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Beeswax — Specification

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Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives established under Cap 327, of the Laws of Uganda, as amended. UNBS is mandated to co-ordinate the elaboration of standards and is

(a) a member of International Organisation for Standardisation (ISO) and

(b) a contact point for the WHO/FAO Codex Alimentarius Commission on Food Standards, and

(c) the National Enquiry Point on TBT Agreement of the World Trade Organisation (WTO).

The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of key stakeholders including government, academia, consumer groups, private sector and other interested parties.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

The committee responsible for this document is UNBS/TC 2 [*Food and Agriculture standards*], Subcommittee SC 6, [*Food Additives and contaminants*].

Introduction

Beeswax is a complex mixture of saturated and unsaturated linear and complex monoesters, hydrocarbons, free fatty acids, free fatty alcohols, and other minor substances secreted in form of scales by worker bees through their wax glands. It is extracted from honeycombs of either wild or domesticated bees after the removal of honey. The beeswax as obtained from the combs is called 'raw beeswax' and is progressively modified by physical treatment to yield crude and refined beeswax, and by chemical treatment to yield bleached beeswax.

Beeswax has many uses such as making adhesives, candles, cosmetics, electrical insulation, explosives, polishes, lubricants, pencils, pharmaceuticals, printing inks, shoe creams, varnishes and in leather. Additionally, it is used in the moulding, paper and rubber industries.

In the food industry, beeswax is used:

- as a glazing agent on confectionery, small products of fine bakery wares coated with chocolate, snacks, nuts and coffee beans;
- as a texturiser for chewing gum base;
- as a clouding agent;
- for the surface treatment only of fruits such as fresh citrus fruits, melons, apples, pears, peaches and pineapples; and
- as a carrier for food flavours and colours.

This Standard has been developed to ensure the safety and quality of beeswax produced and/or traded in the country.

Beeswax — Specification

1 Scope

This Draft Uganda Standard specifies requirements and methods of sampling and test for crude and refined beeswax.

2 Normative references

The following referenced documents are referred to in the text in such a way that some or all their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

AOAC 999.11, *Determination of Lead, Cadmium, Copper, Iron, and Zinc in Foods, Atomic Absorption Spectrophotometry after Dry Ashing*

US 277, *General standard for the labelling of food additives when sold as such*

US 641, *Code of practice for apiary management, handling and processing of bee products*

US 1659, *Materials in contact with food — Requirements for packaging materials*

US CAC/GL 50, *General guidelines on sampling*

FDUS ISO 760, *Determination of water — Karl Fischer Method (General method)*

US ISO 660, *Animal and vegetable fats and oils — Determination of acid value and acidity*

US ISO 3657, *Animal and vegetable fats and oils — Determination of saponification value*

US ISO 3961, *Animal and vegetable fats and oils — Determination of iodine value*

US ISO 6320, *Animal and vegetable fats and oils — Determination of refractive index*

US ISO 6321, *Animal and vegetable fats and oils — Determination of melting point in open capillary tubes (Slip point)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following address:

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
beeswax
the product obtained from the honeycombs of worker bees after the removal of honey

3.2
bleached beeswax
refined beeswax that has been bleached and finely filtered

3.3
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/or moulding

3.4
food grade material
material, made of substances which are safe and suitable for their intended use and which will not impart any toxic substance or undesirable odour or flavour to the product

3.5
refined beeswax
the wax obtained after subjecting crude beeswax to further purification by melting using hot water or steam followed by finer filtration

4 Types of beeswax

4.1 Beeswax shall be of the following two types:

a) Crude Beeswax

b) Refined Beeswax

5 Requirements

5.1 General requirements

The production of beeswax shall be in accordance with the relevant provisions of US 641.

Crude and refined beeswax shall:

i. be pure and unadulterated;

ii. be whitish yellow to yellowish brown in colour

iii. be very soluble in ether, sparingly soluble in alcohol and insoluble in water;

iv. not contain any other waxes such as paraffin, microcrystalline or synthetic waxes;

v. be free of inorganic or organic matter such as bees, brood, debris, sand or any other extraneous matter; and

vi. have a characteristic honey aroma.

