

# Fir Grand Essential Oil

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Date : March 10, 2017

#### SAMPLE IDENTIFICATION

Internal code : 17B16-FSE25-1-DM

Customer Identification : Grand Fir - Lot #MP14E391

Type : Essential oil

Source : Abies grandis

Customer : Flowers Shining Everywhere Inc.



#### 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 : 2017-03-08



Checked and approved by :

Alexis St-Gelais, M. Sc., chimiste



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# IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
Heptane	0.80	691	0.03				Alkane
Toluene	1.31	758	0.03	6.35	948	1.21*	Simple phenolic
cis-Hex-3-en-1-ol	2.45	863	0.08	0.06	1319	5.59	Aliphatic alcohol
Santene	2.62	876	0.03	0.03	889	0.96	Normonoterpene
Tricyclene	3.22	917	1.31	1.33	921	1.09	Monoterpene
$\alpha$ -Thujene	3.31	922	0.03	0.07	957	1.24	Monoterpene
$\alpha$ -Pinene	3.43	929	6.48	[6.35]	948	1.21*	Monoterpene
Camphene	3.72*	947	14.32	14.17	999	1.52	Monoterpene
$\alpha$ -Fenchene	3.72*	947	[14.32]	0.03	988	1.43	Monoterpene
Thuja-2,4(10)-diene	3.79	951	0.01	0.07	1055	2.03*	Monoterpene
Sabinene	4.13	971	0.07	[0.07]	1055	2.03*	Monoterpene
$\beta$ -Pinene	4.23	977	19.89	19.50	1042	1.91	Monoterpene
Myrcene	4.46	991	0.96	0.94	1113	2.61	Monoterpene
$\Delta^3$ -Carene	4.73*	1007	0.18	0.11	1092	2.33	Monoterpene
$\alpha$ -Phellandrene	4.73*	1007	[0.18]	0.06	1106	2.52	Monoterpene
$\alpha$ -Terpinene	4.87	1014	0.03	0.02	1119	2.69	Monoterpene
para-Cymene	5.10	1027	0.21	0.22	1204	3.84	Monoterpene
$\beta$ -Phellandrene	5.20*	1032	11.54	7.73	1146	3.05*	Monoterpene
Limonene	5.20*	1032	[11.54]	3.67	1138	2.95	Monoterpene
1,8-Cineole	5.23	1033	0.03	[7.73]	1146	3.05*	Monoterp. ether
$\gamma$ -Terpinene	5.69	1059	0.04	0.04	1185	3.56	Monoterpene
Isoterpinolene	5.99	1075	0.01	tr	1212	3.96	Monoterpene
Terpinolene	6.16	1084	0.28	0.27	1218	4.05	Monoterpene
$\gamma$ -Campholenal	6.42	1099	0.06				Monoterp. aldehyde
Linalool	6.59	1105	0.04	23.54	1502	9.52*	Monoterp. alcohol
endo-Fenchol	6.99	1120	0.09	0.08	1519	10.15	Monoterp. alcohol
cis-para-Menth-2-en-1-ol	7.11	1124	0.04	0.04	1490	9.12	Monoterp. alcohol
$\alpha$ -Campholenal	7.19	1127	0.06				Monoterp. aldehyde
trans-Pinocarveol	7.47	1138	0.13	0.14	1558	11.67*	Monoterp. alcohol
Camphor	7.68	1145	0.40	0.34	1416	7.33	Monoterp. ketone
Camphene hydrate	7.88	1153	0.27	0.36	1511	9.85*	Monoterp. alcohol
Citronellal	7.93	1154	0.03	0.68	1420	7.44*	Monoterp. aldehyde
Pinocarvone	8.06	1159	0.02	0.01	1471	8.67	Monoterp. ketone
Borneol	8.43	1173	0.51	1.20	1609	13.77*	Monoterp. alcohol
Isopinocampone	8.53	1176	0.03	0.07	1488	9.08	Monoterp. alcohol
Terpinen-4-ol	8.64	1181	0.11	0.14	1525	10.40	Monoterp. alcohol
para-Cymen-8-ol	9.02	1194	0.30				Monoterp. alcohol
$\alpha$ -Terpineol	9.25	1202	1.35	1.56	1614	14.01*	Monoterp. alcohol
Myrtenal	9.31*	1203	0.03	0.01	1533	10.70	Monoterp. aldehyde
Myrtenol	9.31*	1203	[0.03]	1.19	1721	20.04*	Monoterp. alcohol
Citronellol	10.63	1232	0.27	0.32	1698	18.50*	Monoterp. alcohol



