

Date: January 29, 2020

CERTIFICATE OF ANALYSIS - GC PROFILING

Sample identification: Ginger - 180810325

Type: Essential oil

Source: Zingiber officinale

ANALYSIS

Method: 10152018_10:1split.m - Analysis of the composition of an essential oil, or other volatile liquid, by GC-FID, identifications validated by GC-MS.

Analysis date: August 6. 2018

Physical aspect: Light yellow liquid

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with ISO specifications.

Analyzed and approved by:

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Compound	Area Sum %	ISO
α -Pinene	2.15	1.5-2.5
α -Fenchene + Camphene	7.62	4.5-10 Camphene
Neral	0.19	0-0.5
Geraniol	0.19	0.1-1.0
Geranial	0.14	0-0.6
β -Elemene	0.83	0.5-1.5
Ar-Curcumene	6.98	5.0-11.0
α -Zingiberene	32.73	29-40
β -Bisabolene	6.78	2.5-9.0
β -Sesquiphellandrene	13.79	10.0-14.0

Peak	Compound	RT	Area Sum %
1	2-Heptanone	7.922	0.03
2	2-Heptanol	8.376	0.08
3	Tricyclene	9.203	0.18
4	α -Pinene	9.839	2.15
5	α -Fenchene	10.582*	7.62
6	Camphene	10.582*	[7.62]
7	Sabinene	12.137	0.09
8	β -Pinene	12.22	0.31
9	Neomenthol	13.225	0.13
10	β -Myrcene	13.433	0.67
11	α -Phellandrene	14.068	0.31
12	Octanal	14.224	0.07
13	δ 3-carene	14.439	0.06
14	unknown	14.922	0.04
15	p-Cymene	15.48	0.11
16	Limonene	15.704*	6.11
17	β -Phellandrene	15.704*	[6.11]
18	1,8-Cineole	15.837	3.46
19	γ -Terpinene	17.993	0.07
20	α -Terpinolene	20.193	0.22
21	trans-Linalool oxide	20.805	0.05
22	Rosefuran	21.2	0.04
23	Linalool	21.371	0.17
24	2-Nonanol	22.022	0.08
25	unknown	22.585	0.05
26	cis-para-Menth-2-en-1-ol	22.747	0.05
27	trans-para-Mentha-2-en-1-ol	24.222	0.03
28	Camphor	24.36	0.06
29	Camphene hydrate	24.625	0.08
30	Isoborneol	25.405	0.06
31	Citronellal	25.702	0.04
32	Borneol	26.157	0.56
33	Isoneral	26.407	0.06
34	Terpinen-4-ol	27.199	0.21
35	Rosefuran epoxide	27.511	0.19
36	α -Terpineol	28.377	0.59
37	Myrtenal	28.727	0.03
38	Myrtenol	28.841	0.04
39	Decanal	30.078	0.08
40	Citronellol	32.063	0.11
41	Neral	32.803	0.19
42	Geraniol	34.158	0.19

43	Geranial	35.361	0.14
44	Bornyl acetate	36.341	0.17
45	2-Undecanone	37.462	0.08
46	δ -Elemene	40.487	0.07
47	Citronellol acetate	42.262	0.26
48	Cyclosativene II	42.527	0.14
49	α -Copaene	43.372	0.42
50	β -Cubebene	44.651	0.05
51	β -Elemene	44.881	0.83
52	7-epi-Sesquithujene	46.257	0.18
53	β -Caryophyllene	46.628	0.11
54	β -Copaene	47.49	0.09
55	γ -Elemene	48.123	0.09
56	trans- α -Bergamotene	48.391	0.12
57	unknown	49.152	0.09
58	Alloaromadendrene	49.833	0.11
59	Sesquisabinene B	50.123	0.18
60	(E)- β -Farnesene	50.462	0.16
61	Selina-4,11-diene	50.935	0.23
62	γ -Muurolene	51.212	0.23
63	Germacrene D	51.496	1.2
64	β -Selinene	51.815	0.29
65	Ar-Curcumene	52.156	6.98
66	unknown	52.322	0.95
67	unknown	52.641	2.46
68	α -Zingiberene	53.23	32.73
69	unknown	53.505	0.07
70	unknown	53.892	0.34
71	β -Bisabolene	54.164	6.78
72	(3E,6E)- α -Farnesene	54.439	2.26
73	β -Sesquiphellandrene	55.234	13.79
74	unknown	55.577	0.26
75	(E)- γ -Bisabolene	55.806	0.5
76	α -Elemol	56.907	0.37
77	Germacrene B	57.052	0.45
78	trans-Sesquisabinene hydrate	57.455	0.23
79	(E)-Nerolidol	58.444	0.25
80	unknown	60.054	0.25
81	unknown	61.727	0.33
82	unknown	61.973	0.17
83	cis-Zingiberenol	62.54	0.2
84	β -Eudesmol	62.941	0.2
85	γ -Eudesmol	63.057	0.13

