

Date : May 13, 2016

SAMPLE IDENTIFICATION

Internal code : 16E05-ALK5-1-SM

Customer identification : HE Abies balsamea - B-ABBACAN04QC2

Type : Essential oil

Source : *Abies balsamea*

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 : 2016-05-13

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.	
Santene	2.55	874	4.00	3.94	907	0.73	Normonoterpene
Tricyclene	3.14	916	1.28	1.25	931	0.83	Monoterpene
α -Thujene	3.23	922	0.15	15.47	956	0.93*	Monoterpene
α -Pinene	3.36	930	15.40	[15.47]	956	0.93*	Monoterpene
Camphene	3.63*	946	9.35	9.20	1007	1.16	Monoterpene
α -Fenchene	3.63*	946	[9.35]	0.04	996	1.09	Monoterpene
Sabinene	4.04	971	0.08	0.11	1060	1.58	Monoterpene
β -Pinene	4.14	977	18.00	17.78	1048	1.48	Monoterpene
Myrcene	4.38	991	1.36	1.39	1119	2.08	Monoterpene
Δ^3 -Carene	4.69*	1010	18.53	18.34	1101	1.90	Monoterpene
α -Phellandrene	4.69*	1010	[18.53]	0.21	1112	2.01	Monoterpene
α -Terpinene	4.83	1017	0.16	0.15	1125	2.16	Monoterpene
para-Cymene	5.02	1028	0.06	0.09	1212	3.17	Monoterpene
Limonene	5.09*	1031	9.89	8.79	1146	2.40	Monoterpene
β -Phellandrene	5.09*	1031	[9.89]	4.06	1151	2.46*	Monoterpene
1,8-Cineole	5.11	1033	3.06	[4.06]	1151	2.46*	Monoterp. ether
γ -Terpinene	5.60	1060	0.31	0.30	1191	2.93	Monoterpene
Isoterpinolene	5.99	1082	0.06	0.05	1222	3.32	Monoterpene
Terpinolene	6.07	1086	1.58	1.54	1227	3.39	Monoterpene
Fenchone	6.21	1094	0.09	0.08	1322	4.72	Monoterp. ketone
para-Cymenene	6.24	1096	0.04	0.04	1372	5.44	Monoterpene
Linalool	6.48	1107	0.04	0.08	1499	7.67	Monoterp. alcohol
endo-Fenchol	6.88	1122	0.04	0.05	1521	8.14	Monoterp. alcohol
trans-Pinocarveol	7.35	1139	0.04	0.03	1570	9.66	Monoterp. alcohol
Camphor	7.54	1146	0.23	0.22	1425	6.28	Monoterp. ketone
Camphene hydrate	7.74	1154	0.10	0.21	1525	8.28	Monoterp. alcohol
Borneol	8.27	1174	0.20	0.19	1623	11.33	Monoterp. alcohol
trans- β -Terpineol	8.38	1177	0.03	0.03	1618	11.11	Monoterp. alcohol
Terpinen-4-ol	8.48	1181	0.17	0.20	1533	8.52*	Monoterp. alcohol
α -Terpineol	9.07	1203	0.36	0.33	1628	11.60	Monoterp. alcohol
endo-Fenchyl acetate	9.50	1213	0.01	0.02	1407	5.94	Sesquiterpene
Thymol methyl ether	10.26	1230	0.03	[0.20]	1533	8.52*	Monoterp. ether
Piperitone	11.36	1254	0.81	0.79	1626	11.49	Monoterp. ketone
Bornyl acetate	12.67	1284	12.76	13.64	1514	7.97	Monoterp. ester
Thymol	13.74	1306	0.10	0.11	2111	38.02	Monoterp. alcohol
α -Cubebene	15.39	1333	0.04	0.04	1414	6.07	Sesquiterpene
Longifolene	19.07	1389	0.21	0.21	1494	7.58	Sesquiterpene
β -Caryophyllene	19.98	1403	0.32	0.29	1526	8.31	Sesquiterpene

α -Humulene	22.70	1436	0.18	0.18	1586	10.14	Sesquiterpene
β -Bisabolene	28.11	1501	0.30	0.31	1662	13.08	Sesquiterpene
<i>cis</i> -Abienol	51.10	2135	0.06	0.06	2672	50.50	Diterp. alcohol
Total identified	99.43%		99.82%				

*: 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 : Clear liquid

Refractive index : 1.4710 ± 0.0003 (20 °C)

CHEMOTYPES

- High Δ^3 -carene (>10%; likely characteristic of Eastern Canada)^{1,2}
- Low thymol (<0.25%)¹

CONCLUSION

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

REFERENCES

- (1) Régimbal, J.-M.; Collin, G. Essential Oil Analysis of Balsam Fir *Abies Balsamea* (L.) Mill. *J. Essent. Oil Res.* **1994**, *6*, 229–238.
- (2) Hunt, R.; Rudloff, E. Von. Chemosystematic Studies in the Genus *Abies*. I. Leaf and Twig Oil Analysis of Alpine and Balsam Firs. *Can. J. Bot.* **1974**, *52*, 477–487.



