DUS 2127

DRAFT UGANDA STANDARD

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2019-mm-dd

Food grade gelatin — 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*].

Food grade gelatin — Specification

1 Scope

This Draft Uganda Standard specifies requirements and methods of sampling and test for food grade gelatin, also known as edible gelatin.

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 923.03, *Ash of flour*

AOAC 942.05, Ash in Animal Feed

AOAC 952.13, *Arsenic in food. Silver diethyldithiocarbamate*

AOAC 999.11, *Determination of Lead, Cadmium, Copper, Iron, and Zinc in Foods*

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

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

US EAS 39, *Code of practice for hygiene in the food and drink manufacturing industry*

US ISO 1871, *Food and feed products — General guidelines for the determination of nitrogen by the Kjeldahl method*

US ISO 4831, Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of coliforms — Most probable number technique

US ISO 4832, Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coliforms — Colony-count technique

US ISO 4833-1, *Microbiology of the food chain – Horizontal method for the enumeration of microorganisms – Part 1: Colony count at 30 ºC by the pour plate technique*

US ISO 4833-2, *Microbiology of the food chain — Horizontal method for the enumeration of microorganisms — Part 2: Colony count at 30 degrees C by the surface plating technique*

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 addresses:

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

3.1
gelatin
a mixture of peptides and proteins produced by partial hydrolysis of collagen extracted from the hides or skins, bones, and connective tissues of animals permitted for food production in Uganda

3.2
food grade material
material, made of substances that are safe and suitable for their intended use and which will not impart any toxic substance or undesirable odour or flavour to the product

3.3
Foreign matter
any organic and inorganic materials such as hairs, bone fragments, stones, insects and insect fragments, etc.

4 Requirements

4.1 Product description

Food grade gelatin shall:

a) be in the form of sheets, flakes, shreds or coarse to fine powder;

b) be faint yellow or amber in colour, the shade varying in depth according to particle size; and

c) have a slight bouillon like odour.

4.2 General requirements

4.2.1 The product shall be produced in facilities conforming to US EAS 39. It shall be:

a) practically insoluble in cold water but shall swell -and soften when immersed in it, gradually absorbing water 5 to 10 times its own weight;

b) practically insoluble in 95 % ethanol, chloroform, Diethyl ether; and

c) soluble in hot water, 5N acetic acid, and a mixture of hot water and glycerine, forming a jelly on cooling.

4.2.2 When heated with soda lime, ammonia shall be evolved.

4.2.3 Free from foreign matter

4.3 Specific requirements

4.3.1 Physicochemical requirements

Food grade gelatin shall comply with the physicochemical requirements in Table 1 when tested in accordance with the test methods specified therein.

Table 1 — Physicochemical requirements for food grade gelatin

S/N	Characteristic	Requirement	Test method
i)	Loss on drying, %m/m, max.	18	Annex B
ii)	Total ash, %m/m, max.	2.0	AOAC 923.03 AOAC 942.05
iii)	Gel strength	To pass test	Annex C
iv)	Nitrogen, %m/m (dry basis), min.	15	US ISO 1871
v)	Precipitation	To pass test	Annex D
vi)	Sulphur dioxide, mg/kg, max.	40	Annex E

4.3.2 Microbiological requirements

Food grade gelatin shall comply with the microbiological limits specified in Table 2 when tested in accordance with the test methods specified therein.

Table 2 — Microbiological requirements for food grade gelatin

S/N	Characteristic	Requirement	Test method
i)	Total plate count, cfu/g, max.	1 000	US ISO 4833-1/ US ISO 4833-2
ii)	Total coliforms	10	US ISO 4831/ US ISO 4832
iii)	Escherichia coli, MPN/g, max.	Not detected	US ISO 7251
iv)	*Salmonella* spp., cfu/g, max.	Not detected	US ISO 6579-1/ US ISO/TS 6579-2

5 Contaminants

Food grade gelatin shall comply with the limits for heavy metal contaminants specified in Table 3 when tested in accordance with the test methods specified therein.

Table 3 — Limits for contaminants in food grade gelatin

S/N	Characteristic	Requirement mg/kg	Test method
i)	Lead (as Pb), mg/kg, max.	0.5	AOAC 999.11
ii)	Chromium, mg/kg, max	2.0	
ii)	Arsenic (as As), mg/kg, max.	0.5	AOAC 952.13

6 Residues of veterinary drugs

The product shall comply with limits for veterinary drug residues established by the Codex Alimentarius Commission.

7 Pesticide residues

The product shall comply with limits for pesticide residues established by the Codex Alimentarius Commission.

8 Packaging

Food grade gelatin shall be packaged in clean, sound food grade materials conforming to US 1659. The packaging shall be able to preclude contamination from the external environment.

9 Weights and Measures

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

10 Labelling

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

a) name of the product as: “Food grade gelatin” or “edible gelatin”;

b) Lot/batch identification;

c) date of manufacture;

d) best before date;

e) Name and address of the manufacture

f) instructions of use; and

g) storage instructions.

11 Sampling

Representative samples of the product shall be drawn in accordance with the procedure elaborated in Annex A.

