

This analysis was performed by Dr. Kevin Brigden while in the employment of Kobashi, 2 Fore street, Ide, Devon EX2 9RQ tel: +44(0)1392 217 628
 scott@kobashi.com copyright All Rights Reserved No copying without prior written permission.

Pk#	RT (min)	Area%				Component	CAS number
		Fra1	Fra2	Fra3	Fra4		
		<u>Maydi</u> grade1	<u>beyo</u> white	<u>Beyo</u> red	<u>Maydi</u> Grade 2		
1	2.81		0.03	0.15	0.06 Acetone	000067-64-1	HS
2	3.58				0.01 Isobutyraldehyde	000000-00-0	HS*
3	3.77			0.01	2-Butenal	004170-30-3	HS*
4	4.69		0.01	0.02	Butenol, methyl-	060766-00-9	HS*
5	5.50	0.01			0.02 Methylbutanone	000563-80-4	HS
6	6.24	0.01			0.02 C8H12 isomer		HS*
7	6.69	0.01			0.01 Cyclopentene, trimethyl-		HS*
8	7.15	0.01			0.01 C7H10 isomer		HS*
9	7.37		0.21	0.23	0.21 Toluene	000108-88-3	HS
10	7.51	0.02			0.03 C8H14 isomer		HS*
11	7.71		0.01	0.01	2-Octene (or isomer)	013389-42-9	HS*
12	7.96			0.01	Octene isomer		HS*
13	8.07				0.01 C9H14 isomer		HS*
14	8.55		trace	0.04	C5H8O isomer		HS*
15	8.64	0.03	0.01		0.07 Cyclopentene, tetramethyl-		HS*
16	8.90	0.03			0.03 Salvene, cis	033746-70-2	HS
17	9.18	0.01			0.02 Salvene, trans	033746-69-9	HS
18	9.94	0.01			0.01 C10H16 isomer		HS*
19	10.11			0.01	Isovaleric acid, isopropyl ester	032665-23-9	HS
20	10.20	0.03			0.03 C10H16 isomer		HS*
21	10.30		trace	0.01	C8H8, (Styrene ?)	000100-42-5	HS*
22	10.44		0.12	0.04	Hexene, methyl- (isomer unclear)		HS*
23	11.13	30.01	2.01	0.31	19.94 Thujene, alpha	002867-05-2	
24	11.43	51.48	46.03	7.01	56.58 Pinene, alpha	000080-56-8	
25	11.58	0.73	0.45		0.71 2,4(10)-Thujadiene	036262-09-6	*
26	11.79	0.46	0.41	0.11	0.57 Camphene	000079-92-5	
27	12.68	5.06	3.28	0.87	2.98 Sabinene	003387-41-5	
28	12.85	0.97	0.69	0.24	1.03 Pinene, beta	000127-91-3	
29	13.23	0.08	1.87	19.87	0.09 Myrcene	000123-35-3	
30	13.79	0.12			0.18 C10H16 isomer		*
31	14.08		18.94	7.91	Phellandrene.alpha.	000099-83-2	
32	14.38	0.19	0.29	0.10	0.18 Terpinene.alpha.	000096-86-5	
33	14.42	0.09			0.06 Cymene, ortho	000527-84-4	
34	14.83	1.58	3.52	2.06	2.37 Cymene, para	000099-87-6	
35	14.94	0.22	0.15	trace	0.53 1,8-Cineole	000470-82-6	
36	15.08		7.56	10.18	Limonene	000138-86-3	
37	15.27	0.02	0.01		0.03 Cymene isomer (meta?)		*
38	15.51		0.10	0.06	Ocimene, cis-.beta	027400-71-1	
39	15.64		0.11		Thujol	000000-00-0	*
40	16.08	0.31	0.25	0.08	0.29 Terpinene.gamma.	000099-85-4	
41	17.38	0.16	0.17	0.09	0.25 Terpinolene	000586-62-9	
					+ Cymenene, para	001195-32-0	*
42	17.70			0.18	Linalool	000078-70-6	*
43	17.91			0.11	Isopentyl isovalerate	000659-70-1	*
44	18.22	0.04	0.02		0.07 Thujone, cis-	000546-80-5	*
45	18.69			0.05	3-Octanyl acetate	004864-61-3	*
46	18.70	0.48	0.32		0.60 Thujone, trans	000471-15-8	*
47	18.87	0.09	0.07		0.14 Menthenol isomer		*
48	19.07		0.13	0.10	Ocimene.allo. (E,Z)	007216-56-0	