5.2 Specific requirements

All crude and refined beeswax shall conform to the specific requirements given in Table 1.

Table 1 — Specific requirements for beeswax

S/N	Characteristic	Limits		Test method
		Crude	Refined	
i	Specific gravity at 25 °C	0.950 – 0.995	0.945 – 0.980	Annex A
ii	Refractive index at 75 °C	1.440 – 1.445	1.440 – 1.445	US ISO 6320
iii	Melting point, °C	58 – 64	59 – 66	US ISO 6321
iv	Acid value (mg KOH/g), max.	12	10	US ISO 660
v	Saponification value (mg KOH/g), max.	80	105	US ISO 3657
vi	Iodine value (mgI_2/g of product)	5.5 – 10.0	5.5 – 10.0	US ISO 3961
vii	Ash, %mm, max.	0.6	0.5	Annex B
viii	[1)] Sulphated ash, %mm, max.	0.006	0.005	Annex C
ix	Total volatile matter, %mm, max.	1.0	0.75	Annex D
xii	Paraffin and other waxes	To pass test		Annex E
[1)] Shall not contain any particles of gritty nature which are retained on a 425 µm IS sieve				

5 Contaminants

5.1 Heavy metals

The heavy metal contamination, expressed as Lead (Pb), shall not exceed 1 mg/kg when tested in accordance with AOAC 999.11.

5.2 Residues of pesticides and veterinary drugs

All beeswax shall conform to the Maximum residue limits for pesticides and veterinary drugs for foodstuffs of animal origin established by the Codex Alimentarius Commission.

6 Packaging

Beeswax shall be securely packaged in greaseproof paper or a suitable packaging made of food grade material, conforming to US 1659. The packaging shall preclude contamination from the external environment.

7 Weights and Measures

The weight of the packages shall comply with the Weights and Measures Regulations.

8 Labelling

In addition to the requirements of US 277, the products shall be legibly and indelibly labelled with the following:

i. The product name as “beeswax” showing the type; either crude or refined;

ii. The name and physical address of the producer/distributor.

iii. The conditions for storage;

iv. The net weight in metric units;

v. The date of packaging; and

vi. The best before date;

9 Sampling

Representative samples of the product shall be obtained following the procedure elaborated in Annex H.

Annex A
(normative)

Determination of specific gravity

A.1 Apparatus

A.1.1 **Water bath** — Maintained at 25 ºC ± 1 ºC.

A.1.2 **Specific gravity bottle** — 25-ml capacity.

A.2 Reagents

A.2.1 **Rectified Spirit** of specific gravity, d

A.3 Procedure

Melt 2 g of beeswax in a porcelain crucible at a temperature of about 100 ºC. Allow to cool at room temperature. Remove the solidified beeswax from the crucible, warming slightly if necessary. Attach a tared silk thread that will suspend the beeswax during weighing. Store the sample for 2 hours at a temperature of 25 ºC ± 1 ºC. Determine the mass of the sample, first in air (M_1) and then in rectified spirit maintained at 25 ± 1 ºC (M_2). Determine the specific gravity at 25 ºC of the rectified spirit by means of the specific gravity bottle.

A.4 Calculation

Specific gravity at 25 ºC = $\frac{M_1 d}{M_1 - M}$

where,

M_1 is the mass, in grams, of the sample in air;

d is the specific gravity of rectified spirit; and

M_2 is the mass, in grams, of the sample in rectified spirit.

Annex B
(normative)

Determination ash content

B.1 Apparatus

B.1.1 Platinum Dish — 100 ml capacity

B.2 Procedure

Heat the platinum dish to redness, cool to room temperature in a desiccator and weigh. Take about 5 g of the sample in a watch-glass and weigh accurately (M_1). Transfer about three-quarters of the weighed sample into the platinum dish and heat using a Bunsen burner so that the wax burns gently at the surface. When about half of the wax is burnt away, stop heating, cool and add the remainder of the sample. Weigh the watch-glass again and find, by difference, the exact mass of the sample transferred to the platinum dish. Heat again as before till the sample is completely charred. Incinerate in a muffle furnace at 550 ºC – 650 ºC for 1 hour. Cool to room temperature in a desiccator and weigh. Repeat incineration, cooling and weighing until the difference between two successive weighing is less than one milligram.

