

## GC/MS BATCH NUMBER: PF0102

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**ESSENTIAL OIL:** PEPPERMINT WESTERN US

**BOTANICAL NAME:** MENTHA X PIPERITA

**ORIGIN:** USA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF PEPPERMINT WESTERN US OIL	%
MENTHOL	41.4
MENTHONE	19.7
MENTHYL ACETATE	5.3
1,8-CINEOLE	4.8
MENTHOFURAN	4.5
NEO-MENTHOL	3.2
ISOMENTHONE	3.0
β-CARYOPHYLLENE	2.2
LIMONENE	1.6
PULEGONE	1.5
GERMACRENE D	1.4
β-PINENE	1.0

Comments from Robert Tisserand: Excellent green, creamy-minty odor profile. Eleven of twelve key ISO constituents are within range, which is normal for Peppermint oils.

**Date :** December 20, 2017

*SAMPLE IDENTIFICATION*

**Internal code :** 17L14-PTH5-1-CC

**Customer identification :** Peppermint West -USA - PF010278R

**Type :** Essential oil

**Source :** *Mentha x piperita*

**Customer :** Plant Therapy

*ANALYSIS*

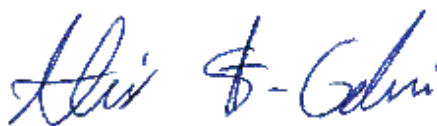
**Method :** PC-PA-001-15E06, "Analysis of the composition of a liquid essential oil by GC-FID" (in French).

Identifications double-checked by GC-MS

**Analyst :** Benoit Roger Ph. D.

**Analysis date :** 2017-12-18

Checked and approved by :



Alexis St-Gelais, M. Sc., chimiste 2013-174

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*This report is digitally signed, it is only considered valid if the digital signature is intact.*

IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
Isoamyl alcohol	1.16	738	0.03	6.44	1143	2.85*	Aliphatic alcohol
2-Methylbutyl alcohol	1.18	741	0.03	[6.44]	1143	2.85*	Aliphatic alcohol
cis-Hex-3-en-1-ol	2.51	866	0.03	0.05	1315	5.28	Aliphatic alcohol
Hexanol	2.75	884	0.02	0.03	1290	4.91	Aliphatic alcohol
2,5-Diethyltetrahydrofuran	2.91	896	0.02				Furan
α-Thujene	3.32	920	0.04	0.71	945	1.12*	Monoterpene
α-Pinene	3.42	927	0.71	[0.71]	945	1.12*	Monoterpene
Camphene	3.71	944	0.02	0.01	1000	1.39	Monoterpene
Thuja-2,4(10)-diene	3.81	949	tr	0.47	1053	1.91*	Monoterpene
3-Methylcyclohexanone	4.03	963	0.03	0.03	1238	4.15	Aliphatic ketone
Sabinene	4.14	969	0.47	[0.47]	1053	1.91*	Monoterpene
β-Pinene	4.21	973	1.01	0.93	1038	1.74	Monoterpene
Myrcene	4.48	989	0.22	0.19	1115	2.47*	Monoterpene
Octen-3-ol	4.55	993	0.14	0.63	1402	6.66	Aliphatic alcohol
α-Phellandrene	4.76	1005	0.02	[0.19]	1115	2.47*	Monoterpene
Octan-3-ol	4.83	1009	0.25	0.27	1339	5.67	Aliphatic alcohol
α-Terpinene	4.95	1015	0.25	0.26	1122	2.56	Monoterpene
Limonene	5.19*	1028	1.72	[6.44]	1143	2.85*	Monoterpene
para-Cymene	5.19*	1028	[1.72]	0.11	1206	3.66	Monoterpene
1,8-Cineole	5.25	1031	4.76	[6.44]	1143	2.85*	Monoterp. ether
cis-β-Ocimene	5.36	1038	0.25	0.64	1186	3.41*	Monoterpene
trans-β-Ocimene	5.54	1047	0.07	0.06	1200	3.59	Monoterpene
γ-Terpinene	5.73	1058	0.43	[0.64]	1186	3.41*	Monoterpene
cis-Linalool oxide (fur.)	6.01	1073	0.02	0.01	1369	6.14*	Monoterp. alcohol
cis-Sabinene hydrate	6.08	1077	0.93	4.84	1407	6.75*	Monoterp. alcohol
Terpinolene	6.21*	1084	0.14	0.12	1222	3.90	Monoterpene
Octanol	6.21*	1084	[0.14]	5.40	1497	8.87*	Aliphatic alcohol
para-Cymenene	6.44	1096	0.01	[0.01]	1369	6.14*	Monoterpene
trans-Sabinene hydrate	6.62	1103	0.04	0.35	1485	8.61*	Monoterp. alcohol
Linalool	6.73	1107	0.40	[0.35]	1485	8.61*	Monoterp. alcohol
cis-para-Menth-2-en-1-ol	7.29	1128	0.06	[5.40]	1497	8.87*	Monoterp. alcohol
Camphor	7.79	1146	0.03	0.07	1420	7.05*	Monoterp. ketone
Isopulegol	7.91	1150	0.11	[5.40]	1497	8.87*	Monoterp. alcohol
Menthone	8.16	1159	19.74	20.00	1388	6.45	Monoterp. ketone
Menthofuran	8.27	1163	4.53	[4.84]	1407	6.75*	Monoterp. ether
Isomenthone	8.36	1166	3.03	3.03	1410	6.80*	Monoterp. ketone
Lavandulol	8.39	1168	0.03	0.75	1616	13.19*	Monoterp. alcohol
neo-Menthol	8.64	1177	3.21	4.04	1526	9.78*	Monoterp. alcohol
Borneol	8.70	1179	0.17	[0.75]	1616	13.19*	Monoterp. alcohol
trans-Isopulegone	8.75	1181	0.06	0.23	1507	9.11*	Monoterp. ketone
Terpinen-4-ol	8.88	1185	0.87	[4.04]	1526	9.78*	Monoterp. alcohol

