PLANT THERAPY
100% PURE ESSENTIAL OILS

GC/MS BATCH NUMBER: S50107

ESSENTIAL OIL: SPRUCE HEMLOCK
BOTANICAL NAME: TSUGA CANADENSIS
ORIGIN: CANADA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF SPRUCE HEMLOCK OIL	%
ISOBORNYL ACETATE	38.1
α-PINENE	15.1
β-PINENE	11.0
CAMPHENE	8.
LIMONENE	4.8
CAMPHOR	4.6
MYRCENE	3.1
Δ3-CARENE	3.1
β-PHELLANDRENE	1.3
BORNEOL	1.1

Comments from Robert Tisserand: Beautifully fresh, green odor profile. Constituents are in expected amounts.

Date : November 9, 2017

SAMPLE IDENTIFICATION

Internal code : 17K08-PTH6-1-CC
Customer identification : Spruce Hemlock - Canada - S5010777R
Type : Essential oil
Source : *Tsuga canadensis*
Customer : Plant Therapy

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 : 2017-11-09

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	1.32	759	0.01	15.27	953	1.17*	Simple phenolic
cis-Hex-3-en-1-ol	2.49	864	0.08	0.11	1319	5.44*	Aliphatic alcohol
Santene	2.63	875	0.81	0.76	888	0.92	Normonoterpene
Hexanol	2.73	882	0.03	0.02	1296	5.07	Aliphatic alcohol
Tricyclene	3.23	915	0.74	0.70	923	1.05	Monoterpene
α-Thujene	3.32	921	0.07	[15.27]	953	1.17*	Monoterpene
α-Pinene	3.45	929	15.45	[15.27]	953	1.17*	Monoterpene
Camphene	3.73*	945	8.07	8.02	1001	1.45	Monoterpene
α-Fenchene	3.73*	945	[8.07]	0.07	992	1.38	Monoterpene
Thuja-2,4(10)-diene	3.81	949	0.02	0.45	1052	1.95*	Monoterpene
Sabinene	4.15	969	0.14	[0.45]	1052	1.95*	Monoterpene
β-Pinene	4.23	974	10.95	10.35	1040	1.82	Monoterpene
Myrcene	4.49	990	3.06	3.12	1116	2.55*	Monoterpene
α-Phellandrene	4.77*	1006	3.45	0.20	1109	2.46	Monoterpene
Δ3-Carene	4.77*	1006	[3.45]	3.05	1079	2.28	Monoterpene
α-Terpinene	4.94	1015	0.12	[3.12]	1116	2.55*	Monoterpene
Limonene	5.19*	1029	5.83	4.76	1141	2.89	Monoterpene
para-Cymene	5.19*	1029	[5.83]	0.19	1207	3.76*	Monoterpene
β-Phellandrene	5.22	1030	1.33	2.22	1144	2.93*	Monoterpene
1,8-Cineole	5.24	1031	0.30	[2.22]	1144	2.93*	Monoterp. ether
cis-β-Ocimene	5.35	1037	0.01	0.14	1188	3.50*	Monoterpene
trans-β-Ocimene	5.53	1047	0.01	[0.19]	1207	3.76*	Monoterpene
γ-Terpinene	5.72	1057	0.15	[0.14]	1188	3.50*	Monoterpene
Isoterpinolene	6.12	1079	0.02	0.57	1223	3.99*	Monoterpene
Terpinolene	6.20	1083	0.57	[0.57]	1223	3.99*	Monoterpene
Fenchone	6.35	1091	0.04	[0.11]	1319	5.44*	Monoterp. ketone
para-Cymenene	6.42	1095	0.07	0.08	1365	6.16	Monoterpene
γ-Campholenal	6.45	1097	0.05				Monoterp. aldehyde
Linalool	6.70	1106	0.13	0.26	1493	8.89*	Monoterp. alcohol
Nonanal	6.79	1110	0.02	0.02	1343	5.80	Aliphatic aldehyde
endo-Fenchol	7.18	1124	0.04	0.25	1517	9.65	Monoterp. alcohol
α-Campholenal	7.26	1127	0.07				Monoterp. aldehyde
trans-Pinocarveol	7.64	1140	0.09	0.12	1564	11.37	Monoterp. alcohol
Camphor	7.79	1146	4.61	4.72	1421	7.19	Monoterp. ketone
Camphene hydrate	8.05	1155	0.23	0.39	1524	9.92*	Monoterp. alcohol
Borneol	8.67	1178	1.13	1.35	1615	13.40*	Monoterp. alcohol
Terpinen-4-ol	8.82	1183	0.27	[0.39]	1524	9.92*	Monoterp. alcohol
Myrtenal	9.33	1200	0.05	[0.39]	1524	9.92*	Monoterp. aldehyde
α-Terpineol	9.53	1205	0.64	0.98	1618	13.58*	Monoterp. alcohol
Verbenone	9.87*	1212	0.13	0.03	1605	12.87*	Monoterp. ketone
endo-Fenchyl acetate	9.87*	1212	[0.13]	0.10	1404	6.78	Monoterp. ester

