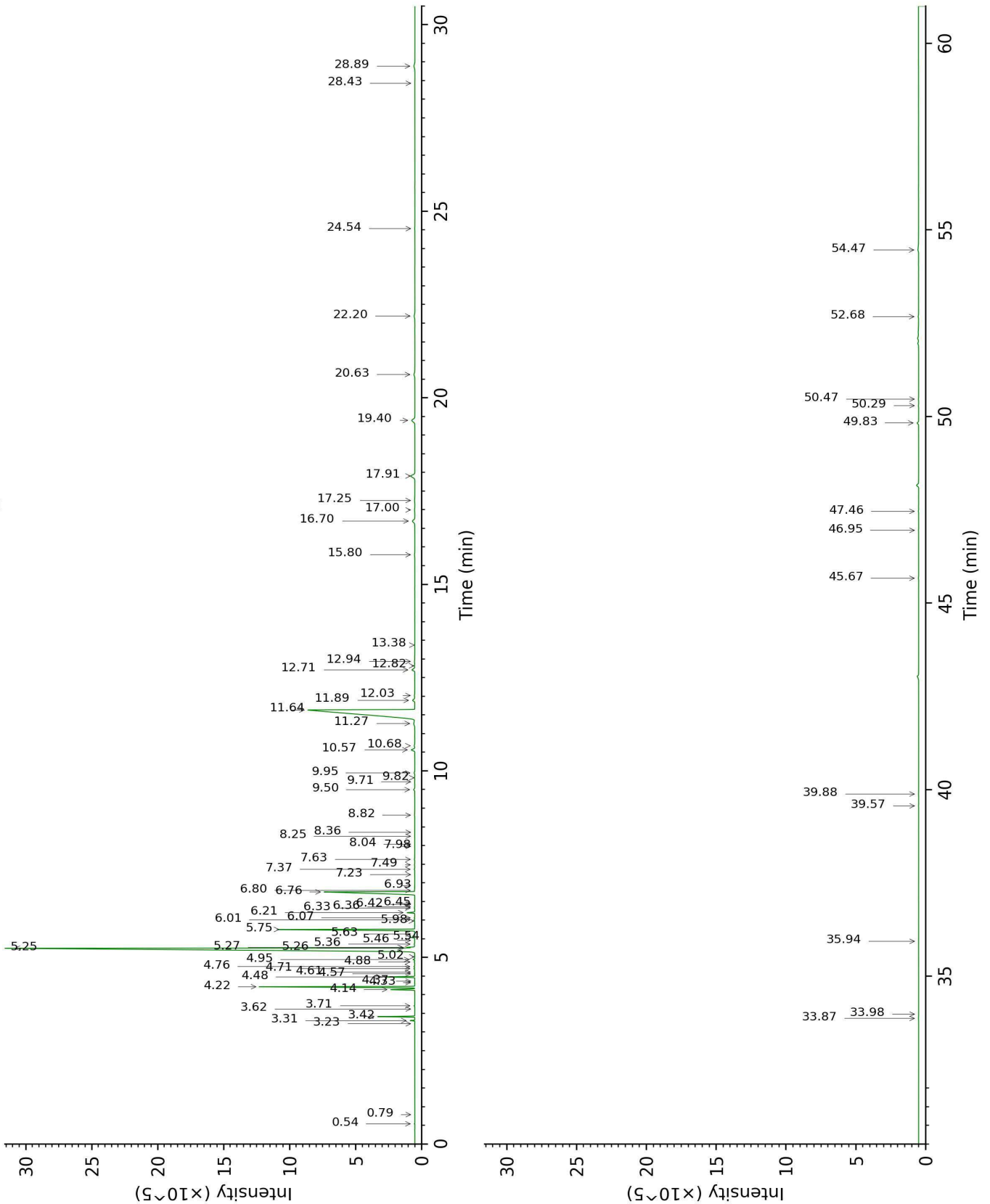
**Physical aspect :** Yellow liquid

**Refractive index :** 1.4655  $\pm$  0.0003 (20 °C)

#### CONCLUSION

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

17107-ORA4-1-DM\_BP5



17107-ORA4-1-DM\_WAX