Menthol	9.19	1197	41.40	42.21	1572	11.48*	Monoterp. alcohol
Isomenthol	9.28	1199	0.54	0.48	1550	10.65	Monoterp. alcohol
neoiso-Menthol	9.45*	1203	0.15	[0.75]	1616	13.19*	Monoterp. alcohol
α-Terpineol	9.45*	1203	[0.15]	1.89	1620	13.41*	Monoterp. alcohol
β-Phellandren-8-ol	9.54	1205	0.02	0.03	1698	17.47	Monoterp. alcohol
γ-Terpineol	9.62	1207	0.19	[1.89]	1620	13.41*	Monoterp. alcohol
(Z)-Hex-3-en-1-yl isovalerate	10.89	1235	0.06	0.05	1431	7.32	Aliphatic ester
Pulegone	11.08	1239	1.50	1.46	1543	10.38	Monoterp. ketone
Carvone	11.49	1248	0.04	0.26	1639	14.36*	Monoterp. ketone
Piperitone	11.88	1256	0.42	[1.89]	1620	13.41*	Monoterp. ketone
neo-Menthyl acetate	12.44	1269	0.19	0.17	1460	8.00	Monoterp. ester
Bornyl acetate	12.86	1278	0.05	[5.40]	1497	8.87*	Monoterp. ester
Dihydroedulan I	13.15	1284	0.04	0.03	1445	7.62	Edulan
Menthyl acetate	13.47	1291	5.27	[5.40]	1497	8.87*	Monoterp. ester
Isomenthyl acetate	14.08	1303	0.16	[0.23]	1507	9.11*	Monoterp. ester
Bicycloelemene	14.33	1306	0.02	[3.03]	1410	6.80*	Sesquiterpene
α-Copaene	17.78	1358	0.05	[0.07]	1420	7.05*	Sesquiterpene
β-Bourbonene	18.20	1365	0.23	0.17	1453	7.83	Sesquiterpene
β-Elemene	19.01	1377	0.05	2.15	1522	9.63*	Sesquiterpene
β-Caryophyllene	20.72	1402	2.19	[2.15]	1522	9.63*	Sesquiterpene
β-Copaene	21.62	1412	0.05	[0.23]	1507	9.11*	Sesquiterpene
cis-β-Farnesene	22.64	1425	0.02	[42.21]	1572	11.48*	Sesquiterpene
α-Humulene	23.50	1435	0.07	0.12	1582	11.85	Sesquiterpene
trans-β-Farnesene	24.60	1448	0.29	[0.75]	1616	13.19*	Sesquiterpene
Germacrene D	25.77*	1462	1.69	[1.89]	1620	13.41*	Sesquiterpene
γ-Murolene	25.77*	1462	[1.69]	0.30	1590	12.12	Sesquiterpene
Bicyclgermacrene	26.97	1476	0.29	[0.26]	1639	14.36*	Sesquiterpene
γ-Cadinene	28.81	1498	0.01	0.04	1660	15.48	Sesquiterpene
δ-Cadinene	29.46	1507	0.06	0.04	1672	16.10	Sesquiterpene
Caryophyllene oxide	33.92	1570	0.04	0.04	1840	26.77	Sesquiterp. ether
Viridiflorol	34.95	1584	0.16	0.15	1970	34.91	Sesquiterp. alcohol
<b>Total identified</b>			<b>99.15%</b>	<b>99.26%</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 :** 1.4610 ± 0.0003 (20 °C)

#### CONCLUSION

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

17L14-PTH5-1-CC\_BP5

