

GC/MS BATCH NUMBER: B40101

ESSENTIAL OIL: BLACK PEPPER
BOTANICAL NAME: PIPER NIGRUM
ORIGIN: INDIA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF BLACK PEPPER OIL	%
β -CARYOPHYLLENE	29.1
LIMONENE	12.6
β -PINENE	7.9
SABINENE	7.7
α -PINENE	7.3
Δ 3-CARENE	5.5
α -COPAENE	2.8
γ -CADINENE	1.8
δ -ELEMENE	1.8
trans- γ -BISABOLENE	1.6
α -HUMULENE	1.6
MYRCENE	1.5
α -COPAENE	2.8
β -SELINENE	0.8
α -SELINENE	0.5
GERMACRENE D	0.4

Comments from Robert Tisserand: A very good quality black pepper oil, which conforms to all 12 key constituents in the ISO standard for Indian Black Pepper oil.

Date : May 4, 2016

SAMPLE IDENTIFICATION

Internal code : 16D15-PTH1-1-SM

Customer identification : Black Pepper - India - B4010152

Type : Essential oil

Source : *Piper nigrum*

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 : 2016-05-03

Checked and approved by :

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

Note: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.

This report is digitally signed, it is only considered valid if the digital signature is intact.

IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
α -Thujene	3.22	921	0.95	1.95	962	0.95	Monoterpene
α -Pinene	3.34	928	7.25	5.98	956	0.93	Monoterpene
Camphene	3.61	945	0.13	0.15	1007	1.15	Monoterpene
Sabinene	4.05	971	7.70	7.84	1066	1.62	Monoterpene
β -Pinene	4.11	975	7.91	7.63	1048	1.48	Monoterpene
Myrcene	4.37	991	1.45	1.43	1121	2.11	Monoterpene
Δ 3-Carene	4.66*	1008	6.45	5.46	1100	1.89	Monoterpene
α -Phellandrene	4.66*	1008	[6.45]	0.94	1114	2.03	Monoterpene
α -Terpinene	4.82	1017	0.09	0.09	1127	2.18	Monoterpene
para-Cymene	5.01	1027	0.49	0.63	1214	3.21	Monoterpene
Limonene	5.08*	1031	13.57	12.63	1149	2.44	Monoterpene
β -Phellandrene	5.08*	1031	[13.57]	1.60	1153	2.48*	Monoterpene
1,8-Cineole	5.10	1032	0.88	[1.60]	1153	2.48*	Monoterp. ether
<i>cis</i> - β -Ocimene	5.23	1039	0.01	0.25	1194	2.97*	Monoterpene
<i>trans</i> - β -Ocimene	5.40	1049	0.12	0.11	1209	3.13	Monoterpene
γ -Terpinene	5.59	1059	0.36	[0.25]	1194	2.97*	Monoterpene
<i>cis</i> -Sabinene hydrate	5.89	1076	0.11	0.11	1415	6.09	Monoterp. alcohol
Isoterpinolene	5.98	1081	0.07	0.06	1225	3.36	Monoterpene
Terpinolene	6.06	1085	0.38	0.35	1229	3.42	Monoterpene
para-Cymenene	6.23	1095	0.02	0.01	1379	5.55	Monoterpene
Linalool	6.48*	1107	0.41	0.39	1503	7.76	Monoterp. alcohol
<i>trans</i> -Sabinene hydrate	6.48*	1107	[0.41]	0.08	1490	7.50	Monoterp. alcohol
Terpinen-4-ol	8.49	1182	0.52	0.72	1538	8.69*	Monoterp. alcohol
Cryptone	8.90	1197	0.03	0.02	1575	9.79	Monoterp. ketone
α -Terpineol	9.08	1203	0.08	0.19	1637	11.99	Monoterp. alcohol
δ -Elemene	14.91*	1325	1.86	1.77	1426	6.30	Sesquiterpene
Bicycloelemene	14.91*	1325	[1.86]	0.27	1428	6.34	Sesquiterpene
α -Cubebene	15.53	1335	0.26	0.18	1418	6.13	Sesquiterpene
Cycloisositivene	16.49	1349	0.08	0.09	1422	6.21	Sesquiterpene
α -Copaene	17.23	1361	2.79	2.87	1442	6.59	Sesquiterpene
β -Cubebene	18.15	1375	0.20	0.20	1485	7.40	Sesquiterpene
β -Elemene	18.37	1378	0.63	31.19	1537	8.66*	Sesquiterpene
α -Gurjunene	19.13	1390	0.10	0.11	1471	7.16	Sesquiterpene
β -Caryophyllene	20.29	1407	29.10	[31.19]	1537	8.66*	Sesquiterpene
β -Copaene	20.44	1409	0.17	[31.19]	1537	8.66*	Sesquiterpene
α -Guaiene	21.58*	1422	0.73	[0.72]	1538	8.69*	Sesquiterpene
<i>trans</i> - α -Bergamotene	21.58*	1422	[0.73]	[31.19]	1537	8.66*	Sesquiterpene
<i>cis</i> - β -Farnesene	22.34	1432	0.11	1.70	1592	10.33*	Sesquiterpene
α -Humulene	22.72	1436	1.56	[1.70]	1592	10.33*	Sesquiterpene
<i>trans</i> - β -Farnesene	23.89	1450	0.47	0.39	1621	11.27	Sesquiterpene