Annex A
(normative)

Sampling

A.1 General requirements for sampling

A.1.1 In drawing, preparing, storing and handling test samples, the precautions and directions as given below shall be observed.

A.1.2 The samples shall be taken in a protected place not exposed to damp air, dust or soot.

A.1.3 Sampling shall be done using clean and dry equipment.

A.1.4 Precaution shall be taken to protect the sample, the product being sampled, the sampling instruments and the containers/bags for sampling from any form of contamination.

A.1.5 To draw a representative sample, the contents of each container selected for sampling shall be mixed as thoroughly as possible by suitable means prior to sampling.

A.1.6 The sample shall be placed and sealed in clean, dry, air-tight sample containers/bags inert to the sample.

A.1.7 Each container/bag sealed with a sample shall be marked with a clear sample identification code, the date of sampling and the product batch/lot.

A.1.8 The samples shall be stored following the product storage instructions prescribed by the manufacturer.

A.1.9 The sampling shall be done by an authorized person using appropriate sampling equipment; in the presence of the purchaser/ owner of the products/his (her) representative.

A.2 Scale of sampling

A.2.1 Lot — In any consignment, all products packaged during one production cycle shall constitute a lot.

A.2.2 The number (*n*) of packages to be selected from each lot shall depend on the lot size (*N*) and shall be obtained as indicated in Table A-2.

Table A-2 — Scale of sampling for food grade gelatin

Lot size ***N***	**Sample** ***n***
2 to 15	2
16 to 50	3
51 – 150	5
151 and above	8

A.2.3 The packages shall be randomly selected.

A.3 Test samples and Referee samples

A.3.1 Draw into a clean container, using an appropriate sampling instrument, small quantities of the product from different parts of each package selected according to Table A-2. Mix all the portions of product drawn thoroughly to form a composite sample weighing not less than 250 g.

A.3.2 Divide the composite sample into three equal parts to form test and referee samples. Each part thus obtained shall constitute the test sample weighing not less than 80 g which shall be sufficient to conduct all the tests. The test samples shall be immediately transferred to clean and dry sample containers/bags which shall be sealed air-tight.

A.3.3 The sealed containers/bags shall be marked with details described in A.1.7.

A.3.4 One sample shall be for owner of the product, the second for the supplier and the third shall constitute the referee sample to be used in case of disputes. The referee sample shall be stored at a place agreed to between the involved parties.

A.4 Criterion for conformity

A.4.1 The samples shall be evaluated against product description criteria in 4.1.

A.4.2 Samples shall be tested against the requirements specified in 4.2, 4.3, 5 and 6, and shall meet the limits specified limits therein.

A.4.3 Products shall be deemed to conform to the standard when the test samples conform to all the specifications in this standard.

Annex B
(normative)

Loss on drying

B.1 Requirements

B.1.1 Weighing bottle, with a stopper

B.1.2 Air oven

B.1.3 Desiccator

B.1.4 Weighing scale

B.2 Procedure

B.2.1 Sample preparation

Weigh 1 to 2 g of sample (M_1). Tare a glass-stoppered, shallow weighing bottle that has been dried for 30 minutes at 105 ºC and cooled in a desiccator. Transfer the sample into the bottle, replace the cover, and weigh the bottle and the sample (M_2). Distribute the sample as evenly as practicable to a depth of about 5 mm, and not over 10 mm.

B.2.2 Drying

Place the bottle with its contents in the drying chamber, removing the stopper and leaving it also in the chamber, and dry the sample at the 105 ºC for 2 hours. Upon opening the chamber, close the bottle promptly and allow it to come to room temperature in a desiccator. Weigh the cool bottle and its contents (M_3).

Calculate the loss on drying from the following equation:

$$\text{Loss on drying (\%m/m)} = \frac{M_2 - M_3}{M_1} \times 100$$

where:

M_1 is the mass of sample in grams;

M_2 is the mass of sample and weighing bottle in grams before drying; and

M_3 is the mass of sample and weighing bottle in grams after drying and cooling in a desiccator.

If the sample melts at a temperature lower than 105 ºC, prepare the sample as described above, then place it in a vacuum desiccator containing sulfuric acid. Evacuate the desiccator to 130 Pa (1 mm of mercury), maintain this vacuum for 24 h, and then weigh the dried sample. Calculate the loss on drying using the same equation above.

Annex C
(normative)

Determination of gel strength

C.1 Apparatus and reagents

C.1.1 Erlenmeyer flask

C.1.2 Analytical balance

C.1.3 Water-bath

C.1.4 Test tube

C.1.5 Ice-bath

C.1.6 Refrigerator

C.1.4 Distilled water

C.2 Procedure

Weigh accurately about 1 g of sample and add it to 99 ml of distilled water in a 200-ml Erlenmeyer flask. Allow the mixture to stand for 15 min. Place the flask in a water-bath at 60 ºC and swirl occasionally until the sample is completely dissolved.

Transfer 10 ml of the solution in the flask into a test tube and place the tube in an ice-bath, making certain that the top of the solution is below the level of the ice and water. Place the bath containing the tube in a refrigerator at O ºC for 6 hours.

