

**Date :** March 30, 2017

*SAMPLE IDENTIFICATION*

**Internal code :** 17C27-GUR10-1-DM

**Customer identification :** Lemon - 240

**Type :** Essential oil

**Source :** *Citrus x limon*

**Customer :** HealthLand LLC.

*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 :** 2017-03-28

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.	
Tricyclene	3.22	917	0.01	0.01	918	1.06	Monoterpene
$\alpha$ -Thujene	3.30	922	0.40	0.43	954	1.21	Monoterpene
$\alpha$ -Pinene	3.41	928	1.95	1.89	943	1.16	Monoterpene
Camphene	3.69	945	0.07	0.06	996	1.45	Monoterpene
Sabinene	4.13	971	2.32	2.32	1057	1.99	Monoterpene
$\beta$ -Pinene	4.21	976	13.96	13.93	1042	1.85	Monoterpene
Myrcene	4.46	991	1.41	1.38	1115	2.55	Monoterpene
$\alpha$ -Phellandrene	4.73	1006	0.03	0.03	1109	2.47	Monoterpene
Octanal	4.84	1013	0.08	0.08	1231	4.12	Aliphatic aldehyde
$\alpha$ -Terpinene	4.92	1017	0.08	0.10	1122	2.64	Monoterpene
Limonene	5.25*	1035	64.20	63.73	1150	3.01	Monoterpene
1,8-Cineole	5.25*	1035	[64.20]	0.42	1151	3.03	Monoterp. ether
para-Cymene	5.25*	1035	[64.20]	0.42	1207	3.78	Monoterpene
<i>cis</i> - $\beta$ -Ocimene	5.33	1039	0.07	8.60	1191	3.55*	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	5.51	1049	0.14	0.13	1201	3.69	Monoterpene
$\gamma$ -Terpinene	5.73	1061	8.49	[8.60]	1191	3.55*	Monoterpene
<i>cis</i> -Sabinene hydrate	5.99	1075	0.05	0.06	1406	6.81	Monoterp. alcohol
Terpinolene	6.16	1085	0.26	0.26	1222	3.99	Monoterpene
Linalool	6.60	1106	0.14	0.10	1492	8.89	Monoterp. alcohol
Nonanal	6.73	1111	0.12	0.11	1334	5.67	Aliphatic aldehyde
<i>cis</i> -Limonene oxide	7.28	1131	0.04	0.04	1382	6.44	Monoterp. ether
<i>trans</i> -Limonene oxide	7.40	1135	0.02	0.01	1393	6.61	Monoterp. ether
Camphor	7.71	1146	0.01	0.01	1421	7.20	Monoterp. ketone
Citronellal	7.90	1153	0.06	0.06	1414	7.02	Monoterp. aldehyde
Terpinen-4-ol	8.66	1181	0.06	0.03	1526	9.94	Monoterp. alcohol
$\alpha$ -Terpineol	9.26	1202	0.23	0.21	1622	13.70	Monoterp. alcohol
Decanal	9.70	1212	0.04	0.04	1434	7.50	Aliphatic aldehyde
Nerol	10.38	1227	0.04	0.04	1729	19.50	Monoterp. alcohol
Neral	11.00	1240	0.77	0.79	1598	12.60	Monoterp. aldehyde
Geraniol	11.63	1255	0.03	0.02	1781	22.90	Monoterp. alcohol
Geranial	12.49	1274	1.33	1.32	1647	14.99	Monoterp. aldehyde
Undecanal	14.54	1313	0.03	0.02	1538	10.39	Aliphatic aldehyde
Citronellyl acetate	17.08	1352	0.02	0.02	1609	13.01	Monoterp. ester
Neryl acetate	17.68	1361	0.42	0.47	1657	15.51	Monoterp. ester
Geranyl acetate	19.14	1383	0.26	0.27	1688	17.17	Monoterp. ester
$\beta$ -Caryophyllene	20.37	1401	0.20	0.20	1517	9.58	Sesquiterpene
<i>trans</i> - $\alpha$ -Bergamotene	21.97	1420	0.35	0.35	1523	9.81	Sesquiterpene
<i>trans</i> - $\beta$ -Farnesene	24.29	1448	0.03	0.04	1616	13.36	Sesquiterpene
$\beta$ -Bisabolene	28.58	1500	0.54	0.54	1654	15.36	Sesquiterpene
Spathulenol	33.51*	1569	0.08	0.06	2017	37.07	Sesquiterp. alcohol
( <i>E</i> )-Nerolidol	33.51*	1569	[0.08]	0.01	1992	36.01	Sesquiterp. alcohol

$\alpha$ -Bisabolol	39.27	1686	0.04	0.02	2132	40.67	Sesquiterp. alcohol
Citropten	47.74	1980	0.09				Coumarin
Oxypeucedanin	58.09	2465	0.08				Coumarin
<b>Total identified</b>			<b>98.55%</b>	<b>98.63%</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 :** 1.4738  $\pm$  0.0003 (20 °C)

#### COMPLIANCE WITH ISO 855:2004 (CITRUS XLIMON, EXPRESSION)

Compound	%	ISO 855:2004 : USA type				Satisfied?
		Coastal type		Desert type		
		% min	% max	% min	% max	
$\alpha$ -Thujene	0.4	0.2	0.5	0.2	0.5	Yes
$\alpha$ -Pinene	2.0	1.5	2.5	1.4	2.5	Yes
Sabinene	2.3	1.5	2.5	1.3	2.5	Yes
$\beta$ -Pinene	14.0	9.0	14.0	10.0	13.0	Coastal
Limonene	63.7	63.0	70.0	70.0	80.0	Coastal
para-Cymene	0.4	0.05	0.35	0.01	0.35	No
$\gamma$ -Terpinene	8.5	8.3	9.5	6.5	8.0	Coastal
$\alpha$ -Terpineol	0.2	0.10	0.25	0.06	0.15	Coastal
Neral	0.8	0.6	0.9	0.3	0.6	Coastal
Geranial	1.3	1.0	2.0	0.5	0.9	Coastal
Neryl acetate	0.4	0.35	0.60	0.30	0.50	Yes
Geranyl acetate	0.3	0.20	0.50	0.10	0.30	Yes
$\beta$ -Bisabolene	0.5	0.45	0.90	0.40	0.70	Yes
<b>Refractive index</b>	1.4738	1.473	1.476	1.473	1.476	Yes

#### CONCLUSION

No adulterant, contaminant or diluent were detected using this method. The oil does not comply with the ISO norm, but nonetheless corresponds to the expected profile for this species.



