

ANALYSIS Pine , Red Esssential Oil

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SAMPLE IDENTIFICATION livinglibotionv

Internal code : 17D10-FSE3-1-DM

Customer Identification : Red Pine

Type : Essential oil

Source : *Pinus resinosa*

Customer : Flowers Shining Everywhere Inc.

Lot EAB746737 CA92214A

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ANALYSIS
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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 : Benoit Roger Ph. D.

Analysis date : 2017-04-12

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Checked and approved by :

Alexis St-Gelais
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Alexis St-Gelais, M. Sc., chimiste 2013-174

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IDENTIFIED COMPOUNDS

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Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
Toluene	1.30	757	0.02	47.76	954	1.20*	Simple phenolic
Hexanal	1.72	807	0.01	0.01	1009	1.56	Aliphatic aldehyde
Santene	2.62	876	0.02				Normonoterpene
Tricyclene	3.22	917	0.45	0.44	915	1.04	Monoterpene
α -Thujene	3.31	922	0.07	[47.76]	954	1.20*	Monoterpene
α -Pinene	3.70	946	47.09	[47.76]	954	1.20*	Monoterpene
Camphene	3.78	951	2.08	1.98	995	1.43	Monoterpene
Thuja-2,4(10)-diene	4.12	971	0.10	0.15	1053	1.94*	Monoterpene
Sabinene	4.22*	976	0.11	[0.15]	1053	1.94*	Monoterpene
β -Pinene	4.22*	976	12.65	12.62	1039	1.82	Monoterpene
Benzaldehyde	4.47	991	[12.65]	0.01	1430	7.40	Simple phenolic
Myrcene	4.50	993	2.12	2.12	1113	2.52	Monoterpene
Octan-3-one	4.75*	1007	0.10	0.20	1197	3.63*	Aliphatic ketone
α -3-Carene	4.75*	1007	3.90	3.80	1084	2.26	Monoterpene
α -Phellandrene	4.92	1017	[3.90]	0.07	1106	2.43	Monoterpene
α -Terpinene	5.11	1031	0.06	0.06	1118	2.60	Monoterpene
para-Cymene	5.17	1031	8.15	7.68	1139	2.87	Monoterpene
Limonene	5.20	1032	1.77	2.24	1144	2.93	Monoterpene
β -Phellandrene	5.22	1033	0.01	0.02	1150	3.02	Monoterp. ether
1,8-Cineole	5.33	1039	0.03	0.02	1181	3.42	Monoterpene
cis- β -Ocimene	5.50	1049	0.22	[0.20]	1197	3.63*	Monoterpene
trans- β -Ocimene	5.69	1059	0.09	0.09	1183	3.45	Monoterpene
γ -Terpinene	5.98	1075	0.07	0.25	1445	7.75*	Monoterp. alcohol
<i>P. maritima</i> biomarker**	6.09	1081	0.01	0.01	1214	3.87	Monoterpene
Isoterpinolene	6.16*	1085	0.49	0.01	1366	6.17	Monoterpene
meta-Cymenene	6.16*	1085	[0.49]	0.46	1219	3.94	Monoterpene
Terpinolene	6.35	1095	0.18	0.16	1361	6.11	Monoterpene
para-Cymenene	6.48	1101	0.07	0.06	1295	5.06	Monoterp. ether
α -Pinene oxide	6.76	1121	0.05	0.07	1510	9.38*	Monoterp. alcohol
endo-Fenchol	7.02	1121	0.09	[0.07]	1510	9.38*	Monoterp. alcohol
trans-Pinocarveol	7.49	1138	0.26	0.26	1562	11.26*	Monoterp. alcohol
Camphor	7.69	1145	0.22	0.24	1418	7.12*	Monoterp. ketone
Camphene hydrate	7.90	1153	0.04	1.32	1515	9.51*	Monoterp. alcohol
Pinocamphone	8.05	1159	0.13	0.12	1422	7.20	Monoterp. ketone
Borneol	8.46	1174	0.23	0.41	1614	13.25*	Monoterp. alcohol
Isopinocampheol	8.53	1176	0.19	0.56	1499	9.04*	Monoterp. alcohol
Terpinen-4-ol	8.66	1181	0.22	0.50	1523	9.83*	Monoterp. alcohol
Cryptone	9.13	1208	0.07	[0.26]	1562	11.26*	Monoterp. ketone
para-Cymen-8-ol	9.21	1201	0.06	0.08	1761	21.61	Monoterp. alcohol
Myrtenol	9.28*	1202	0.94	0.03	1711	18.35	Monoterp. alcohol

