

**Date :** August 22, 2017

*SAMPLE IDENTIFICATION*

**Internal code :** 17H14-ROO2-1-DM

**Customer identification :** Peppermint - India - Batch #1

**Type :** Essential oil

**Source :** *Mentha x piperita*

**Customer :** Root

*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 :** 2017-08-22

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	7.40	1145	3.07*	Aliphatic alcohol
2-Methylbutyl alcohol	1.19	742	0.01	[7.40]	1145	3.07*	Aliphatic alcohol
2,5-Diethyltetrahydrofuran	2.92	897	0.03				Furan
$\alpha$ -Thujene	3.32	921	0.03	0.80	945	1.22*	Monoterpene
$\alpha$ -Pinene	3.43	927	0.86	[0.80]	945	1.22*	Monoterpene
Camphene	3.72	944	0.03				Monoterpene
3-Methylcyclohexanone	4.03	963	0.05	0.05	1250	4.50	Aliphatic ketone
Sabinene	4.15	969	0.40	0.46	1060	2.08	Monoterpene
$\beta$ -Pinene	4.21	973	1.26	1.12	1040	1.90	Monoterpene
Myrcene	4.49	989	0.22	0.20	1115	2.67*	Monoterpene
Octen-3-ol	4.54	992	0.05	25.15	1396	6.81*	Aliphatic alcohol
$\alpha$ -Phellandrene	4.76	1005	0.03	[0.20]	1115	2.67*	Monoterpene
Octan-3-ol	4.82	1008	0.10	0.11	1347	6.00	Aliphatic alcohol
$\alpha$ -Terpinene	4.95	1016	0.14	0.13	1123	2.77	Monoterpene
para-Cymene	5.15	1026	0.12	0.16	1212	3.94	Monoterpene
Limonene	5.19	1028	2.76	[7.40]	1145	3.07*	Monoterpene
1,8-Cineole	5.26	1032	4.84	[7.40]	1145	3.07*	Monoterp. ether
<i>cis</i> - $\beta$ -Ocimene	5.36	1038	0.10	0.31	1193	3.66*	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	5.54	1048	0.04	0.04	1206	3.84	Monoterpene
$\gamma$ -Terpinene	5.73	1058	0.22	[0.31]	1193	3.66*	Monoterpene
<i>cis</i> -Linalool oxide (fur.)	6.02	1073	0.01	[25.15]	1396	6.81*	Monoterp. alcohol
<i>cis</i> -Sabinene hydrate	6.08	1077	0.23	7.33	1412	7.21*	Monoterp. alcohol
Terpinolene	6.21*	1084	0.13	0.07	1228	4.17	Monoterpene
Octanol	6.21*	1084	[0.13]	5.92	1502	9.44*	Aliphatic alcohol
<i>trans</i> -Linalool oxide (fur.)	6.34	1091	0.01	[7.33]	1412	7.21*	Monoterp. alcohol
Linalool	6.72	1107	0.16	[5.92]	1502	9.44*	Monoterp. alcohol
<i>trans</i> -Sabinene hydrate	6.78	1109	0.02	0.03	1482	8.87	Monoterp. alcohol
<i>cis</i> -para-Menth-2-en-1-ol	7.27	1127	0.04	[5.92]	1502	9.44*	Monoterp. alcohol
Isopulegol	7.89	1149	0.14	[5.92]	1502	9.44*	Monoterp. alcohol
Menthone	8.16	1159	24.92	[25.15]	1396	6.81*	Monoterp. ketone
Menthofuran	8.25	1162	3.09	[7.33]	1412	7.21*	Monoterp. ether
Isomenthone	8.36	1166	4.13	[7.33]	1412	7.21*	Monoterp. ketone
Lavandulol	8.40	1168	0.16	0.13	1608	13.54	Monoterp. alcohol
neo-Menthol	8.60	1175	3.47	4.02	1533	10.57*	Monoterp. alcohol
Borneol	8.67	1178	0.21	2.10	1622	14.28*	Monoterp. alcohol
Menthol	9.12*	1194	36.74	36.62	1581	12.38	Monoterp. alcohol
Terpinen-4-ol	9.12*	1194	[36.74]	[4.02]	1533	10.57*	Monoterp. alcohol
Isomenthol	9.22	1198	0.68	0.56	1559	11.55	Monoterp. alcohol
neiso-Menthol	9.40	1202	0.44	[2.10]	1622	14.28*	Monoterp. alcohol
$\alpha$ -Terpineol	9.56	1205	0.54	[2.10]	1622	14.28*	Monoterp. alcohol
$\beta$ -Phellandren-8-ol	9.67	1208	0.08	0.21	1708	19.03*	Monoterp. alcohol

Pulegone	11.05	1238	1.14	1.20	1550	11.23	Monoterp. ketone
Carvone	11.45	1247	0.07	0.12	1630	14.72	Monoterp. ketone
Piperitone	11.86	1256	0.76	[2.10]	1622	14.28*	Monoterp. ketone
neo-Menthyl acetate	12.44	1269	0.23	0.20	1467	8.50	Monoterp. ester
Decanol	13.10	1283	0.15	[0.21]	1708	19.03*	Aliphatic alcohol
Menthyl acetate	13.46	1291	5.31	[5.92]	1502	9.44*	Monoterp. ester
Isomenthyl acetate	14.07	1302	0.13	[5.92]	1502	9.44*	Monoterp. ester
Bicycloelemene	15.07	1317	0.17	0.15	1425	7.48	Sesquiterpene
α-Copaene	17.76	1358	0.14	0.12	1434	7.71	Sesquiterpene
β-Bourbonene	18.18	1364	0.20	0.25	1455	8.21	Sesquiterpene
β-Elemene	18.98	1376	0.07	3.01	1522	10.17*	Sesquiterpene
β-Caryophyllene	20.70	1401	3.00	[3.01]	1522	10.17*	Sesquiterpene
β-Copaene	21.57	1412	0.05	[3.01]	1522	10.17*	Sesquiterpene
cis-β-Farnesene	23.12	1430	0.07	0.24	1588	12.66*	Sesquiterpene
α-Humulene	23.45	1434	0.19	[0.24]	1588	12.66*	Sesquiterpene
trans-β-Farnesene	24.56	1447	0.13	0.28	1617	14.03	Sesquiterpene
Germacrene D	25.67	1461	0.58	[2.10]	1622	14.28*	Sesquiterpene
Bicyclgermacrene	26.90*	1475	0.09	0.05	1641	15.34	Sesquiterpene
α-Selinene	26.90*	1475	[0.09]	0.04	1634	14.96	Sesquiterpene
γ-Cadinene	28.82	1498	0.04	0.09	1666	16.66	Sesquiterpene
δ-Cadinene	29.40	1506	0.06	0.08	1675	17.15	Sesquiterpene
Caryophyllene oxide	33.87*	1569	0.11	0.04	1845	28.54	Sesquiterp. ether
(E)-Nerolidol	33.87*	1569	[0.11]	0.01	1984	36.43	Sesquiterp. alcohol
Spathulenol	34.01	1571	0.01				Sesquiterp. alcohol
Viridiflorol	34.87	1583	0.07	0.07	1976	36.05	Sesquiterp. alcohol
<b>Total identified</b>			<b>99.27%</b>	<b>98.87%</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 :** Clear liquid

**Refractive index :** 1.4600 ± 0.0003 (20 °C)

#### CONCLUSION

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

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