49	19.10	0.28	0.14		0.47	+ Campholenal .alpha.-	004501-58-0	
50	20.16		0.14		0.33	C10H16O isomer		*
51	20.96	0.74	0.51	0.02	1.21	p-mentha-1,5-dien-8-ol + overlap	001686-20-0	*
52	21.00			0.04		Ethyl benzoate	000093-89-0	*
53	21.07	0.02	0.02	0.02		Borneol	000507-70-0	
54	21.50	0.69	0.52	0.02	1.29	Terpinene-4-ol	000562-74-3	
55	21.74	0.21	0.15	0.04	0.32	Cymen-8-ol.para.	001197-01-9	
56	21.85		0.01	0.03		Cryptone + overlap	000500-02-7	*
57	22.07	0.49	0.46	0.09	0.61	Terpineol, alpha- + Myrtenol isomer ?	000098-55-5	*
58	22.33	0.16	0.12	0.03	0.29	Myrtenol	000515-00-4	
59	22.38	0.09	0.06		0.20	Myrtenal	000564-94-3	
60	22.48			0.11		C10H18O isomer		*
61	22.55		0.12			Phellandrene.alpha. Epoxide	072138-69-3	*
62	22.77		0.03			Piperitol isomer		*
63	22.87		0.01			Cymen-9-ol, para-	004371-50-0	*
64	22.97	0.20	0.15	0.03	0.66	Verbenone	000080-57-9	
65	23.23	0.12	0.10	0.05	0.23	Carveol, trans-	001197-07-5	
66	23.38	0.03	0.02		0.04	Isopropylphenol (meta?)		*
67	23.75	0.02	0.02	0.03	0.02	Carveol, cis-	002102-59-2	
68	24.27	0.04	0.03	0.02	0.07	Cumin aldehyde	000122-03-2	
69	24.42	0.02	0.03	0.04	0.04	Carvone	000099-49-0	
70	24.61	0.02	0.01		0.04	Carvotanacetone	000499-71-8	
71	24.92		0.01			Piperitone	000089-81-6	*
72	26.32	1.12	0.74	0.09	1.50	Bornyl acetate	000076-49-3	
73	26.41	0.05	0.03		0.06	Cymen-7-ol, para-	000536-60-7	*
74	26.50	0.02	0.03		0.04	Cymenol isomer ?		*
75	26.76	0.06	0.06	0.04	0.10	Carvacrol	000499-75-2	*
76	28.97	0.03			0.03	Carvomenthyl acetate	005256-66-6	*
77	29.11		0.10	0.59		Cubebene, alpha	017699-14-8	*
78	29.64	0.02	0.04	0.04	0.03	isomer of eugenol		*
79	29.96		0.04	0.16		Veratrole, 4-vinyl-	006380-23-0	*
80	30.13		0.01	0.05		C15H24 isomer		*
81	30.35		0.36	1.78		Copaene.alpha.-	003856-25-5	
82	30.76		0.04	0.13	0.08	Bourbonene.beta.	5208-59-3	*
83	30.89		0.12	0.83		Cubebene.beta.-	013744-15-5	*
84	30.97		0.24	1.14	0.04	Elemene, beta	000515-13-9	
85	31.82		0.04	0.25		Gurjunene.alpha.-	000489-40-7	
86	32.38		1.86	10.11		Caryophyllene.beta.	000087-44-5	
87	32.62		0.05	0.43		C15H24 isomer		*
88	32.92		0.02	0.09		Guaiene.alpha.-	003691-12-1	
89	33.13		0.01			C15H24 isomer		*
90	33.26		0.02	0.15		C15H24 isomer		*
91	33.52		0.05	0.27		C15H24 isomer		*
92	33.73		0.58	3.40		Humulene.alpha.	006753-98-6	
93	33.99		0.09	0.57		Alloaromadendrene	025246-27-9	
94	34.41		0.08	0.24		C15H24 isomer		*
95	34.53		0.22	1.32		C15H24 isomer		*
96	34.81		0.31	3.13		Germacrene-D	023986-74-5	*
97	35.04		0.18	1.30		Selinene.beta.	017066-67-0	*
98	35.12		0.04	0.15	0.02	Selinene isomer ?		*
99	35.28		0.22	1.57		C15H26O isomer		*
100	35.45		0.12	0.61		2 overlapping C15H24 isomers		*
101	36.15		0.32	2.38		C15H26O isomer		*
102	36.41		0.62	2.94	0.01	Cadinene, delta-	000483-76-1	
103	36.52		0.09	0.30		C15H24 isomer		*
104	36.77		0.05	0.48		Cadina-1,4-diene	029837-12-5	
105	36.96		0.02	0.17		C15H24 isomer		*