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Thymol methyl ether	10.63	1229	0.04	0.03	1535	10.28	Monoterp. ether
Citronellol	10.96	1236	0.16	0.26	1705	18.08*	Monoterp. alcohol
Piperitone	11.84	1255	0.25	[0.98]	1618	13.58*	Monoterp. ketone
Isobornyl acetate	13.18	1285	38.05	39.46	1512	9.47	Monoterp. ester
trans-Pinocarvyl acetate	13.57	1293	0.04	[0.39]	1524	9.92*	Monoterp. ester
Citronellyl acetate	17.24	1350	0.04	[0.03]	1605	12.87*	Monoterp. ester
β-Elemene	18.93	1376	0.05	[0.39]	1524	9.92*	Sesquiterpene
Geranyl acetate	19.35	1382	0.06	0.16	1692	17.38	Monoterp. ester
Longifolene	19.67	1387	0.12	[0.26]	1493	8.89*	Sesquiterpene
β-Caryophyllene	20.59	1400	0.14	0.12	1520	9.76	Sesquiterpene
α-Humulene	23.41	1434	0.09	0.17	1582	12.02	Sesquiterpene
γ-Muurolene	25.47	1458	0.05	[1.35]	1615	13.40*	Sesquiterpene
Germacrene D	25.62	1460	0.02	[0.98]	1618	13.58*	Sesquiterpene
β-Selinene	26.42	1470	0.01	[0.98]	1618	13.58*	Sesquiterpene
α-Selinene	26.88	1475	0.02	0.06	1633	14.30	Sesquiterpene
α-Muurolene	27.66	1484	0.15	0.15	1644	14.92	Sesquiterpene
γ-Cadinene	28.72	1497	0.16	0.13	1667	16.14	Sesquiterpene
β-Bisabolene	29.11	1502	0.12	0.06	1658	15.63	Sesquiterpene
δ-Cadinene	29.37	1506	0.54	0.56	1673	16.46	Sesquiterpene
α-Cadinene	30.87	1527	0.03	[0.26]	1705	18.08*	Sesquiterpene
trans-α-Bisabolene	31.86	1541	0.04	[0.26]	1705	18.08*	Sesquiterpene
τ-Cadinol	37.54	1638	0.04	0.03	2068	38.83	Sesquiterp. alcohol
τ-Muurolol	37.65	1641	0.04	0.03	2083	39.30	Sesquiterp. alcohol
α-Cadinol	38.10	1652	0.07	0.07	2120	40.45	Sesquiterp. alcohol
Total identified			**99.12%**	**99.59%**			

*: 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 : 1.4698 ± 0.0003 (20 °C)

