

## GC/MS BATCH NUMBER: L10100

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**ESSENTIAL OIL:** LEMON DISTILLED  
**BOTANICAL NAME:** CITRUS X LIMON  
**ORIGIN:** ARGENTINA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF LEMON DISTILLED OIL	%
LIMONENE	66.3
β-PINENE	13.4
γ-TERPINENE	7.8
SABINENE	2.3
α-PINENE	1.9
MYRCENE	1.3
GERANIAL	1.2
para-CYMENE	1.0

Comments from Robert Tisserand: An excellent distilled lemon oil, with expected composition.

**Date :** September 8, 2015

*SAMPLE IDENTIFICATION*

**Internal code :** 15I01-PTH2-1-HM

**Customer identification :** Lemon Distilled – Argentina - L1010056

**Type :** Essential Oil

**Source :** *Citrus x limon*

**Customer :** Plant Therapy

*ANALYSIS*

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

**Analyst :** Hubert Marceau, B. Sc.

**Analysis date :** 2015-09-02

IDENTIFIED COMPOUNDS

Identification	Colonne: BP5			Colonne: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
Heptanal	2.56	910	0.01	0.01	1149	2.63	Aliphatic aldehyde
Tricyclene	2.63	914	0.01	0.01	963	0.96	Monoterpene
$\alpha$ -Thujene	2.72	920	0.40	0.43	996	1.11	Monoterpene
$\alpha$ -Pinene	2.81	926	1.94	1.93	985	1.07	Monoterpene
Camphene	3.07	942	0.07	0.07	1024	1.35	Monoterpene
Sabinene	3.50†	970	15.39	2.26	1084	1.88	Monoterpene
$\beta$ -Pinene	3.56†	974	[15.39]	13.35	1068	1.73	Monoterpene
Myrcene	3.84	991	1.32	1.31	1135	2.46	Monoterpene
$\alpha$ -Phellandrene	4.07	1006	0.03	0.03	1126	2.34	Monoterpene
Octanal	4.20	1013	0.06	0.07	1253	4.04	Aliphatic aldehyde
$\alpha$ -Terpinene	4.26	1016	0.12	0.18	1140	2.52	Monoterpene
para-Cymene	4.59*	1036	67.77	1.04	1229	3.69	Monoterpene
1,8-Cineole	4.59*	1036	[67.77]	0.37	1170	2.90*	Monoterp. ether
$\beta$ -Phellandrene	4.59*	1036	[67.77]	[0.37]	1170	2.90*	Monoterpene
Limonene	4.59*	1036	[67.77]	66.30	1169	2.88	
<i>cis</i> - $\beta$ -Ocimene	4.69	1041	0.31	7.80	1210	3.42*	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	4.85	1050	0.13	0.09	1222	3.58	Monoterpene
$\gamma$ -Terpinene	5.04	1061	7.82	[7.80]	1210	3.42*	Monoterpene
<i>cis</i> -Sabinene hydrate	5.33	1078	0.06	0.06	1423	6.70	Monoterp. alcohol
Terpinolene	5.46	1085	0.35	0.34	1241	3.86	Monoterpene
Nonanal	5.92	1109	0.12	0.10	1357	5.57	Monoterp. aldehyde
Linalool	5.98	1112	0.12	0.12	1516	8.82	Monoterp. alcohol
<i>cis</i> -Limonene oxide	6.39	1130	0.04	0.04	1393	6.12	Monoterp. ether
Citronellal	6.91	1154	0.15	0.05	1434	6.93	Monoterp. aldehyde
Terpinen-4-ol	7.54	1183	0.03	0.03	1545	9.77	Monoterp. alcohol
$\alpha$ -Terpineol	8.08	1205	0.21	0.22	1641	13.50	Monoterp. alcohol
Decanal	8.35	1212	0.04	0.04	1454	7.35	Aliphatic aldehyde
Nerol	8.97	1229	0.05	0.06	1749	19.37	Monoterp. alcohol
Neral	9.45	1242	0.73	0.74	1618	12.42	Monoterp. aldehyde
Geranial	10.70	1275	1.19	1.46	1668	14.78*	Monoterp. aldehyde
Undecanal	12.38	1313	0.05				Aliphatic aldehyde
Neryl acetate	15.12	1361	0.33	0.34	1679	15.33	Monoterp. ester
Geranyl acetate	16.43	1384	0.16	0.17	1711	16.98	Monoterp. ester
$\beta$ -Caryophyllene	17.26	1399	0.12	0.13	1529	9.23	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	18.73	1419	0.21	0.21	1535	9.44	Sesquiterpene
$\beta$ -Bisabolene	24.85	1499	0.28	[1.46]	1668	14.78*	Sesquiterpene
<b>Total identified</b>			<b>99.62%</b>	<b>99.36%</b>			

\*: Two or more compounds are coeluting on this column

†: The peak apexes were resolved, but they overlapped and were summed for analysis.

[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 :**  $1.4723 \pm 0.0003$  (20 °C)

*CONCLUSION*

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

Checked and approved by :

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

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