

GC/MS BATCH NUMBER: J40101

ESSENTIAL OIL: JACK PINE

BOTANICAL NAME: PINUS BANKSIANA

ORIGIN: CANADA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF JACK PINE OIL	%
α -PINENE	38.9
BORNYL ACETATE	12.2
Δ 3-CARENE	7.9
CAMPHENE	7.4
β -PINENE	7.3
LIMONENE	5.9
MYRCENE	4.7
α -TERPINEOL	1.3
TRICYCLENENE	1.2
β -PHELLANDRENE	1.1
TERPINOLENE	1.1

Comments from Robert Tisserand: Jack Pine oil has more bornyl acetate than Pinus sylvestris oil, giving it more of a mind-focusing effect.

Date : June 27, 2016

SAMPLE IDENTIFICATION

Internal code : 16F21-PTH3-1-DM

Customer identification : Jack Pine - Canada - J40101511R

Type : Essential oil

Source : *Pinus banksiana*

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 : 2016-06-27

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.	
Toluene	1.27	750	0.05	39.90	960	0.95*	Simple phenolic
Santene	2.57	875	0.91	0.91	907	0.73	Normonoterpene
Styrene	2.84	897	0.06	0.07	1191	2.93	Phenylpropanoid
Tricyclene	3.17	918	1.24	1.20	931	0.83	Monoterpene
α -Thujene	3.26	923	0.09	[39.90]	960	0.95*	Monoterpene
α -Pinene	3.41	933	38.94	[39.90]	960	0.95*	Monoterpene
Camphene	3.66*	948	7.76	8.26	1007	1.16	Monoterpene
α -Fenchene	3.66*	948	[7.76]	0.35	997	1.09	Monoterpene
Thuja-2,4(10)-diene	3.74	952	0.16	0.27	1061	1.58*	Monoterpene
Sabinene	4.07	973	0.17	[0.27]	1061	1.58*	Monoterpene
β -Pinene	4.15	977	7.34	7.34	1047	1.46	Monoterpene
Myrcene	4.43	994	4.73	4.62	1121	2.11	Monoterpene
Δ 3-Carene	4.71*	1010	8.06	7.86	1099	1.88	Monoterpene
α -Phellandrene	4.71*	1010	[8.06]	0.18	1113	2.02	Monoterpene
α -Terpinene	4.87	1019	0.20	0.28	1127	2.17	Monoterpene
Limonene	5.11*	1033	6.76	5.89	1146	2.41	Monoterpene
para-Cymene	5.11*	1033	[6.76]	0.31	1213	3.19*	Monoterpene
β -Phellandrene	5.13	1034	1.11	1.49	1151	2.46	Monoterpene
1,8-Cineole	5.16	1036	0.23	0.11	1157	2.54	Monoterp. ether
<i>cis</i> - β -Ocimene	5.28	1042	0.06	0.26	1193	2.95*	Monoterpene
<i>trans</i> - β -Ocimene	5.45	1052	0.01	[0.31]	1213	3.19*	Monoterpene
γ -Terpinene	5.64	1062	0.25	[0.26]	1193	2.95*	Monoterpene
Isoterpinolene	6.03	1084	0.03	0.02	1224	3.34	Monoterpene
Terpinolene	6.11	1088	1.10	1.04	1228	3.41	Monoterpene
Fenchone	6.27	1097	0.06	0.04	1324	4.74	Monoterp. ketone
para-Cymenene	6.32	1100	0.23	0.20	1373	5.46	Monoterpene
α -Pinene oxide	6.39	1103	0.02	0.02	1305	4.46	Monoterp. ether
Linalool	6.64	1113	0.07	0.12	1499	7.68	Monoterp. alcohol
Nonanal	6.69	1115	0.02	0.02	1343	5.02	Aliphatic aldehyde
endo-Fenchol	7.08	1129	0.13	0.15	1521	8.16	Monoterp. alcohol
α -Campholenal	7.15	1132	0.07				Monoterp. aldehyde
<i>trans</i> -Pinocarveol	7.55	1147	0.14	0.41	1571	9.67*	Monoterp. alcohol
Camphor	7.64	1150	0.24	0.22	1426	6.30	Monoterp. ketone
Borneol	8.57	1185	0.49	0.65	1623	11.34*	Monoterp. alcohol
Terpinen-4-ol	8.67	1188	0.33	0.33	1534	8.55	Monoterp. alcohol
α -Terpineol	9.35	1209	1.34	1.41	1629	11.63*	Monoterp. alcohol
Myrtenol	9.42	1211	0.09	0.11	1712	15.34	Monoterp. alcohol
Verbenone	9.72	1218	0.14	0.11	1620	11.19	Monoterp. ketone
Thymol methyl ether	10.44	1234	0.10	0.18	1529	8.40	Monoterp. ether
Bornyl acetate	12.83	1288	12.22	11.98	1515	8.01	Monoterp. ester
<i>P. mariana</i> biomarker‡	13.40	1301	0.19	[0.41]	1571	9.67*	Monoterp. ester

Myrtenyl acetate	14.98	1326	0.25	0.26	1611	10.89	Monoterp. ester
α-Terpinyl acetate	16.39	1348	0.12	[0.65]	1623	11.34*	Monoterp. ester
β-Bourbonene	17.75	1369	0.04	0.05	1454	6.83	Sesquiterpene
β-Caryophyllene	20.18	1405	0.10	0.05	1525	8.29	Sesquiterpene
Aromadendrene	21.53	1422	0.03	0.02	1541	8.77	Sesquiterpene
Germacrene D	25.13	1465	0.20	[1.41]	1629	11.63*	Sesquiterpene
Bicyclogermacrene	25.91	1475	0.07	0.05	1639	12.10	Sesquiterpene
α-Muurolene	27.14	1490	0.16	0.14	1652	12.66	Sesquiterpene
γ-Cadinene	28.16	1502	0.28	0.27	1674	13.66	Sesquiterpene
δ-Cadinene	28.85	1511	0.80	0.79	1680	13.93	Sesquiterpene
α-Cadinene	29.94	1526	0.03	0.02	1705	15.00	Sesquiterpene
τ-Cadinol	37.27	1644	0.11	0.14	2074	36.76	Sesquiterp. alcohol
τ-Muurolol	37.40	1648	0.09	0.11	2089	37.29	Sesquiterp. alcohol
α-Cadinol	37.85	1658	0.21	0.21	2126	38.58	Sesquiterp. alcohol
cis-Abienol	51.34	2146	0.04	0.04	2675	50.57	Diterpenic alcohol
Total identified			97.67%	98.46%			

*: Two or more compounds are coeluting on this column

‡: Also characteristic of a number of other conifer species, including *P. banksiana*

[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 : 1.4705 ± 0.0003 (20 °C)

CONCLUSION

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