Bornyl acetate	12.98	1284	22.51	[23.54]	1502	9.52*	Monoterp. ester
2-Undecanone	13.68	1300	0.08	[0.14]	1558	11.67*	Aliphatic ketone
$\alpha$ -Cubebene	15.85	1333	0.67	0.73	1398	6.89	Sesquiterpene
Citronellyl acetate	17.09	1352	0.90	0.93	1594	13.00	Monoterp. ester
$\alpha$ -Copaene	17.54	1358	0.68	[0.68]	1420	7.44*	Sesquiterpene
$\beta$ -Cubebene	18.50	1373	0.20	0.25	1464	8.52	Sesquiterpene
$\beta$ -Elemene	18.71	1376	0.15	[0.36]	1511	9.85*	Sesquiterpene
Geranyl acetate	19.16	1383	0.71	0.75	1679	17.53	Monoterp. ester
$\beta$ -Caryophyllene	20.35	1401	0.32	0.36	1509	9.78	Sesquiterpene
cis-Muurolo-3,5-diene	22.72	1429	0.04	0.08	1545	11.17	Sesquiterpene
$\alpha$ -Humulene	23.09	1434	0.07	0.06	1585	12.63	Sesquiterpene
$\gamma$ -Muuroloene	24.79	1454	0.29	0.21	1599	13.20	Sesquiterpene
Germacrene D	25.14	1459	0.10	0.08	1603	13.44	Sesquiterpene
$\alpha$ -Amorphene	25.46	1462	0.04	0.02	1606	13.58	Sesquiterpene
$\beta$ -Selinene	25.87	1467	0.30	[1.56]	1614	14.01*	Sesquiterpene
cis-Muurolo-4(14),5-diene	26.08	1470	0.77	[1.20]	1609	13.77*	Sesquiterpene
$\alpha$ -Selinene	26.51	1475	0.24	0.27	1619	14.29	Sesquiterpene
4-epi-Cubebol	26.99	1481	0.22	0.26	1789	24.58	Sesquiterp. alcohol
$\alpha$ -Muuroloene	27.31	1485	0.82	0.75	1631	14.95	Sesquiterpene
$\gamma$ -Cadinene	28.30	1496	0.19	0.18	1676	17.38	Sesquiterpene
Cubebol	28.72	1502	0.40	0.35	1837	28.15	Sesquiterp. alcohol
$\delta$ -Cadinene	29.08	1507	3.55	3.57	1661	16.57	Sesquiterpene
trans-Calamenene	29.36	1511	1.43	[1.19]	1721	20.04*	Sesquiterpene
trans-Cadina-1,4-diene	30.08	1521	0.21	[0.32]	1698	18.50*	Sesquiterpene
Germacrene B	31.68	1543	0.14	0.10	1707	19.11	Sesquiterpene
(E)-Nerolidol	33.47*	1568	0.21	0.08	1988	36.74	Sesquiterp. alcohol
Caryophyllene oxide	33.47*	1568	[0.21]	0.08	1832	27.80	Sesquiterp. ether
Glenol	34.46	1582	0.18	0.10	1971	35.98	Sesquiterp. alcohol
1,10-diepi-Cubenol	36.34	1614	1.24	1.32	1942	34.65	Sesquiterp. alcohol
Cubenol	36.95	1629	0.53	0.56	1932	34.20	Sesquiterp. alcohol
$\tau$ -Cadinol	37.27	1637	0.23	0.17	2070	39.50	Sesquiterp. alcohol
$\alpha$ -Cadinol	37.69	1647	0.13				Sesquiterp. alcohol
trans-Calamen-10-ol	38.18	1659	0.06	0.04	2205	43.18	Sesquiterp. alcohol
(2Z,6E)-Farnesyl acetate	43.00	1799	0.10	0.06	2181	42.59	Sesquiterp. ester
<b>Total Identified</b>			<b>97.01%</b>	<b>95.71%</b>			

\*: 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



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#### OTHER DATA

**Physical aspect:** Clear liquid

**Refractive Index:**  $1.4760 \pm 0.0003$  (20 °C)

#### CONCLUSION

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

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