B.3 Calculation

Ash, percentage, mass by mass (%mm) = $\frac{100M2}{M1}$

where,

M_1 is the mass, in grams, of the sample analysed; and

M_2 is the mass, in grams, of the ash obtained.

Annex C
(normative)

Test for sulphated ash

C.1 Reagent

C.1.1 Sulphuric Acid – 10% (min)

C.2 Procedure

Accurately weigh about 5 g of the sample into a platinum dish and add 5 ml of sulphuric acid. Gently heat the dish until the sample is well carbonised, and then increase the heat until the evolution of sulphuric acid fumes ceases. Ash the carbonised matter in a muffle furnace at 550 °C ± 25 °C. Cool the ash and moisten it with 2 – 3 ml of sulphuric acid. Heat strongly until the evolution of sulphuric acid fumes ceases and finally ash in the muffle furnace at 550 °C ± 25 °C for 2 hours. Cool in a desiccator and weigh. Heat again in the muffle furnace for 30 minutes at 550 ± 25 °C. Cool in a desiccator and weigh. Repeat the process of heating in the muffle furnace for 30 minutes, cooling and weighing till the difference between two successive weighings is less than 1 mg. Record the lowest mass.

C.3 Calculation

Sulphated ash, percentage, mass by mass (%mm) = $\frac{100M1}{M2}$

where,

M_1 is the mass, in grams, of the ash, and

M_2 is the mass, in grams of the sample tested.

Annex D
(normative)

Test for total volatile matter

D.1 Apparatus

D.1.1 Air oven – maintained at 105 ºC

D.1.2 Analytical balance

D.1.3 Metal or aluminium dish

D.2 Procedure

Weigh accurately about 10 g of the material in a metal/aluminium dish, previously dried and weighed, and heat in an air oven at 105 ºC for 6 hours. Cool the dish in a desiccator and weigh with the lid on. Heat the dish again in the oven for 30 minutes. Repeat the process until the loss in mass between two successive weighings in less than one milligram. Record the lowest mass obtained.

D.3 Calculation

Total volatile matter, percentage, mass by mass (%mm) = $\frac{100(M1-M2)}{M1-M3}$

where,

M_1 is the mass, in grams, of the dish with the sample before heating;

M_2 is the mass, in grams, of the dish with sample after heating; and

M_3 is the mass, in grams, of the empty dish.

Annex E
(normative)

Test for paraffin and other waxes

E.1 Apparatus

E.1.1 Weigh scale – readable to 0.1 g

E.1.2 Conical flask – 250-ml capacity

E.1.3 Reflux condenser

E.1.4 Water bath or hot plate

E.2 Reagents

E.2.1 Alcoholic Potassium Hydroxide Solution approximately 0.5N, prepared by dissolving potassium hydroxide in 95 percent ethanol.

E.2.2 Ethanol, 95%

E.3 Procedure

Weigh 1.0 g of the sample 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 suitably a thermometer into the liquid in the flask and allow to cool, stirring constantly. The material shall be taken to have passed the test if the following conditions are satisfied:

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

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

Annex F
(normative)

Sampling and sample preparation

F.1 General requirements of sampling

In drawing, preparing, storing and handling samples, the following precautions and directions shall he observed.

a. Samples shall be taken in a protected place not exposed to damp air, dust or soot.

b. The sampling instruments shall be clean and dry.

c. The samples shall be placed in clean and dry glass containers. The sample containers shall be of such a size that they are almost completely filled by the sample.

d. Each container shall be sealed air-tight after sampling and marked with full details of the sample, such as; batch or code number, name of the manufacturer, and other important particulars of the consignment.

e. Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

F.2 Scale of sampling

F.2.1 Lot

All the containers in a single consignment of the same material drawn from a single batch of manufacture shall constitute a lot. If the consignment is declared to consist of different batches of manufacture, the batches shall be marked separately and the groups of containers in each batch shall constitute a separate lot.