106	37.21	0.01	0.08	Calacorene.alpha.-	021391-99-1
107	37.35			0.01 Elemicin	000487-11-6 *
108	38.28	0.01	0.07	Palustrol	005986-49-2
109	38.90	0.13	0.41	Caryophyllene oxide	001139-30-6
110	39.21	0.02	0.13	Viridiflorol	000552-02-3
111	39.89	0.04	0.10	Humulene epoxide II	019888-34-7 *
112	39.93		0.76	isomer of gamma Eudesmol ?	*
113	40.01	0.02	0.11	Cubenol isomer ?	*
114	40.50	0.09	0.41	Cubenol, 1,10-di-epi-	073365-77-2 *
115	40.62		0.11	C15H26O isomer	*
116	40.96	0.17	1.56	Cadinol, epi-alpha-	011070-72-7 *
117	41.06	0.08	0.34	Cubenol isomer ?	039029-41-9 *
118	41.13	0.04	0.26	muurolol isomer ?	*
119	41.41	0.04	1.17	0.02 Eudesmol .beta.	000473-15-4 *
120	41.46	0.04	0.36	Eudesmol .alpha.	000473-16-5 *
121	42.22	0.01	0.10	C15H18 isomer	*
122	44.47	0.01		Has ms of .alpha.-phellandrene	*
123	45.34	0.01	0.02	Benzyl benzoate	000120-51-4
124	46.49	0.23	0.03	0.07 Has ms of .alpha.-phellandrene	*
125	46.95	0.06	0.02	0.01 Has ms of .alpha.-phellandrene	*
126	47.52	0.01		Has ms of .alpha.-phellandrene	*
127	47.84	0.06	0.02	0.01 Has ms of .alpha.-phellandrene	*
128	50.33	0.01	0.02	0.01 Has ms of .alpha.-phellandrene	*
129	50.64	0.01	0.02	Has ms of .alpha.-phellandrene	*
130	51.12	0.02	0.04	C30H32 isomer	*
131	51.49	0.03	0.51	C30H32 isomer	*
132	52.11	0.04	0.20	C30H32 isomer	*
133	52.60	0.02	0.17	C30H32 isomer	*
134	53.18	0.02		Manoyl oxide, or isomer	000596-84-9 *
135	58.15	0.40	1.53	unknown, may be incensole	022419-74-5 *

total % 96.69 97.86 93.69 94.98

HS - Head-space analysis (see notes)

* - Most likely match

Head space -

These results are from a separate head-space analysis.

The HS retention times (in bold) relate to that analysis, not the main analysis.

Due to the nature of the head-space analysis, there may be some error in the percentages quoted.

This analysis was performed by Dr. Kevin Brigden while in the employment of Kobashi, 2 Fore street, Ide, Devon EX2 9RQ tel: +44(0)1392 217 628

scott@kobashi.com copyright All Rights Reserved No copying without prior written permission.

Still not sure whether frankincense tears can be purchased without crosses of tears.

Consistency of gum composition must always vary to some degree.

Test have shown that slight variations in instrument settings will change percentage results and no two machines can give the exact same results.