PLANT THERAPY
100% PURE ESSENTIAL OILS

GC/MS BATCH NUMBER: G40102

ESSENTIAL OIL: GINGER ROOT
BOTANICAL NAME: ZINGIBER OFFICINALE
ORIGIN: NIGERIA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF GINGER ROOT CO2 OIL	%
[6]-SHOGAOL	11.8
α-ZINGIBERENE	8.4
ZINGERONE	5.7
[8]-SHOGAOL	4.9
[10]-SHOGAOL	4.1
1-DEHYDRO-[10]-GINGERDIONE	3.8
β-SESQUIPHELLANDRENE	3.5
STEARIC ACID	2.1
Δ-CADINENE	2.0
[11]-PARADOL	1.9
LINOLEIC ACID	1.6
(E,E)-α-FARNESENE	1.6
[6]-GINGEROL	1.6
ar-CURCUMENE	1.4
[7]-PARADOL	1.4
DECANAL	1.0
PALMITIC ACID	1.0

Comments from Robert Tisserand: A very good quality Ginger CO2 extract. This is quite different to Ginger essential oil, which is high in zingiberene and contains no shogaols, paradols or gingerol, all highly active therapeutic compounds.

Date : September 18, 2015

SAMPLE IDENTIFICATION

Internal code : 15I11-PTH6-1-HM
Customer identification : Ginger Root CO2 - Nigeria - G4010256
Type : CO2 extract
Source : *Zingiber officinale*
Customer : Plant Therapy

ANALYSIS

Method : PC-PA-001-15E06, "Analysis of the composition of a liquid essential oil by GC-FID" (in French), modified with a higher temperature ramp. Identifications validated by GC-MS and against literature.
Analyst : Alexis St-Gelais, M. Sc.
Analysis date : 2015-09-15

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IDENTIFIED COMPOUNDS

Identification	Colonne: BP5			Colonne: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
Hexanal	1.37	809	0.83	0.77	1050	1.58	Aliphatic aldehyde
Tricyclene	2.61	914	0.02	0.01	964	0.96	Monoterpene
α-Pinene	2.80	926	0.17	0.15	985	1.06	Monoterpene
Camphene	3.06	942	0.53	0.48	1024	1.35	Monoterpene
β-Pinene	3.52	971	0.02				Monoterpene
Myrcene	3.82	991	0.08	0.07	1134	2.45	Monoterpene
α-Phellandrene	4.06	1005	0.04	0.03	1126	2.34	Monoterpene
Octanal	4.22	1014	0.22	0.21	1255	4.06	Aliphatic aldehyde
β-Phellandrene	4.49*	1029	0.58	0.81	1164	2.82*	Monoterpene
Limonene	4.49*	1029	[0.58]	0.11	1157	2.73	Monoterpene
para-Cymene	4.49*	1029	[0.58]	0.00	1228	3.67	Monoterpene
1,8-Cineole	4.51	1031	0.41	[0.81]	1164	2.82*	Monoterp. ether
Terpinolene	5.45	1084	0.03	0.02	1240	3.85	Monoterpene
Linalool	5.92	1109	0.12	0.17	1516	8.83*	Monoterp. alcohol
Borneol	7.38	1176	0.28	1.06	1636	13.27*	Monoterp. alcohol
Terpinen-4-ol	7.53	1183	0.03	0.02	1545	9.78	Monoterp. alcohol
α-Terpineol	8.07	1204	0.12	[1.06]	1636	13.27*	Monoterp. alcohol
Decanal	8.40	1213	0.98	0.48	1458	7.43	Aliphatic aldehyde
Neral	9.45	1242	0.34	0.35	1618	12.43	Monoterp. aldehyde
Geraniol	10.06	1258	0.12	0.13	1804	22.80	Monoterp. alcohol
Geranial	10.70	1275	0.58	8.98	1672	14.97*	Monoterp. aldehyde
Bornyl acetate	10.84	1279	0.03	0.02	1521	8.97	Monoterp. ester
2-Undecanone	11.67	1301	0.09	0.08	1571	10.62	Aliphatic ketone
para-Vinylguaiacol	12.90	1323	0.13	0.12	2123	39.70	Phenylpropanoid
α-Copaene	14.80	1356	0.10	0.07	1439	7.03	Sesquiterpene
β-Elemene	15.93	1376	0.12	0.16	1535	9.45	Sesquiterpene
Geranyl acetate	16.43	1384	0.08	5.24	1712	17.06*	Monoterp. ester
cis-α-Bergamotene	16.95	1393	0.05	[0.17]	1516	8.83*	Sesquiterpene
Dodecanal	17.30	1400	0.03	0.05	1663	14.55*	Aliphatic aldehyde
Sesquisabinene	19.95	1435	0.08	0.05	1584	11.04	Sesquiterpene
9-epi-β-Caryophyllene	20.49	1442	0.09	[0.05]	1663	14.55*	Sesquiterpene
γ-Gurjunene	20.98	1448	0.10	0.08	1620	12.51	Sesquiterpene
Germacrene D	21.78	1459	0.41	0.44	1631	13.03	Sesquiterpene
ar-Curcumene	22.92*	1474	1.81	1.42	1715	17.24	Sesquiterpene
β-Selinene	22.92*	1474	[1.81]	[1.06]	1636	13.27*	Sesquiterpene
α-Selinene	23.12	1476	0.70	0.45	1641	13.51	Sesquiterpene
α-Zingiberene	24.28	1492	8.35	[8.98]	1672	14.97*	Sesquiterpene
γ-Cadinene	24.49	1494	0.08	0.11	1678	15.24	Sesquiterpene
(*E,E*)-α-Farnesene	25.00	1501	1.57	[5.24]	1712	17.06*	Sesquiterpene
δ-Cadinene	25.33	1505	1.99	1.57	1675	15.11	Sesquiterpene
β-Sesquiphellandrene	26.35*	1517	3.46	[5.24]	1712	17.06*	Sesquiterpene

