

**Date :** April 8, 2016

*SAMPLE IDENTIFICATION*

**Internal code :** 16C30-NGA3-1-DM

**Customer identification :** Ruh Khus - North India - Batch #NI-58544

**Type :** Essential oil

**Source :** *Vetiveria zizanoides*

**Customer :** Nature Gifts

*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., chimiste

**Analysis date :** 2016-04-02

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.	
$\alpha$ -Ylangene	15.87	1349	0.06	0.05	1424	6.25	Sesquiterpene
12-Norisoziza-5-ene	15.96	1351	0.06	0.06	1443	6.61	Norsesquiterpene
$\alpha$ -Copaene	16.11	1353	0.22	0.18	1432	6.40	Sesquiterpene
6-epi-Nigritene	16.96	1367	0.11	0.13	1493	7.57	Norsesquiterpene
Nigritene	17.68	1378	0.04	0.06	1505	7.80	Norsesquiterpene
$\beta$ -Caryophyllene	18.83	1397	0.25	0.24	1520	8.13	Sesquiterpene
Acora-3,9-diene?	21.20	1427	0.21				Sesquiterpene
Prezizaene	21.31	1428	0.56	0.43	1628	11.59	Sesquiterpene
Khusimene	21.62	1432	0.63	0.74	1639	12.09	Sesquiterpene
Unknown (m/z = 105, 161 (58), 91 (41), 93 (41)... 204 (21))	22.22	1440	0.50				Sesquiterpene
(E)-Isoeugenol	23.43	1454	0.26	0.33	2248	41.80	Phenylpropanoid
nknown (m/z = 145, 159 (66), 202 (64), 187 (43), 91 (34), 128 (31))	23.50	1455	0.75				Sesquiterpene
$\alpha$ -Amorphene	24.27	1465	2.41	2.45	1620	11.21	Sesquiterpene
$\alpha$ -Vetispirene	24.74*	1470	2.52	1.28	1632	11.77	Sesquiterpene
Unknown (m/z = 189, 161 (100), 204 (86), 91 (71), 105 (64), 108 (54), 133 (51), 119 (50))	24.74*	1470	[2.52]				Sesquiterpene
$\beta$ -Vetispirene	24.85	1472	1.35	1.40	1648	12.49	Sesquiterpene
Valencene isomer?	25.31	1477	0.81	1.04	1624	11.40	Sesquiterpene
$\delta$ -Amorphene	26.20	1488	1.71	1.47	1644	12.32	Sesquiterpene
Spirovetiva-1(10),7(11)-diene	26.47	1492	0.36				Sesquiterpene
Nootkatene	26.75	1495	0.30				Sesquiterpene
Eremophila-1(10),7(11)-diene	26.99	1498	1.47				Sesquiterpene
$\gamma$ -Vetivenene	28.42	1516	0.39	0.82	1732	16.45	Sesquiterpene
$\alpha$ -Calacorene	28.63	1519	0.27	0.22	1807	20.88*	Sesquiterpene
$\beta$ -Vetivenene	30.03	1537	4.88	4.90	1750	17.51	Sesquiterpene
$\gamma$ -Calacorene	30.95	1549	1.45	1.78	1812	21.16	Sesquiterpene
$\beta$ -Vetivenene isomer I	31.22	1553	0.31	0.33	1784	19.56	Sesquiterpene
Unknown (m/z = 149, 59 (52), 43 (50), 164 (40)... 207 (25), 222? (3))	31.49	1556	1.46				Oxygenated sesquiterpene
$\beta$ -Vetivenene isomer II	32.01	1563	0.22	[0.22]	1807	20.88*	Sesquiterpene

Unknown (m/z = 202, 187 (75), 145 (56), 159 (41), 131 (48), 91 (38))	32.13	1565	0.58				Sesquiterpene
Khusimone	33.09	1577	2.10	1.48	2099	37.65	Norsesquiterp. ketone
Unknown (m/z = 187, 202 (69), 145 (28), 131 (23), 91 (20), 105 (20))	34.82	1600	1.03				Sesquiterpene
Unknown (m/z = 109, 81 (95), 161 (94), 43 (83), 204 (80))	35.37	1610	1.19				Sesquiterpene
Unknown (m/z = 81, 161 (92), 204 (79), 43 (78), 105 (66), 121 (64), 93 (63)... 222 (10))	35.42	1612	1.48				Oxygenated sesquiterpene
Unknown (m/z = 161, 179 (73), 119 (66), 91 (63), 105 (62), 123 (51)... 204 (46), 218 (6))	35.95	1624	0.71				Oxygenated sesquiterpene
$\alpha$ -Cadinol	37.16	1652	2.13	1.71	2118	38.28	Sesquiterp. alcohol
Cyclocopacamphan-12-ol (epimer A)	37.26	1655	0.48				Sesquiterp. alcohol
Cyclocopacamphan-12-ol (epimer B)	37.42	1658	0.91				Sesquiterp. alcohol
Unknown (m/z = 91, 105 (97), 107 (92), 93 (90), 79 (89), 119 (73), 161 (71)... 204 (42))	37.74	1666	1.07				Sesquiterpene
Zizanal	37.94*	1671	1.18				Sesquiterp. aldehyde
Zizanol	37.94*	1671	[1.18]				
Khusiol	38.27	1678	1.09				Sesquiterp. alcohol
Unknown (m/z = 187, 159 (98), 91 (79), 131 (73), 105 (73), 133 (54)... 202 (29), 220 (14))	38.61*	1686	1.71				Oxygenated sesquiterpene
Unknown (m/z = 189, 204 (88), 43 (76), 161 (75), 91 (61), 105 (58)... 220 (9))	38.61*	1686	[1.71]				Oxygenated sesquiterpene
Vetiselinol	39.61	1712	3.50	3.37	2297	42.96	Sesquiterp. alcohol
Khusimol	40.29	1733	4.25	11.30	2372	44.62*	Sesquiterp. alcohol
Unknown (m/z = 187, 91 (95), 105 (73), 220 (68), 119 (67), 41 (66), 121 (65))	40.35	1735	3.34	[11.30]	2372	44.62*	Oxygenated sesquiterpene
Isovalencenol	41.72	1777	9.16	10.15	2417	45.58	Sesquiterp. alcohol
Isovalencenol isomer	41.98	1786	1.56				Sesquiterp. alcohol

Unknown (m/z = 91, 105 (83), 161 (75), 218 (72), 119 (65), 203 (60), 77 (56), 79 (53), 176 (63), 93 (51))	42.25	1795	1.36				Oxygenated sesquiterpene
$\beta$ -Vetivone	42.55	1804	3.15	3.63	2342	43.98	Sesquiterp. ketone
Unknown (m/z = 91, 105 (89), 161 (83), 218 (74), 119 (66), 77 (55), 93 (54), 79 (51), 203 (49))	42.76	1812	1.25				Oxygenated sesquiterpene
$\alpha$ -Vetivone	43.22*	1828	10.39	[11.30]	2372	44.62*	Sesquiterp. ketone
Zizanoic acid	43.22*	1828	[10.39]	6.23	2881	54.15	Sesquiterp. acid
<b>Total identified</b>			<b>60.75%</b>	<b>55.78%</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 :** Green viscous liquid

**Refractive index :** 1.5240  $\pm$  0.0003 (20 °C)

#### CONCLUSION

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