F.2.1.1 Samples shall be tested for each lot for ascertaining the conformity of the material to the requirement of this specification.

F.2.1.2 The number of containers to be selected from the lot shall depend on the size of the lot and shall be in accordance with the sampling criteria given in Table 2.

F.2.1.3 The containers shall be selected at random from the lot and for this purpose a random number table shall be used. If such a table is not available, the following procedure shall be adopted:

Starting from any container in the lot, count them as I, 2, 3 up to r in a systematic manner, where r is equal to the integral part of N/n, N being the total number of containers in the lot and n the number of containers to be chosen (see Table 2). Every rth container thus counted shall be separated until the requisite number of containers is obtained from the lot to give samples for test.

F.3 Test and referee samples

F.3.1 Preparation of individual samples

Using suitable sampling instrument, draw equal quantities of the product from different parts of the container till 500 g of product is drawn and divide it into three equal parts. Each part of the three parts shall constitute an individual sample representing the container and shall be transferred immediately to thoroughly cleaned and dry containers, sealed air-tight and marked with particulars given under **F.1 d**. The individual sample so obtained shall be divided into three sets in such a way that each set has a sample representing each selected container. One of these shall be marked for the purchaser, another for the seller and the third for the referee.

F.3.2 Preparation of composite sample

From the product remaining after the individual sample has been taken from the selected containers, approximately equal quantities of the product shall be taken and mixed together so as to form a composite sample weighing 150 g. This composite sample shall be divided into three equal parts and transferred to clean and dry containers, sealed air-tight and labelled with particulars as given in **H.1 d**. One of these composite samples shall be for the purchaser, another for the vendor and the third for the referee.

F.3.3 Referee samples

Referee samples shall consist of a set of individual samples (F.3.1) and a composite sample (F.3.2) marked for this purpose and shall bear the seals of the purchaser and the seller. These shall be kept at an agreed place.

F.4 Number of tests

F.4.1 Tests for melting point, total volatile matter, ash and sulphated ash shall be conducted on each of the samples constituting a set of individual samples.

F.4.2 Tests for specific gravity, refractive index, acid value, saponification value and iodine value, matter insoluble in benzene and matter soluble in water shall be conducted on the composite sample.

F.5 Criteria for conformity

A lot shall be declared to have satisfied all the requirements of this specification when the test results on each of the individual samples and the composite samples satisfy the corresponding requirements given in Table 1.

Table 2: Number of containers to be selected for Sampling
(Clause F.2.1.2)

Lot size (N)	Number of containers to be selected (n)
Up to 25	3
26 – 100	4
101 – 500	5
501 – 1000	7
1001 and above	9

Bibliography

[1] ES 1203: 2005, Beeswax — Specification (First edition)

[2] EFSA (2007), Beeswax (E 901) as a glazing agent and as carrier for flavours

[3] ET 1504: 2005, Beeswax — Specification (First Revision)

[4] IS 1504: 1996 (Reaffirmed in 2008), Beeswax, Crude and refined — Specification (Third Revision)

[5] IS 4028 (1977), Beeswax, Bleached for Cosmetic Industry — Specification (First Revision)

[6] JECFA (2005) — Beeswax

Certification marking

Products that conform to Uganda standards may be marked with Uganda National Bureau of Standards (UNBS) Certification Mark shown in the figure below.

The use of the UNBS Certification Mark is governed by the Standards Act, and the Regulations made thereunder. This mark can be used only by those licensed under the certification mark scheme operated by the Uganda National Bureau of Standards and in conjunction with the relevant Uganda Standard. The presence of this mark on a product or in relation to a product is an assurance that the goods comply with the requirements of that standard under a system of supervision, control and testing in accordance with the certification mark scheme of the Uganda National Bureau of Standards. UNBS marked products are continually checked by UNBS for conformity to that standard.

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