

GC/MS BATCH NUMBER: V30101

ESSENTIAL OIL: VETIVER
BOTANICAL NAME: VETIVERIA ZIZANOIDES
ORIGIN: HAITI

KEY CONSTITUENTS PRESENT IN THIS BATCH OF VETIVER OIL	%
KHUSIMOL	12.4
ISOVALENCENOL	10.0
β -VETIVENENE	5.0
ZIZANOIC ACID	4.7
VETISELINENOL	4.5
β -VETIVONE	2.9
CYCLOCOPACAMPHAN-12-OL (EPIMER A)	2.8
α -VETIVONE	2.2
β -VETISPIRENE	2.1
γ -EUDESMOL	2.1
ZIZANAL	2.1
α -AMORPHENE	1.8
ZIZANOL	1.7
CYCLOCOPACAMPHAN-12-OL (EPIMER B)	1.7
β -EUDESMOL	1.4
KHUSIOL	1.2
α -VETISPIRENE	1.1
GLOBULOL	1.1

JUNENOL	1.0
Δ -AMORPHENE	1.0

Comments from Robert Tisserand: The odor profile is excellent - full, round, deep, not too smoky. The composition is representative of a Haitian vetiver oil. Vetiver oils are highly complex and still present challenges to analytical chemists.

Date : September 8, 2015

SAMPLE IDENTIFICATION

Internal code : 15I01-PTH4-1-HM

Customer identification : Vetiver – Haiti – V3010156

Type : Essential Oil

Source : *Vetiveria zizanoides*

Customer : Plant Therapy

ANALYSIS

Method : PC-PA-001-15E06, "Analysis of the composition of a liquid essential oil by GC-FID" (in French).

Analyst : Alexis St-Gelais, M. Sc.

Analysis date : 2015-09-02

IDENTIFIED COMPOUNDS

Identification	Colonne: BP5			Colonne: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
12-Norisoziza-5-ene	14.19	1345	0.07	0.08	1444	7.14	Norsesquiterpene
α -Ylangene	14.30	1347	0.10	0.09	1423	6.70	Monoterp. ester
Unknown (m/z = 119, 147 (97), 91 (87), 105 (76), 161 (74), 134 (61), 175 (58), 190 (55))	14.41	1349	0.14				Norsesquiterpene
α -Copaene	14.93	1358	0.06	0.16	1432	6.89	Sesquiterpene
6-epi-Nigritene	15.19	1363	0.10	0.08	1498	8.26	Norsesquiterpene
Nigritene	15.66	1371	0.04	0.02	1509	8.60	Norsesquiterpene
Acora-3,7(14)-diene	16.88	1392	0.11				Sesquiterpene
β -Funebrene?	16.96	1394	0.16	0.13	1518	8.90	Sesquiterpene
β -Caryophyllene	17.40	1401	0.18	0.21	1539	9.58	Sesquiterpene
β -Copaene	17.73*	1405	0.16	0.09	1507	8.54	Sesquiterpene
β -Gurjunene	17.73*	1405	[0.16]	0.05	1530	9.28	Sesquiterpene
α -Guaiane	18.54	1416	0.03	0.05	1534	9.41	Sesquiterpene
6,9-Guaiadiene	19.17	1424	0.62	0.65	1554	10.06	Sesquiterpene
Prezizaene	19.47	1428	0.61	0.59	1626	12.79	Sesquiterpene
Khusimene	20.06	1436	0.37	0.48	1642	13.55	Sesquiterpene
(E)-Isoeugenol	21.33	1453	0.34	0.35	2263	43.32	Phenylpropanoid
α -Amorphene	22.02	1462	1.78	1.84	1620	12.53	Sesquiterpene
β -Vetispirene	22.50*	1468	3.80	2.13	1661	14.44	Sesquiterpene
α -Vetispirene	22.50*	1468	[3.80]	1.12	1633	13.12	Sesquiterpene
γ -Amorphene	23.01	1475	0.42	0.32	1691	15.89	Sesquiterpene
δ -Guaiane	23.57*	1482	0.29	0.12	1640	13.45	Sesquiterpene
Unknown (m/z = 91, 93 (99), 145 (87), 202 (86), 105 (78), 77 (59), 131 (56), 119 (54), 108 (52), 107 (52))	23.57*	1482	[0.29]				Sesquiterpene
δ -Amorphene	23.83	1486	0.95	0.99	1651	13.97	Sesquiterpene
Nootkatene	24.16	1490	0.10				Sesquiterpene
γ -Cadinene	24.53*	1495	1.52	0.21	1680	15.37	Sesquiterpene
Eremophila-1(10),7(11)-diene	24.53*	1495	[1.52]				Sesquiterpene
δ -Cadinene	25.30	1504	0.25	0.22	1686	15.64	Sesquiterpene
γ -Vetivenene	26.03	1513	0.43	0.62	1735	18.51	Sesquiterpene
α -Calacorene	27.26	1528	0.19				Sesquiterpene
β -Vetivenene	27.55	1531	4.96	4.96	1756	19.79	Sesquiterpene
γ -Calacorene	28.43	1542	0.53	1.00	1818	23.83	Sesquiterpene
α -Elemol	28.74	1546	0.63	0.30	2010	35.89	Sesquiterp. alcohol

