KENYA STANDARD

CD/ 05-1279: 2013
ICS 67.120

Specification for natural beeswax

TECHNICAL COMMITTEE REPRESENTATION

The following organizations were represented on the Technical Committee:

National Beekeeping Station

Ministry of Livestock Development — Apiculture Division

National Museums of Kenya.

African Beekeepers Limited.

Honeycare Africa Limited.

Winnies Pure Health.

Desert Edge Limited

Maynard Farm.

Kenya Industrial Research& Development Institute

.

University of Nairobi – Department of Public Health, Pharmacology and Toxicology.

Technical University of Kenya.

Consumer Information Network.

Government Chemists Department.

Aimwise Global Ltd.

Egerton University-Department of Animal Sciences

Kenya Bureau of Standards — Secretariat

REVISION OF KENYA STANDARDS

In order to keep abreast of progress in industry, Kenya Standards shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Managing Director, Kenya Bureau of Standards, are welcome.

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FOREWORD

This Kenya Standard was developed by the Apiary and Apiary Products Technical Committee under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of Kenya Bureau of Standards.

Beeswax is obtained from honey combs after the removal of honey. Beeswax has many uses in industry, pharmacy and medicine. Some of the documented uses include making of adhesives, candles, cosmetics, electrical insulation, explosives, floor polishes, lubricants, pencils, pharmaceuticals, printing inks, shoe creams, varnishes in leather, moulding, paper and rubber industries.

During the preparation of this standard, reference was made to the following documents:

IS 1504-1996 Specification for beeswax (*Third Revision*).Amendment No. 1 June 2007

IS 4028-1977 Specification for beeswax, bleached, for cosmetic industry (*First Revision*).

ES 1203: 2005 Beeswax-Specification.

The United States Pharmacopoeia, USP XXII (1990), (1995-1996).

Summary report of JEFCA/70/SC- Joint FAO/WHO Expert Committee on Food Additives (residues of Veterinary Drugs 2010.

Acknowledgement is hereby made for the assistance derived from these sources.

KENYA STANDARD

SPECIFICATION FOR NATURAL BEESWAX

1. SCOPE

This Kenya Standard specifies the minimum requirements and methods of test for beeswax.

2. APPLICATION

This standard applies to all beeswax produced from honey combs (after removal of honey) and cappings that cover cells of honey combs derived from honey bee species *Apis mellifera.* It includes the various forms offered for direct use whether in crude, refined or bleached forms.

3. DEFINITIONS

For the purposes of this standard, the following definitions shall apply:

3.1 **beeswax** — Is a natural animal wax produced by *Apis mellifera* species of the honey bee. The wax is secreted by four pairs of glands located on the ventral side of the abdomen of worker bees. Bees use it to make cells and cappings for the purpose of storing honey pollen and rearing brood.

3.2 **crude beeswax** — The wax obtained from the honey combs after the removal of honey and after being subjected to a preliminary treatment, such as melting, scumming, decantation and moulding.

3.3 **refined beeswax** — The wax obtained after subjecting crude beeswax to further purification by melting (usually in hot water or steam) and finer filtration.

3.4 **bleached beeswax** — Refined beeswax which has been naturally bleached (solar) and finally filtered.

4. GENERAL REQUIREMENTS

4.1 **Colour and Aroma** — Beeswax shall have its characteristic colour and aroma. The colour of beeswax varies from whitish yellow to yellowish brown. The aroma of bees wax shall vary with method and/or degree of processing.

4.2 **Freedom from Foreign Matter** — Beeswax shall be free from inorganic or organic matter such as bees, brood, debris, sand or any other extraneous matter.

4.3 Beeswax shall be pure and unadulterated. It shall not be blended or contain any other waxes such as paraffin, microcrystalline or synthetic waxes nor shall it be mixed with any oil, fat or any other contaminant.

4.4 **Composition of Natural Beeswax** — Generally, beeswax consists of hydrocarbons (14 per cent), mono-esters (35 per cent), diesters (14 per cent), triesters (3 per cent), hydroxymonoester (4 per cent), hydroxy-polyesters (8 per cent), free acids (12 per cent), acid esters (1 per cent) acid polyesters (2 per cent), free alcohols (1 per cent) and unidentified substances including pigments and proprolis (6 per cent).

4.5 **Storage conditions-**Natural bees wax should be stored at room temperature away from direct sunlight and contaminants.

4.6 Beeswax shall also comply with the requirements given in Table 1.

5. PACKAGING AND LABELLING

5.1 **Packaging** — Beeswax shall be packed in greaseproof paper or any suitable material like polythene, jute or sisal bags.