trans-γ-Bisabolene	26.35*	1517	[3.46]	0.09	1699	16.26	Sesquiterpene
Germacrene B	27.72	1533	0.11	0.12	1731	18.26	Sesquiterpene
α-Elemol	28.63	1544	0.08	0.14	2009	35.88*	Sesquiterp. alcohol
cis-Sesquisabinene hydrate	29.26	1552	0.05				Sesquiterp. alcohol
(*E*)-Nerolidol	30.38	1565	0.15	0.17	2001	35.58	Sesquiterp. alcohol
trans-Sesquisabinene hydrate	32.15	1586	0.09				Sesquiterp. alcohol
(*cis*?)-Zingiberenol	33.66	1607	0.07	[0.14]	2009	35.88*	Sesquiterp. alcohol
(*trans*?)-Zingiberenol	34.97	1634	0.07	0.13	2039	36.94	Sesquiterp. alcohol
β-Eudesmol	35.47	1645	0.17	0.17	2129	39.84	Sesquiterp. alcohol
Zingerone	36.60	1668	5.73	5.99	2682	52.14	Gingerol
Palmitic acid	46.94	2001	0.97	1.30	2868	55.21	Fatty acid
Linoleic acid	50.98*	2178	3.50	1.66	3154	59.90	Fatty acid
Oleic acid	50.98*	2178	[3.50]				Fatty acid
Stearic acid	51.98	2225	2.13	1.99	3105	59.13	Fatty acid
[6]-Shogaol	53.84	2313	11.77	8.83	3399	63.65	Gingerol
[7]-Paradol	54.21	2332	1.37	1.79	3274	61.77	Gingerol
[6]-Gingerol	55.55	2399	1.56				Gingerol
Methyl [6]-gingerol	56.67	2455	0.03				Gingerol
[8]-Shogaol	57.74	2511	4.86	4.99	3613	66.72	Gingerol
[9]-Paradol	58.23	2538	0.83	0.62	3485	64.89	Gingerol
Diacetoxy-[6]-gingerdiol	58.34	2544	0.27				Gingerol
[8]-Gingerol	59.66	2616	0.71				Gingerol
[10]-Shogaol	61.69*	2730	7.48	4.11	3841	69.82	Gingerol
1-Dehydro-[6]-gingerdione	61.69*	2730	[7.48]				Gingerol
[11]-Paradol	62.13	2756	1.92	1.26	3652	67.26	Gingerol
[10]-Gingerol	63.14	2815	0.09				Gingerol
1-Dehydro-[8]-gingerdione	64.78	2913	0.33				Gingerol
[12]-Shogaol	65.05	2929	0.37	0.31	4032	76.97	Gingerol
[13]-Paradol	66.20	3000	0.66	1.00	3854	69.99	Gingerol
1-Dehydro-[10]-gingerdione	68.12	3124	3.78				Gingerol
[15]-Paradol	69.03	3183	0.14	0.12	4046	79.24	Gingerol
1-Dehydro-[12]-gingerdione	71.20	3328	0.10				Gingerol
Total identified			**74.16%**	**58.50%**			

