

## GC/MS BATCH NUMBER: J20102

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**ESSENTIAL OIL:** JUNIPER BERRY  
**BOTANICAL NAME:** JUNIPERUS COMMUNIS  
**ORIGIN:** MOROCCO

KEY CONSTITUENTS PRESENT IN THIS BATCH OF JUNIPER BERRY OIL	%
$\alpha$ -PINENE	39.1
MYRCENE	12.9
$\beta$ -PINENE	12.7
SABINENE	8.9
$\beta$ -CARYOPHYLLENE	4.4
GERMACRENE D	4.3
LIMONENE	2.3
TERPINEN-4-OL	1.7
$\delta$ -CADINENE	1.4
GERMACRENE B	1.4
$\alpha$ -HUMULENE	1.1
BORNYL ACETATE	0.1

Comments from Robert Tisserand: Excellent odor profile, and conforms to 10 of 11 key ISO constituents with b-pinene being marginally high.

**Date :** July 13, 2016

*SAMPLE IDENTIFICATION*

**Internal code :** 16F23-PTH1-1-DM

**Customer identification :** Juniper Berry - Morocco - J2010264

**Type :** Essential oil

**Source :** *Juniperus communis*

**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 :** 2016-07-12

Checked and approved by :

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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.	
Tricyclene	3.17	918	0.09	0.08	932	0.83	Monoterpene
$\alpha$ -Thujene	3.26	924	0.81	1.10	964	0.96	Monoterpene
$\alpha$ -Pinene	3.42	933	39.14	37.43	961	0.95	Monoterpene
$\alpha$ -Fenchene	3.63	946	0.02	0.01	998	1.10	Monoterpene
Camphene	3.65	947	0.26	0.22	1007	1.15	Monoterpene
Thuja-2,4(10)-diene	3.74	953	0.03	9.65	1066	1.62*	Monoterpene
Sabinene	4.10	975	8.89	[9.65]	1066	1.62*	Monoterpene
$\beta$ -Pinene	4.17	979	12.70	12.91	1049	1.48	Monoterpene
Myrcene	4.45	996	12.94	13.00	1124	2.14	Monoterpene
$\alpha$ -Phellandrene	4.69*	1009	0.17	0.06	1114	2.04	Monoterpene
$\Delta^3$ -Carene	4.69*	1009	[0.17]	0.05	1099	1.88	Monoterpene
$\alpha$ -Terpinene	4.87	1020	0.39	0.89	1128	2.19	Monoterpene
para-Cymene	5.07	1030	0.18	0.21	1213	3.19	Monoterpene
Limonene	5.10	1032	2.25	2.16	1145	2.40	Monoterpene
$\beta$ -Phellandrene	5.13	1034	0.45	0.52	1151	2.46	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	5.46	1052	0.03	0.03	1209	3.13	Monoterpene
$\gamma$ -Terpinene	5.64	1062	0.71	0.68	1194	2.96	Monoterpene
<i>cis</i> -Sabinene hydrate	6.00	1082	0.03	0.03	1413	6.04	Monoterp. alcohol
Terpinolene	6.11	1088	0.69	0.68	1229	3.41	Monoterpene
para-Cymenene	6.33	1100	0.04	0.04	1373	5.46	Monoterpene
Linalool	6.65	1113	0.09	0.10	1499	7.69	Monoterp. alcohol
$\alpha$ -Campholenal	7.16	1132	0.05				Monoterp. aldehyde
<i>trans</i> -Pinocarveol	7.56	1147	0.05	0.04	1574	9.78	Monoterp. alcohol
Camphor	7.68	1151	0.02	0.02	1427	6.32	Monoterp. ketone
Borneol	8.40	1178	0.02	0.24	1633	11.82*	Monoterp. alcohol
Terpinen-4-ol	8.68	1189	0.90	1.76	1533	8.54*	Monoterp. alcohol
para-Cymen-8-ol	9.19	1205	0.02	0.02	1768	18.56	Monoterp. alcohol
$\alpha$ -Terpineol	9.34	1209	0.14	0.33	1640	12.14*	Monoterp. alcohol
Verbenone	9.71	1217	0.02	0.02	1602	10.65	Monoterp. ketone
Carvacrol methyl ether	10.81	1242	0.05	0.04	1537	8.67	Monoterp. ether
Bornyl acetate	12.72	1285	0.14	0.15	1511	7.91	Monoterp. ester
$\alpha$ -Cubebene	15.68	1337	0.41	0.44	1418	6.13	Sesquiterpene
$\alpha$ -Copaene	17.35	1363	0.45	0.47	1441	6.57	Sesquiterpene
$\beta$ -Elemene	18.60	1382	0.79	[1.76]	1533	8.54*	Sesquiterpene
Sibirene	19.17	1391	0.20	0.19	1491	7.52	Sesquiterpene
$\beta$ -Caryophyllene	20.28	1407	4.43	4.40	1530	8.45	Sesquiterpene
$\beta$ -Copaene	21.10	1417	0.07	0.07	1514	7.98	Sesquiterpene
$\gamma$ -Elemene	21.51*	1421	0.17	0.08	1570	9.66	Sesquiterpene
Aromadendrene	21.51*	1421	[0.17]	[1.76]	1533	8.54*	Sesquiterpene
<i>cis</i> - $\beta$ -Farnesene	22.56	1434	0.09	0.13	1576	9.83	Sesquiterpene
$\alpha$ -Humulene	22.98	1439	1.07	1.18	1590	10.28	Sesquiterpene

<i>trans</i> -β-Farnesene	24.19	1454	0.47	0.48	1621	11.24*	Sesquiterpene
γ-Murolene	24.66	1460	0.11	[0.48]	1621	11.24*	Sesquiterpene
Germacrene D	25.25	1467	4.25	4.14	1631	11.70	Sesquiterpene
β-Selinene	25.76	1473	0.21	[0.24]	1633	11.82*	Sesquiterpene
α-Selinene	25.94	1475	0.10	[0.33]	1640	12.14*	Sesquiterpene
Eremophilene	27.17	1490	0.32	0.32	1648	12.49	Sesquiterpene
α-Murolene	27.31	1492	0.32	0.32	1652	12.70	Sesquiterpene
γ-Cadinene	28.19	1502	0.43	0.41	1675	13.70	Sesquiterpene
δ-Cadinene	28.89	1512	1.37	1.36	1681	13.97	Sesquiterpene
α-Cadinene	29.94	1526	0.09	0.12	1712	15.35	Sesquiterpene
Germacrene B	31.60	1549	1.36	1.33	1728	16.20	Sesquiterpene
Caryophyllene oxide	33.44	1574	0.04	0.03	1851	23.82	Sesquiterp. ether
α-Cedrol	35.17	1598	0.01	0.02	1994	33.16	Sesquiterp. alcohol
τ-Cadinol	37.28	1645	0.05	0.06	2075	36.77	Sesquiterp. alcohol
τ-Murolol	37.41	1648	0.05	0.05	2089	37.30	Sesquiterp. alcohol
α-Murolol	37.54	1651	0.02	0.02	2105	37.82	Sesquiterp. alcohol
α-Cadinol	37.65	1654	0.01	0.01	2134	38.81	Sesquiterp. alcohol
meta-Camphorene	46.74	1949	0.04	0.04	2143	39.07	Diterpene
para-Camphorene	47.46	1978	0.03	0.03	2177	39.98	Diterpene
<b>Total identified</b>			<b>98.28%</b>	<b>98.17%</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

#### OTHER DATA

**Physical aspect :** Clear liquid

**Refractive index :** 1.4743 ± 0.0003 (20 °C)

#### CONCLUSION

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