Unknown (m/z = 131, 145 (100), 202 (97), 91 (87), 105 (78), 187 (65), 117 (56))	29.16	1551	1.45				Sesquiterpene
Caryophyllene oxide	29.83	1558	0.81	1.21	1857	26.66	Sesquiterp. ether
Globulol	30.90	1571	1.10	1.05	1993	35.15	Sesquiterp. alcohol
Guaiol	32.16	1586	0.89	0.94	2012	35.98	Sesquiterp. alcohol
Unknown (m/z = 187, 202 (69), 145 (28), 131 (23), 91 (20), 105 (20))	32.89	1595	0.56				Sesquiterpene
Junenol	33.06	1597	1.01	0.70	1945	32.39	Sesquiterp. alcohol
γ-Eudesmol	34.47	1624	2.11	0.64	2083	38.45	Sesquiterp. alcohol
τ-Cadinol	35.01	1635	0.51	0.65	2090	38.70	Sesquiterp. alcohol
τ-Muurolol	35.15	1638	0.46	1.27	2106	39.23	Sesquiterp. alcohol
α-Muurolol	35.46	1645	0.92	0.82	2124	39.70	Sesquiterp. alcohol
β-Eudesmol	35.66*	1649	2.61	1.39	2131	39.92	Sesquiterp. alcohol
α-Cadinol	35.66*	1649	[2.61]	0.25	2146	40.32	Sesquiterp. alcohol
Cyclocopacamphan-12-ol (epimer A)?	35.75	1650	2.79				Sesquiterp. alcohol
Cyclocopacamphan-12-ol (epimer B)	35.92	1654	1.67				Sesquiterp. alcohol
Zizanol	36.57	1668	1.72				Sesquiterp. alcohol
Zizanal	36.71	1671	2.06				Sesquiterp. aldehyde
Khusiol	37.01	1677	1.23				Sesquiterp. alcohol
Vetiselinol	38.51	1711	4.54	3.94	2311	44.45	Sesquiterp. alcohol
Khusimol	39.38	1737	12.36	14.66	2386	46.09*	Sesquiterp. alcohol
Isovalencenol	40.72	1776	9.66	9.67	2430	47.00	Sesquiterp. alcohol
Isovalencenol isomer	41.00	1784	1.60				Sesquiterp. alcohol
β-Vetivone	41.50	1799	2.88	2.89	2353	45.36	Sesquiterp. ketone
α-Vetivone	42.16**	1822	8.09	2.20	2366	45.66?	Sesquiterp. ketone
Zizanoic acid	42.58**	1837	[8.09]	4.72	2895	55.66	Sesquiterp. acid
Total identified			77.82%	63.96%			

*: Two or more compounds are coeluting on this column

***: The peak apexes were resolved, but they overlapped and were summed for analysis.

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

Note: no correction factor was applied

OTHER DATA

Physical aspect : Greenish yellow, viscous liquid

Refractive index : 1.5233 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent were detected using this method. Please note that *Vetiveria* sp. essential oils are quite complex and not very well characterized in scientific literature and databases. The somewhat low identification percentage is thus normal, and does not indicate that any sign of adulteration was noted. The observed profile does correspond to what is typically observed for Haitian vetiver.

Checked and approved by :

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

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