Conclusion

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

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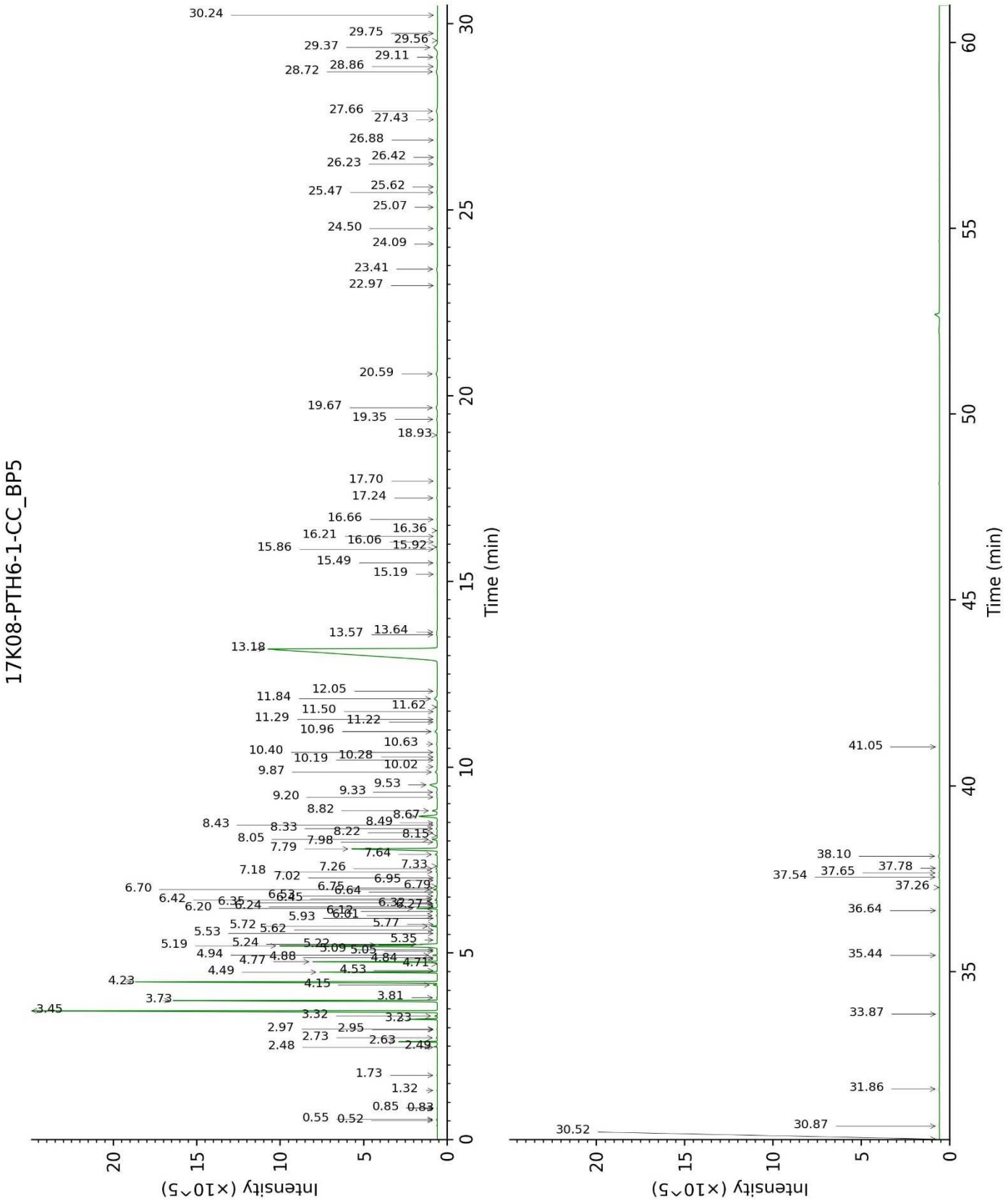
17K08-PTH6-1-CC_BP5
Intensity (×10^5)
Time (min)