Germacrene D	24.85	1462	0.40	0.61	1625	11.45*	Sesquiterpene
β-Selinene	25.45	1469	0.79	0.77	1634	11.86	Sesquiterpene
Unknown (m/z = 93, 119 (94), 91 (63), 77 (41), 105 (39), 41 (33)... 204 (21))	25.58	1471	0.36	[0.61]	1625	11.45*	Sesquiterpene
ar-Curcumene	25.81	1474	0.19	0.15	1700	14.78	Sesquiterpene
α-Selinene	26.08*	1477	0.77	0.50	1641	12.16	Sesquiterpene
Bicyclgermacrene	26.08*	1477	[0.77]	0.26	1648	12.51	Sesquiterpene
4-epi-Cubebol	26.58	1483	0.09	0.08	1811	21.10	Sesquiterp. alcohol
Valencene	26.83	1486	0.56	0.56	1661	13.04	Sesquiterpene
β-Bisabolene	27.08	1489	0.58	0.37	1653	12.71	Sesquiterpene
γ-Cadinene	28.15	1502	1.79	1.85	1667	13.33	Sesquiterpene
δ-Cadinene	28.30	1504	0.16	0.14	1670	13.45	Sesquiterpene
trans-γ-Bisabolene	28.57	1507	1.60	1.60	1682	14.03	Sesquiterpene
trans-Cadina-1,4-diene	29.47	1520	0.80	0.66	1691	14.41	Sesquiterpene
trans-α-Bisabolene	31.12	1542	0.29	0.24	1715	15.46	Sesquiterpene
α-Elemol	31.66	1550	0.31	0.34	2003	33.71	Sesquiterp. alcohol
Caryophyllene oxide	33.14*	1570	1.44	0.97	1853	23.94	Sesquiterp. ether
Spathulenol	33.14*	1570	[1.44]	0.10	2023	34.86	Sesquiterp. alcohol
Isospathulenol	36.33	1622	0.16	0.15	2160	39.51	Sesquiterp. alcohol
τ-Muurolol	37.01	1638	0.07	0.05	2092	37.40	Sesquiterp. alcohol
α-Muurolol	37.16	1642	0.28	0.23	2108	37.93	Sesquiterp. alcohol
α-Bisabolol	39.00	1686	0.09	0.09	2140	38.98	Sesquiterp. alcohol
Total identified			97.41%	97.11%			

*: 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 : Faintly yellow liquid

Refractive index : 1.4823 ± 0.0003 (20 °C)

CONCLUSION

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