*: 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 : Orange brown viscous liquid
Refractive index : 1.5053 ± 0.0003 (20 °C)

Conclusion

No adulterant, contaminant or diluent were detected using this method. The extract contains both signature compounds of ginger essential oils as well as many gingerol derivatives, which are characteristic of most liquid extracts of ginger and contribute to its taste and medicinal properties. Please note that CO_2 extracts are complex matrixes and usually yield a lower identification percentage upon GC analysis given that it is a younger science. It should also be noted that percentages reported apply for the volatile fraction of the extract. Part of it can be of non-volatile nature and go undetected by the methods used.

Checked and approved by :

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

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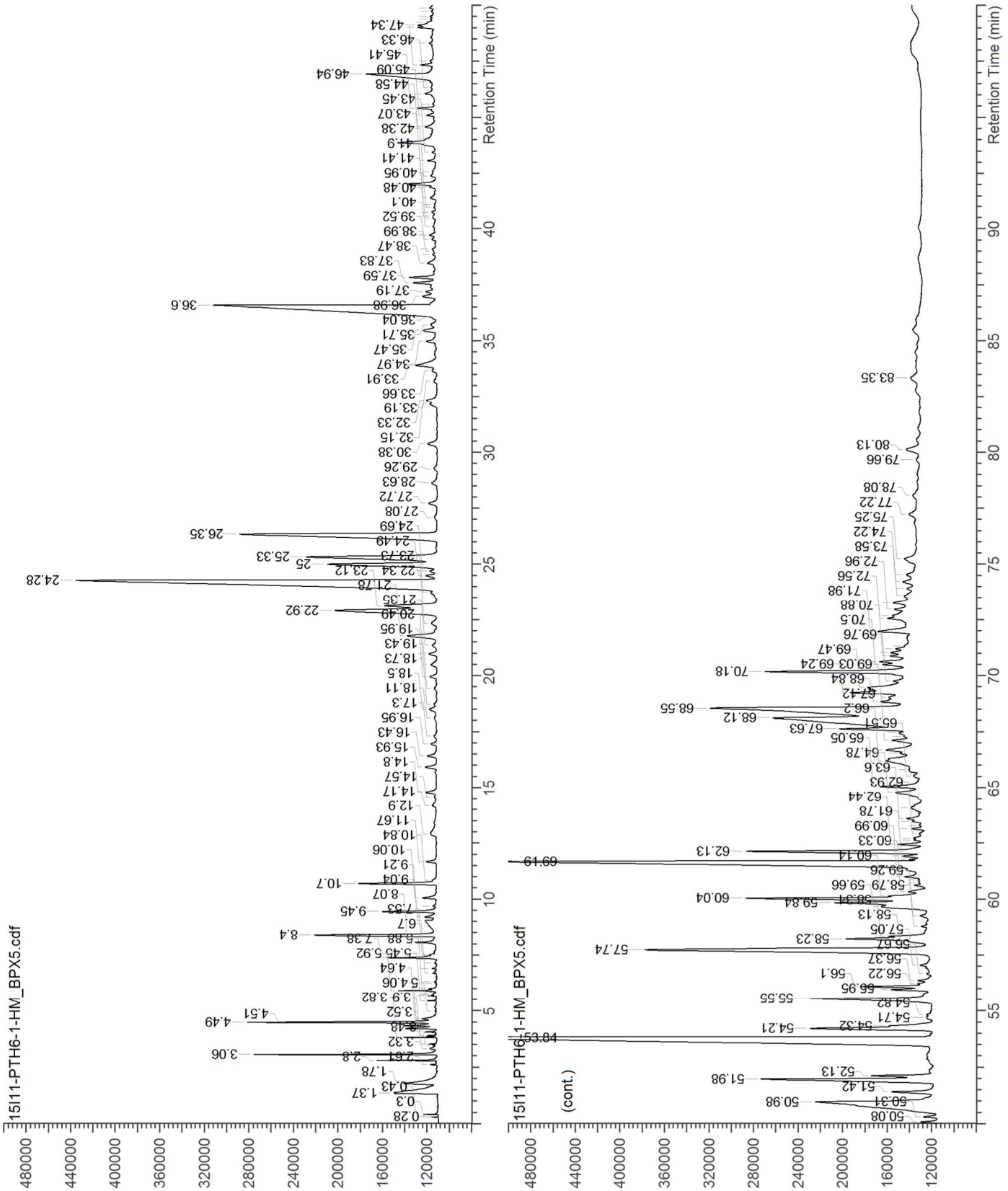
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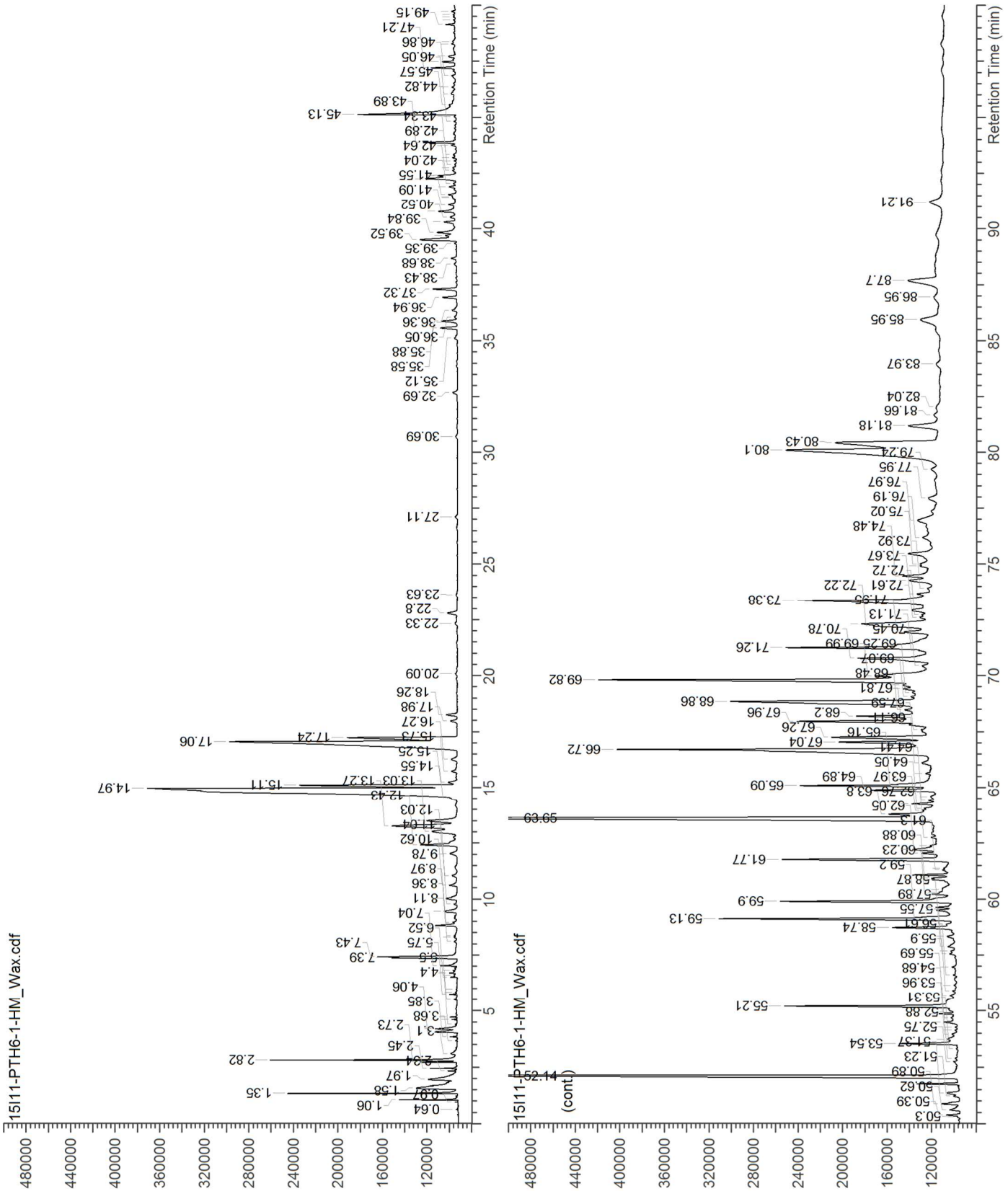
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Retention Time (min)
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