α -Terpineol	9.28*	1202	[0.94]	1.42	1619	13.55*	Monoterp. alcohol
Verbenone	9.71	1212	0.07	0.07	1591	12.32	Monoterp. ketone
trans-Carveol	10.22	1223	0.03	0.02	1749	20.81	Monoterp. alcohol
Thymol methyl ether	10.49	1229	0.11	[0.50]	1523	9.83*	Monoterp. ether
Carvone	11.22	1245	0.04	0.03	1631	14.15	Monoterp. ketone
Phellandral	12.67	1277	0.12	0.08	1610	13.04	Monoterp. aldehyde
Bornyl acetate	12.80	1280	0.50	[0.56]	1499	9.04*	Monoterp. ester
2-Undecanone	13.69	1300	0.04	0.03	1552	10.91	Aliphatic ketone
α -Longipinene	15.71	1331	0.08	0.24	1402	6.74*	Sesquiterpene
α -Cubebene	15.86	1333	0.17	[0.24]	1402	6.74*	Sesquiterpene
α -Terpinyl acetate	16.46*	1342	0.10	0.09	1617	13.44	Monoterp. ester
Cyclosativene	17.09	1352	0.06	[0.24]	1418	7.12*	Sesquiterpene
α -Copaene	17.55	1359	0.27	0.29	1424	7.27	Sesquiterpene
β -Bourbonene	17.96	1365	0.07	[0.25]	1445	7.75*	Sesquiterpene
β -Cubebene	18.51	1373	0.02	0.02	1471	8.40	Sesquiterpene
β -Elemene	18.74	1377	0.36	0.49	1518	9.63	Sesquiterpene
Longitolene	19.47	1388	0.58	0.57	1479	8.57	Sesquiterpene
β -Caryophyllene	20.41	1402	1.18	[1.32]	1515	9.51*	Sesquiterpene
β -Copaene	21.31	1413	0.12	[1.32]	1515	9.51*	Sesquiterpene
Aromadendrene	21.76	1418	0.22	[0.50]	1523	9.83*	Sesquiterpene
6,9-Guadiene	22.38	1429	0.16	0.20	1530	10.09	Sesquiterpene
cis-Muurolo-3,5-diene	22.76	1430	0.05	0.05	1545	10.64	Sesquiterpene
α -Humulene	23.14	1435	0.20	0.34	1574	11.72	Sesquiterpene
cis-Muurolo-4(14),5-diene	23.80	1442	0.09				Sesquiterpene
trans-Cadina-1(6),4-diene	24.85	1455	0.23	0.12	1579	11.92	Sesquiterpene
γ -Muuroloene	25.22	1459	0.67	0.67	1604	12.85	Sesquiterpene
Germacrene D	25.35	1461	0.17	0.15	1613	13.20*	Sesquiterpene
β -Selinene	25.95	1468	0.55	[1.42]	1619	13.55*	Sesquiterpene
trans-Muurolo-4(14),5-diene	26.13	1470	0.21	[0.41]	1614	13.25*	Sesquiterpene
α -Selinene	26.59	1476	0.48	0.49	1627	13.91*	Sesquiterpene
Epizonarene	27.15	1483	0.04	[0.49]	1627	13.91*	Sesquiterpene
α -Muuroloene	27.39	1486	1.11	1.09	1639	14.57	Sesquiterpene
γ -Cadinene	28.44	1498	1.95	2.10	1661	15.77	Sesquiterpene
δ -Cadinene	29.17	1508	3.66	3.79	1669	16.14*	Sesquiterpene
Zonarene	29.31	1510	0.07	[3.79]	1669	16.14*	Sesquiterpene
trans-Cadina-1,4-diene	29.40	1511	0.24	0.17	1694	17.48	Sesquiterpene
α -Cadinene	30.16	1522	0.08	0.08	1699	17.75	Sesquiterpene
α -Calacorene	30.49	1527	0.19	0.13	1796	23.90	Sesquiterpene
β -Calacorene	32.69	1557	0.07	0.09	1836	26.71	Sesquiterpene
Spathulenol	33.52*	1569	0.43	0.24	2013	36.91	Sesquiterp. alcohol
Caryophyllene oxide	33.52*	1569	[0.43]	0.15	1841	27.07	Sesquiterp. ether
1-epi-Cubenol	36.37	1615	0.05	0.03	1965	34.74	Sesquiterp. alcohol
γ -Cadinol	37.21	1635	0.14	0.15	2065	38.64	Sesquiterp. alcohol

Essential oil, *Pinus resinosa*
Internal Code: 17D10-FSE3-1-DM

Customer Identification:
Red Pine - Zayat Aroma - Lot EAB746737 CA92214A

Report prepared for
Flowers Shining Everywhere Inc.

γ -Muurolol	37.33	1638	0.14	0.17	2081	39.13	Sesquiterp. alcohol
α -Muurolol	37.46	1642	0.04	0.04	2095	39.58	Sesquiterp. alcohol
α -Cadinol	37.77	1649	0.24	0.27	2119	40.80	Sesquiterp. alcohol
cis-Calamenen-10-ol	38.24	1661	0.03				Sesquiterp. alcohol
trans-Calamenen-10-ol	38.41	1665	0.03	0.02	2199	42.39	Sesquiterp. alcohol
Cadalene	38.46	1666	0.01				Sesquiterpene
Total identified			98.11%	98.00%			

*: 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 : 1.4753 \pm 0.0003 (20 °C)

CONCLUSION

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

17D10-FSE3-1-DM_BPS



