

Date : January 18, 2018

SAMPLE IDENTIFICATION

Internal code : 18A10-CHS1-1-CC

Customer identification : Sweet orange - USA - 1709211

Type : Essential oil

Source : *Citrus sinensis*

Customer : American College of Healthcare sciences

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 : 2018-01-18

Checked and approved by :

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.	
α -Thujene	3.31	920	tr	tr	951	1.07	Monoterpene
α -Pinene	3.42	926	0.56	0.56	940	1.03	Monoterpene
Camphene	3.71	943	tr	tr	993	1.29	Monoterpene
Sabinene	4.14	969	0.27	0.26	1057	1.77	Monoterpene
β -Pinene	4.21	973	0.03	0.03	1036	1.61	Monoterpene
Myrcene	4.49	989	1.94	1.92	1113	2.31	Monoterpene
Δ 3-Carene	4.77*	1005	0.11	0.08	1090	2.05	Monoterpene
α -Phellandrene	4.77*	1005	[0.11]	0.04	1106	2.22	Monoterpene
Octanal	4.88	1011	0.32	0.30	1231	3.83	Aliphatic aldehyde
Limonene	5.32*	1035	94.79	94.76	1150	2.77	Monoterpene
1,8-Cineole	5.32*	1035	[94.79]	0.25	1151	2.78	Monoterp. ether
para-Cymene	5.32*	1035	[94.79]	tr	1207	3.47	Monoterpene
cis- β -Ocimene	5.38	1038	0.01	0.02	1182	3.20*	Monoterpene
trans- β -Ocimene	5.55	1048	0.02	0.02	1200	3.38	Monoterpene
γ -Terpinene	5.74	1058	0.01	[0.02]	1182	3.20*	Monoterpene
cis-Sabinene hydrate	6.08	1076	0.01	0.01	1406	6.48	Monoterp. alcohol
Terpinolene	6.22*	1084	0.03	0.02	1220	3.67	Monoterpene
Octanol	6.22*	1084	[0.03]	0.01	1503	8.61	Aliphatic alcohol
Linalool	6.72	1107	0.38	0.38	1496	8.39	Monoterp. alcohol
Nonanal	6.80	1109	0.05	0.04	1334	5.33	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	7.24	1125	tr	tr	1556	10.30	Monoterp. alcohol
cis-Limonene oxide	7.35	1129	tr	tr	1371	5.89	Monoterp. ether
trans-Limonene oxide	7.48	1134	0.01	0.01	1383	6.07	Monoterp. ether
cis-para-Mentha-2,8-dien-1-ol	7.64	1140	tr	0.01	1604	12.07	Monoterp. alcohol
Citronellal	7.98	1152	0.04	0.04	1412	6.60	Monoterp. aldehyde
α -Terpineol	9.52	1204	0.04	0.04	1621	12.83	Monoterp. alcohol
Decanal	9.82	1210	0.23	0.20	1432	7.00	Aliphatic aldehyde
Neral	11.19	1240	0.06	0.06	1597	11.71	Monoterp. aldehyde
Carvone	11.45	1246	0.01	tr	1631	13.33	Monoterp. ketone
Geranial	12.71	1274	0.10	0.10	1643	13.89	Monoterp. aldehyde
α -Copaene	17.74	1357	0.02	0.02	1420	6.76	Sesquiterpene
β -Cubebene	18.72	1371	0.02	0.02	1466	7.69	Sesquiterpene
β -Caryophyllene	20.64	1400	0.02	0.01	1513	8.91	Sesquiterpene
β -Copaene	21.59	1411	0.02	0.02	1506	8.71	Sesquiterpene
Dodecanal	21.79	1413	0.04	0.02	1635	13.50	Aliphatic aldehyde
Germacrene D	25.68	1460	0.02	0.03	1608	12.24	Sesquiterpene
α -Selinene	26.94	1475	0.01	0.01	1628	13.17	Sesquiterpene
Valencene	27.93	1487	0.01	0.01	1650	14.22	Sesquiterpene
δ -Cadinene	29.42	1505	0.03	0.03	1661	14.71	Sesquiterpene

β-Sinensal	39.83	1693	0.04	0.04	2113	39.55	Sesquiterp. aldehyde
α-Sinensal	41.78	1754	0.02	0.02	2213	42.22	Sesquiterp. aldehyde
Tangeretin	70.33	3170	0.06				Flavonoid
Nobiletin	72.99	3330	0.01				Flavonoid
Heptamethoxyflavone isomer?	73.22	3342	0.17				Flavonoid
Hexamethoxyflavone isomer?	73.52	3356	0.15				Flavonoid
Total identified			99.65%	99.38%			

*: 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 : Bright yellow liquid

Refractive index : 1.4725 ± 0.0003 (20 °C)