5.2 **Labelling** — Each container of beeswax shall be suitably labelled to give the following information:

(i) name and address of manufacturer (or dealer);

(ii) name or type of wax;

(iii) net contents in appropriate SI units;

(iv) Country of origin or “made in Kenya”.

(v) Batch no. or Lot no.

(vi) Date of extraction.

TABLE 1. REQUIREMENTS FOR NATURAL BEESWAX

SL NO.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST (REF. APPENDIX)
(i)	Melting point (ºC)	62 - 65	A
(ii)	Specific gravity at 20°- 25 ºC	0.9500 - 0.9600	B
(iii)	Refractive index at 75 ºC	1.4398 -1.4455	C
(iv)	Saponification cloud point (ºC), max.	65	D
(v)	Acid value	17 - 24	E
(vi)	Ester-value	70 - 79	F
(vii)	Ester-acid ratio	3.0 -4.3	G
(viii)	Saponification value	88 - 102	H
(ix)	Iodine value, max.	10	J
(x)	Ash, % by mass, max.	0.6	K
(xi)	Fats, fatty acid, Japan wax and rosin	to pass test	L
(xii)	Hydrocarbons content	18 %	*
(xiii)	Parafin and other waxes	To pass test	M

* Method of test for hydrocarbon content is by column chromatography.

A P P E N D I X A

DETERMINATION OF MELTING POINT

A1. QUALITY OF REAGENTS

Unless specified otherwise, pure chemicals and distilled water shall be used in tests.

A2. APPARATUS

A2.1 **Thermometer** — With an accuracy of 0.1 ºC and graduated at every 0.1 ºC.

A2.2 **Test Tube** — With centrally bored cork to take thermometer and with a slit to permit air circulation.

A2.3 **Water Bath** — With a thermometer.

A3. PROCEDURE

A3.1 Melt the wax by warming it in water bath at a temperature just sufficient to melt it.

A3.2 Dip the thermometer and withdraw, so as to get the bulb thinly coated with wax.

A3.3 Insert the thermometer into the test tube through the bored cork and then place the test tube in the water bath.

A3.4 Rise the temperature gradually, at the rate of 1 ºC in 3 minutes. Note the temperature, accurately to 0.1 ºC, at which a transparent drop forms on the end of the thermometer bulb.

A3.5 Record this temperature as the melting point of the wax.

A P P E N D I X B

DETERMINATION OF SPECIFIC GRAVITY

B1. APPARATUS

B1.1 Water Bath — Maintained at 25 ºC ± 1 ºC.

B1.2 Specific Gravity Bottle — 25 mL capacity.

B2. REAGENTS

B2.1 Rectified Spirit

B3. PROCEDURE

B3.1 Melt approximately 2 g of the wax in a porcelain crucible at a temperature of about 100 ºC.

B3.2 Allow to cool at room temperature.

B3.3 Remove the solidified beeswax from the crucible, warming slightly if necessary.

B3.4 Attach a tared silk thread that will suspend the beeswax during weighing.

B3.5 Store the sample for 2 hours at a temperature of 25 ± 1 ºC.

B3.6 Determine the mass of the sample, first in air and then in rectified spirit maintained at 25 ± 1 ºC.

B3.7 Determine the specific gravity at 25 ºC/25 ºC of the rectified spirit by means of the specific gravity bottle.

B3.8 Calculation

$$\text{Specific gravity at } 25\ ^{o}C/25\ ^{o}C = \frac{M_1 d}{M_1 - M_2}$$

where,

M_1 = Mass in g of the material in air,

d = Specific gravity of rectified spirit, and

M_2 = Mass in g of the material in rectified spirit.

A P P E N D I X C

DETERMINATION OF REFRACTIVE INDEX

C1. APPARATUS

C1.1 Abbe' Refractometer

C2. PROCEDURE

C2.1 Set up the Abbe' refractometer so that reflected sunlight will strike the prisms. A slow stream of water at 80 ºC should be allowed to flow through the instrument.

C2.2 When the thermometer reading is 80 ºC, cover the surface of the lower prism with a drop or two of the melted wax.

C2.3 Rotate the alidade until the boarder line of illumination and shadow is visible. Adjust the compensator until the boarder line is sharp. With the alidade the boarder line should be brought to the intersection of the crossed lines.

C2.4 Read the index of refraction.

A P P E N D I X D

DETERMINATION OF SAPONIFICATION CLOUD POINT

D1. APPARATUS

D1. 1 Round Bottom Flask — 100 mL fitted with a ground glass joint.

