

## GC/MS BATCH NUMBER: LL0100

---

**ESSENTIAL OIL:** LIME DISTILLED  
**BOTANICAL NAME:** CITRUS AURANTIFOLIA  
**ORIGIN:** MEXICO

KEY CONSTITUENTS PRESENT IN THIS BATCH OF LIME DISTILLED OIL	%
LIMONENE	46.7
γ-TERPINENE	10.3
α-TERPINEOL	7.3
TERPINOLENE	6.8
para-CYMENE	3.3
β-PINENE	2.1
γ-CADINENE	1.5
α-PINENE	1.3
MYRCENE	1.3
1,8-CINEOLE	1.2
γ-TERPINEOL	1.0

Comments from Robert Tisserand: A beautifully fresh, sweet Lime oil with constituents in expected amounts.

**Date :** August 11, 2016

*SAMPLE IDENTIFICATION*

**Internal code :** 16H03-PTH2-1-DM

**Customer identification :** Lime Distilled - Mexico - LL0100510R

**Type :** Essential oil

**Source :** *Citrus aurantifolia*

**Customer :** Plant Therapy

*ANALYSIS*

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

**Analyst :** Sylvain Mercier, M. Sc., chimiste

**Analysis date :** 2016-08-10

Checked and approved by :

---

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

*Note: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.*

*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.	
Nonane	2.84	892	0.04	0.04	812	0.54	Alkane
ξ-Fenchene	2.89	896	0.02	0.02	904	0.70	Monoterpene
Tricyclene	3.16	913	0.03	0.03	930	0.80	Monoterpene
α-Thujene	3.25	918	0.02	0.05	961	0.93	Monoterpene
α-Pinene	3.35	924	1.33	1.37	949	0.88	Monoterpene
α-Fenchene	3.61	940	0.23	0.22	991	1.05	Monoterpene
Camphene	3.64	941	0.59	0.61	1002	1.10	Monoterpene
Geranic oxide	4.02	965	0.26	0.30	1051	1.46	Monoterp. ether
Sabinene	4.07	968	0.01	0.02	1058	1.52	Monoterpene
β-Pinene	4.13	971	2.11	2.12	1042	1.39	Monoterpene
Myrcene	4.41	988	1.32	1.24	1119	2.02	Monoterpene
6-Methyl-5-hepten-2-one	4.50	994	0.01	0.01	1278	4.03	Aliphatic ketone
Pseudolimonene	4.63	1001	0.03	0.02	1109	1.92	Monoterpene
α-Phellandrene	4.68*	1004	0.39	0.32	1112	1.95	Monoterpene
Δ <sup>3</sup> -Carene	4.68*	1004	[0.39]	0.03	1096	1.82	Monoterpene
Octanal	4.86†	1014	4.30	6.91	1229	3.35*	Aliphatic aldehyde
α-Terpinene	4.88†	1015	[4.30]	4.41	1126	2.11	Monoterpene
Limonene	5.18*	1032	50.44	46.68	1151	2.41	Monoterpene
para-Cymene	5.18*	1032	[50.44]	3.27	1213	3.12	Monoterpene
1,8-Cineole	5.20	1033	1.23	1.31	1153	2.42	Monoterp. ether
cis-β-Ocimene	5.29	1038	0.20	10.73	1195	2.92*	Monoterpene
trans-β-Ocimene	5.46	1047	0.45	0.44	1207	3.05	Monoterpene
γ-Terpinene	5.68	1059	10.32	[10.73]	1195	2.92*	Monoterpene
cis-Sabinene hydrate	5.93	1073	0.02	0.04	1426	6.15	Monoterp. alcohol
Terpinolene	6.14	1084	6.81	[6.91]	1229	3.35*	Monoterpene
para-Cymenene	6.33	1094	0.26	0.25	1371	5.35	Monoterpene
trans-Sabinene hydrate	6.63	1106	0.20	0.23	1497	7.50	Monoterp. alcohol
Linalool	6.70	1109	0.01	0.02	1508	7.69	Monoterp. alcohol
Nonanal	6.74	1110	0.03	0.02	1357	5.13	Aliphatic aldehyde
endo-Fenchol	7.08	1123	0.65	0.68	1517	7.88*	Monoterp. alcohol
1-Terpineol	7.44	1136	0.74	0.91	1521	7.94*	Monoterp. alcohol
cis-β-Terpineol	7.89	1153	0.63	0.62	1565	9.24	Monoterp. alcohol
trans-β-Terpineol	8.45	1174	0.27	0.22	1616	10.76	Monoterp. alcohol
Borneol	8.56	1178	0.48	0.72	1624	11.01*	Monoterp. alcohol
Terpinen-4-ol	8.67	1182	0.91	0.89	1537	8.39	Monoterp. alcohol
α-Terpineol	9.42*	1205	7.28	7.54	1633	11.38*	Monoterp. alcohol
para-Cymen-8-ol	9.42*	1205	[7.28]	0.22	1771	18.05	Monoterp. alcohol
γ-Terpineol	9.52	1207	1.02	1.24	1636	11.47	Monoterp. alcohol
Decanal	9.65	1210	0.11	0.05	1443	6.49	Aliphatic aldehyde
Neral	10.98	1240	0.04	0.03	1603	10.38	Monoterp. aldehyde
Geraniol	11.82	1259	0.03	0.03	1787	18.96	Monoterp. alcohol