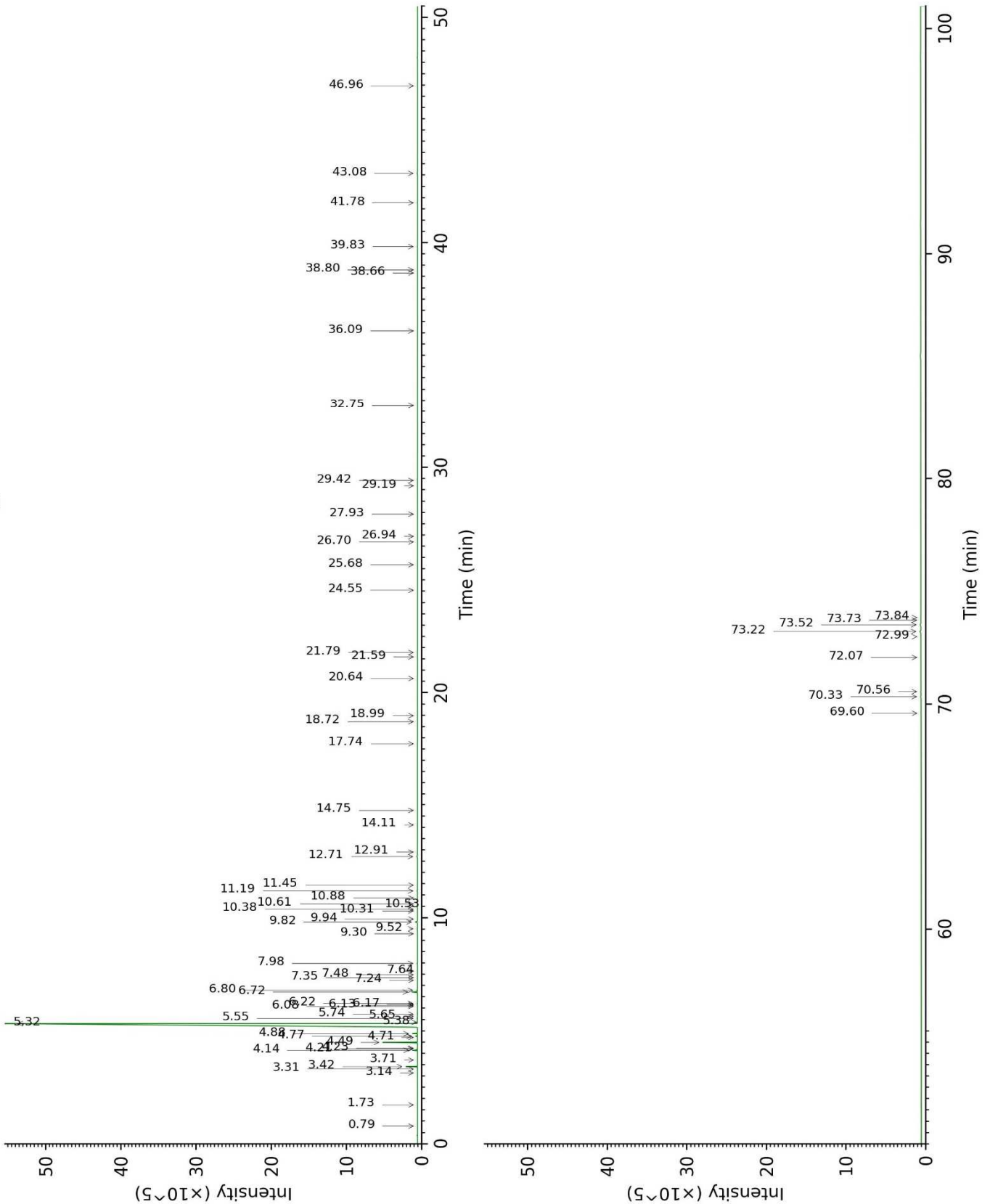
COMPLIANCE WITH ISO 3140:2011 (CITRUS SINENSIS)

Compound	Min. Content	Max. Content	Observed Content	Complies?
α-Pinene	0.4	0.8	0.6	Yes
β-Pinene	0.02	0.15	0.03	Yes
Sabinene	0.2	0.8	0.3	Yes
Myrcene	1.5	3.5	1.9	Yes
Limonene	93.0	96.0	94.8	Yes
Octanal	0.1	0.4	0.3	Yes
Nonanal	0.01	0.06	0.05	Yes
Decanal	0.1	0.7	0.2	Yes
Linalool	0.15	0.7	0.4	Yes
Neral	0.03	0.1	0.06	Yes
Valencene	0.01	0.4	0.01	Yes
Geranial	0.05	0.2	0.1	Yes
β-Sinensal	0.01	0.06	0.04	Yes
Refractive index	1.470	1.476	1.4725	Yes

CONCLUSION

No adulterant, contaminant or diluent were detected using this method. The oil complies with the ISO norm.

18A10-CHS1-1-CC_BP5



18A10-CHS1-1-CC_WAX