D1.2 Thermometer

D1.3 Waterbath

D2. REAGENTS

D2.1 Potassium Hydroxide Solution — Prepared by dissolving 40 g of potassium hydroxide in about 1 000 mL of aldehyde-free alcohol maintained at room temperature.

D3. PROCEDURE

D3.1 Place 3 g of wax in a round-bottom, 100 mL boiling flask.

D3.2 Add 30 mL of potassium hydroxide solution (as in **D2.1**).

D3.3 Reflux the mixture gently for 2 hours

D3.4 Open the flask, insert a thermometer into the solution, and place the flask in a waterbath maintained at 80 ºC.

D3.5 The sample passes if the solution shows no cloudiness or globule formation at temperatures below 65 ºC.

A P P E N D I X E

DETERMINATION OF ACID VALUE

E1. PROCEDURE

E1.1 Accurately weigh 3 g of wax and place in a 200 mL flask.

E1.2 Add 25 mL of neutralized dehydrated alcohol and warm until melted.

E1.3 Shake the mixture and add 1 mL of phenolphthalein indicator solution.

E1.4 Tiltrate the warm liquid with 0.5 N alcoholic potassium hydroxide solution until a permanent, faint pink colour is obtained.

E2. CALCULATION

$$\text{Acid value} = \frac{56.1\ V\ N}{M}$$

where,

V = volume in mL of standard potassium hydroxide solution used,

N = normality of standard potassium hydroxide solution,

M = mass in g of the wax taken for the test.

A P P E N D I X F

DETERMINATION OF ESTER VALUE

F1. PROCEDURE

F1.1 To the solution resulting from the determination of acid value add mL of 0.5 N alcoholic potassium hydroxide and 50 mL of aldehyde-free alcohol.

F1.2 Reflux the mixture for 4 hours.

F1.3 Tiltrate the excess alkali with 0.5 N hydrochloric acid.

F1.4 Perform a blank determination.

F1.5 The difference between the volumes, in mL, of 0.5N hydrochloric acid consumed in the actual test and in the blank test, multiplied by 28.05 and divided by the weight in g of the specimen taken, is the ester value.

A P P E N D I X G

DETERMINATION OF ESTER-ACID RATIO

G1. OUTLINE OF METHOD

The ester-acid ratio or ratio number is the number obtained by dividing the ester value by the acid value.

G2. PROCEDURE

Calculation of results

$$\text{Ratio number} = \frac{\text{Ester value}}{\text{Acid value}}$$

A P P E N D I X H

DETERMINATION OF SAPONIFICATION VALUE

H1. OUTLINE OF THE METHOD

The wax is saponified by refluxing with a known excess of alcoholic potassium hydroxide solution. The alkali consumed for saponification is determined by tiltrating the excess alkali with standard acid.

H2. APPARATUS

H2.1 Conical Flasks — 250 mL to 300 mL made of alkali resistant glass.

H2.2 Reflux Air Condenser — At least 65 cm long.

H3. REAGENT

H3.1 Methyl Ethyl Ketone — Stored in a dark place.

H3. 2 Rectified Spirit — Neutral to phenolphthalein indicator.

H3. 3 Alcoholic Potassium Hydroxide Solution — Dissolve 30 g of potassium hydroxide in rectified spirit and make up to 1 litre. Allow to settle overnight in a dark place, decant the clear liquid and keep in a bottle closed tight with a cork or rubber stopper.

H3. 4 Phenolphthalein Indicator Solution — Same as **E1.4**

H3. 5 Standard Hydrochloric Acid — 0.5 N.

H4. PROCEDURE

H4. 1 Weigh accurately about 2 g of the wax in a tarred conical flask.

H4. 2 Add 25 mL of methyl ketone, followed by 25 mL of alcoholic potassium hydroxide solution.

H4. 3 Add a few pieces of pumice stone and connect the reflux air condensed to the flask.

H4.4 Heat the flask on a water-bath or electric hot-plate for about 2 hours.

H4.5 Boil steadily but gently.

H4.6 After the flask and condenser have cooled, wash down the inside of the condenser with about 10 mL of rectified spirit.

H4.7 Add about 1 mL of phenolphthalein indicator solution and tiltrate with standard hydrochloric acid.

H4.8 Carry out a blank determination at the same time.

H5. CALCULATION

$$\text{Saponification value} = \frac{56.1\,(B - S)N}{M}$$

where,

B = volume in mL of the standard hydrochloric acid. Required for the blank,

S = volume in mL of standard hydrochloric acid required for the wax,

N = normality of standard hydrochloric acid, and

M = mass in g of the wax taken for the test.