Geranial	12.47	1273	0.03	0.11	1643	11.79	Monoterp. aldehyde
Bornyl acetate	12.95	1283	0.04	[0.68]	1517	7.88*	Monoterp. ester
Neryl acetate	17.60	1359	0.04	0.06	1655	12.34*	Monoterp. ester
β-Elemene	18.57	1373	0.06	[0.91]	1521	7.94*	Sesquiterpene
Geranyl acetate	19.09	1381	0.06	0.07	1704	14.53	Monoterp. ester
β-Caryophyllene	20.20*	1398	0.65	0.44	1529	8.19	Sesquiterpene
<i>cis</i> -α-Bergamotene	20.20*	1398	[0.65]	[0.91]	1521	7.94*	Sesquiterpene
Dodecanal	21.37	1412	0.02	[0.06]	1655	12.34*	Aliphatic aldehyde
<i>trans</i> -α-Bergamotene	21.78	1417	0.87	1.03	1534	8.32	Sesquiterpene
α-Humulene	22.95	1431	0.10	0.10	1587	9.89	Sesquiterpene
<i>trans</i> -β-Farnesene	24.13	1445	0.07	0.08	1612	10.65	Sesquiterpene
Germacrene D	25.33	1460	0.03	[7.54]	1633	11.38*	Sesquiterpene
β-Selinene	25.76	1465	0.07	[0.72]	1624	11.01*	Sesquiterpene
Viridiflorene	25.91	1467	0.20	[0.72]	1624	11.01*	Sesquiterpene
<i>cis</i> -α-Bisabolene	27.95	1490	0.11	1.64	1668	12.90*	Sesquiterpene
γ-Cadinene	28.44	1497	1.46	[1.64]	1668	12.90*	Sesquiterpene
( <i>E,E</i> )-α-Farnesene	28.70*	1500	0.69	0.61	1701	14.37	Sesquiterpene
β-Bisabolene	28.70*	1500	[0.69]	0.08	1657	12.44	Sesquiterpene
<i>trans</i> -γ-Bisabolene	29.77	1515	0.21	0.24	1690	13.86	Sesquiterpene
Germacrene B	31.45	1538	0.05	0.06	1716	15.02	Sesquiterpene
<b>Total identified</b>			<b>97.58%</b>	<b>98.38%</b>			

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

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

†: Peaks apexes were resolved, but peaks overlapped and were summed for analysis

Note: no correction factor was applied

#### OTHER DATA

**Physical aspect :** Clear liquid

**Refractive index :** 1.4743 ± 0.0003 (20 °C)

#### CONCLUSION

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