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29.37
29.11
28.72
28.86
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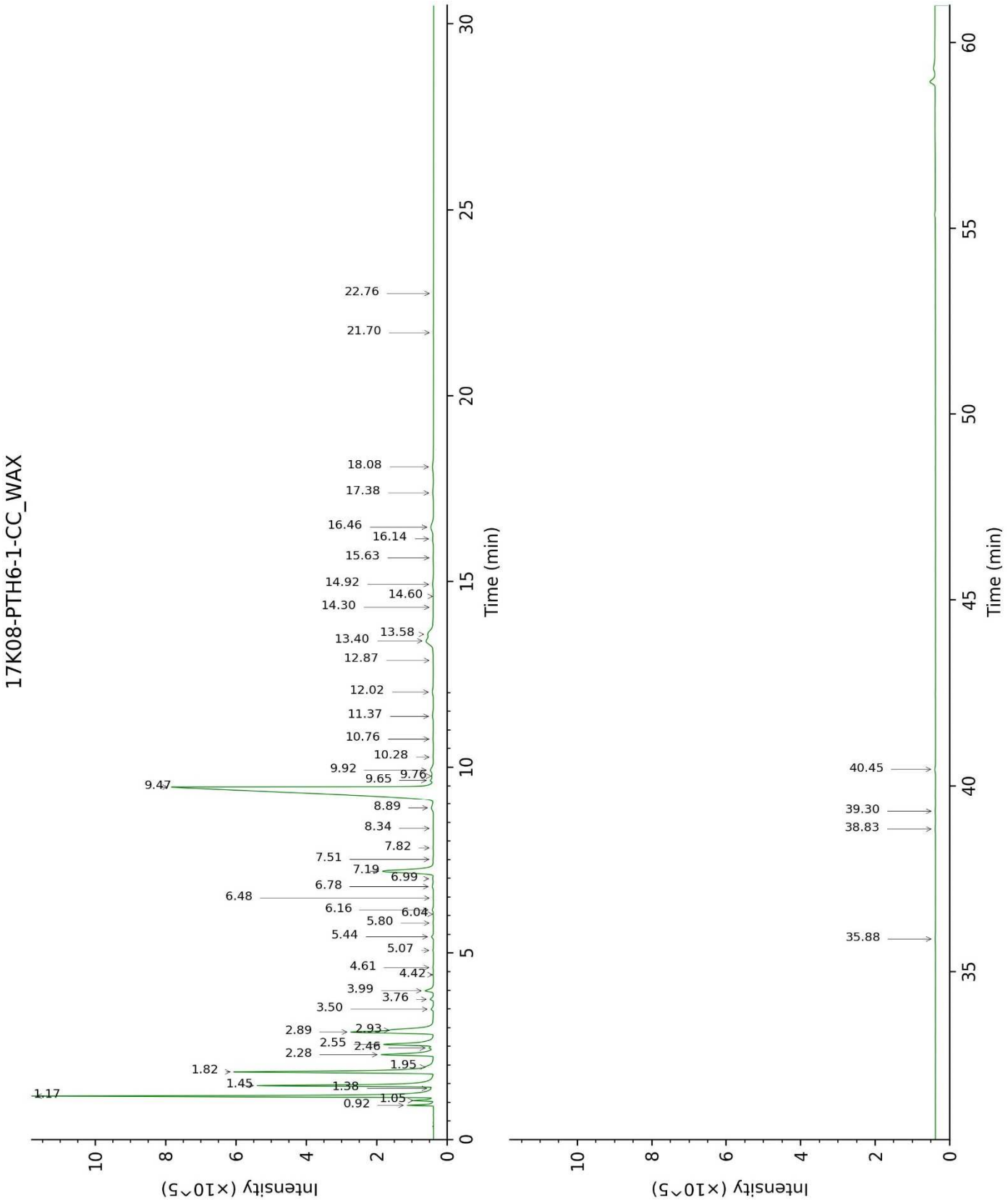

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