A P P E N D I X J

DETERMINATION OF IODINE VALUE (WIJS METHOD)

J1. PROCEDURE

J1.1 To a 500 mL iodine flask transfer an accurately weighed quantity, in g, of the substance to be tested about equal to that calculated by the formula 25/I, in which I is the Iodine Value, except that, for substances having iodine values not greater than 2.5, take about 10 g accurately weighed, for the test.

J1.2 Dissolve the test sample in 20 mL of carbon tetrachloride then add 25 mL of iodochloride. Insert the stopper securely in the vessel, and allow to stand at 25 ºC + 5 ºC for 30 minutes, protected from light, with occasional shaking.

J1.3 Add, in the order named, 20 mL of potassium iodide (150 g/L) tiltrate the liberated iodide with 0.1 N sodium thiosulfate, shaking thoroughly after each addition of thiosulfate.

J1.4 When iodide colour becomes quite pale, add 3 mL of starch and continue the tiltration with 0.1N sodium thiosulfate until the blue colour is discharged.

J1.5 Perform a blank test at the same time with the same quantities of the same reagents and in the same manner.

J1.6 The difference between the volume in mL, of 0.1 N sodium thiosulfate consumed by the blank test and the actual test, multiplied by 1.269 and divided by the weight in g of the sample taken, is the iodine value.

A P P E N D I X K

DETERMINATION OF ASH

K1. APPARATUS

K1.1 Platinum Dish — Having a capacity of 100 mL.

K2. PROCEDURE

K2.1 Heat the platinum dish to redness, cool to room temperature in a dessicator and weigh.

K2.2 Take about 5 g of the material in a watch-glass and weigh accurately.

K2.3 Transfer about three-quarters of this quantity to the platinum dish and heat on a Bunsen burner so that the material burns gently at the surface. When about half of the material is burnt away, stop heating, cool and add the remainder of the material.

K2.4 Weigh the watch-glass again an find, by difference, the exact mass of the sample transferred to the platinum dish.

K2.5 Heat again as before till the material is completely charred.

K2.6 Incinerate in a muffle furnace at 550 ºC to 650 ºC for 1 hour.

K2.7 Cool to room temperature in a dessicator and weigh.

K2.8 Repeat incineration, cooling and weighing until the difference between two successive weighing is less than one milligram.

K3. CALCULATION OF RESULTS

$$\text{Ash, per cent by mass} = \frac{100\, M_2}{M_1}$$

where,

M_2 = mass on g of the ash, and

M_1 = mass in g of the material taken for the test.

A P P E N D I X L

TEST FOR FATS, FATTY ACIDS, JAPAN WAX AND ROSIN

L1. REAGENT

L1.1 Sodium Hydroxide Solution — 3.5 N.

L1.2 Dilute Hydrochloric Acid — 1 N.

L2. PROCEDURE

L2.1 Boil 1 g of the wax for 30 minutes with 35 mL of 3.5 N sodium hydroxide contained in a 100 mL beaker maintaining the volume by the occasional addition of water.

L2.2 Allow the mixture to cool at room temperature for about 2 hours. The wax separates, leaving the liquid clear, turbid, or translucent but not opaque.

L2.3 Filter the cool mixture, and acidify the clear filtrate with dilute hydrochloric acid.

L2.4 The wax will have passed the test if the liquid remains clear or shows not more than a slight amount of turbidity or precipitate.

APPENDIX M
(NORMATIVE)

DETERMINATION OF PARAFIN WAXES AND OTHER WAXES

Test for paraffin and other waxes

M1 Apparatus

M1.1 Balance readable to 0.1g

M1.2

Conical flask

250 ml

M1.3 Reflux

condenser

M1.4 Water

bath or hot plate

M2

Reagents

M2.1 Alcoholic potassium hydroxide solution approximately 0.5 N, prepared by dissolving potassium hydroxide in 95 percent ethanol,

M2.2 *Ethanol 95%*

M3 Procecedure

M3.1 Weigh1.0 g of the material and place it in a conical flask fitted with a water-cooled reflux condenser. Add 10 ml of alcoholic potassium hydroxide solution. Boil under reflux for one hour. Detach the flask from the condenser, insert suitable thermometer into the liquid in the flask and allow to cool, stirring constantly.

M3.1.1 The material shall be taken to have passed the test if the following conditions are satisfied:

a)The the liquid does not become cloudy at a temperature higher than 61 ° C but becomes cloudy between 61° and 59°

b)Precipitation of large flocks occurs at not more than 2°C below the temperature at which the liquid becomes cloudy.

Example:

If the liquid becomes cloudy at 60℃, precipitation should take place at a

From ES 1203 : 1995