When the tube is removed from the ice-bath and inverted, no movement of the gel shall be observed.

Annex D
(normative)

Test for precipitation

D.1 Reagents

D.1.1 Gelatin solution (1 in 100). Dissolve one gram of sample in distilled water

D.1.2 Trinitrophenol TS or Potassium bichromate solution (1 in 15).

D.1.3 Dilute hydrochloric acid

D.1.4 Mercuric nitrate solution

D.2 Procedure

D.2.1 To a solution of gelatin, add trinitrophenol TS or a solution of potassium bichromate previously mixed with about one-fourth its volume of dilute hydrochloric acid.

A yellow precipitate shall be formed.

D.2.2 To a solution of gelatin, add mercuric nitrate solution.

A white precipitate shall be formed which develops a brick red colour on warming.

Annex E
(normative)

Test for sulphur dioxide

E.1 General

Two methods are recommended for the determination of sulphur dioxide, both of which give consistent and accurate results. The first method is simpler and quicker while the second method is generally adopted in the food industry for arbitration purposes.

E.2 METHOD 1

E.2.1 Apparatus

E.2.1.1 Distillation Apparatus (Figure E.1) — it comprises a special round-bottom flask of 500-ml capacity, with a steam inlet and outlet connected to double surface condenser (Davies pattern or equivalent). The bottom of the condenser is connected by means of a glass adaptor to a 250-ml conical flask which acts as receiver. All connections are made by means of glass tubing passing through rubber bungs.

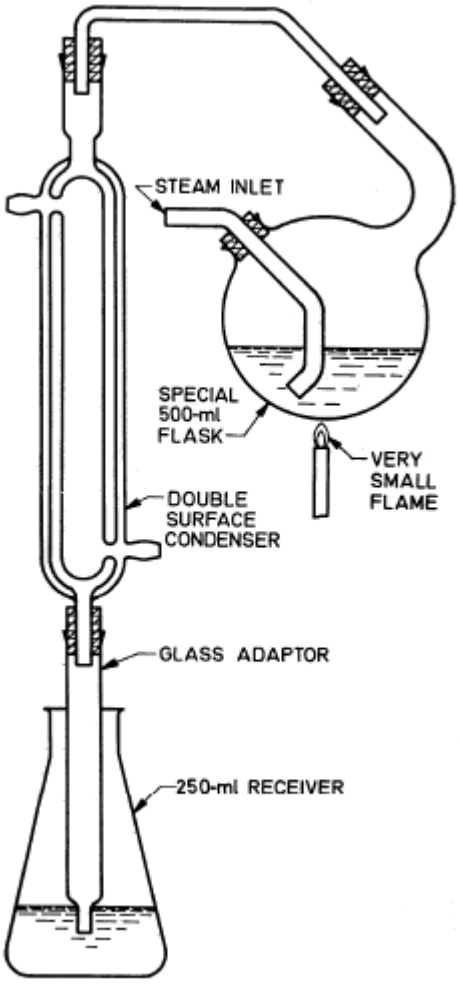

Figure E.1 — Apparatus for sulphur dioxide test in gelatin – Method 1

E.2.1.2 Burrette — preferably 10-ml, graduated in 0.05-ml divisions,

E.2.2 Reagents

E.2.2.1 Sulphuric acid solution — Dilute 50 ml of sulphuric acid (SP.GR. 1.84) to 250 ml with distilled water.

E.2.2.2 Hydrogen Peroxide — 10 volumes.

E.2.2.3 Sodium Hydroxide Solution — 0.05 N, accurately standardised.

E.2.2.4 Screened Methyl Red Indicator — Dissolve 0.05 g of methyl red and 0.033 g of methylene blue in 200 ml of ethanol.

E.2.3 Procedure

Place 75 ml of distilled water in the flask, introduce 20 g of powdered gelatin (W), followed by 25 ml of the sulphuric acid solution. Connect flask to the condenser. Place 20 ml of the hydrogen peroxide solution, neutralised to the end point of the indicator, in the receiver and arrange it so that the condenser adaptor dips into the liquid. Pass a current of steam for 10 min, collecting about 100 ml of distillate in this time. Titrate the distillate with the sodium hydroxide solution, using screened methyl red indicator until a green end-point.

NOTE: It is advisable to titrate in daylight.

E.2.4 Calculation

Sulphur dioxide, mg/kg = $\frac{0.16\mathrm{T}}{\mathrm{W}}$

where;

T = volume of 0.05 N sodium hydroxide solution required, in millilitres to reach green end-point and

W = mass in grams of powdered gelatin sample used.

E.3 METHOD 2

E.3.1 Apparatus

E.3.1.1 The apparatus is shown in Figure E.2 and comprises a round-bottom flask of 1500-ml capacity (preferably provided with two necks) fitted with a lead in tube, passing to within 1.3 cm of the bottom of the flask, connected to a supply of carbon dioxide, and with a reflux condenser. A tube from the upper end of the condenser passes to the bottom of a 250-ml conical flask which acts as a receiver and which is followed by two Wohler (Peligot) tubes. All connections are made by means of glass tubing passing through rubber bungs.

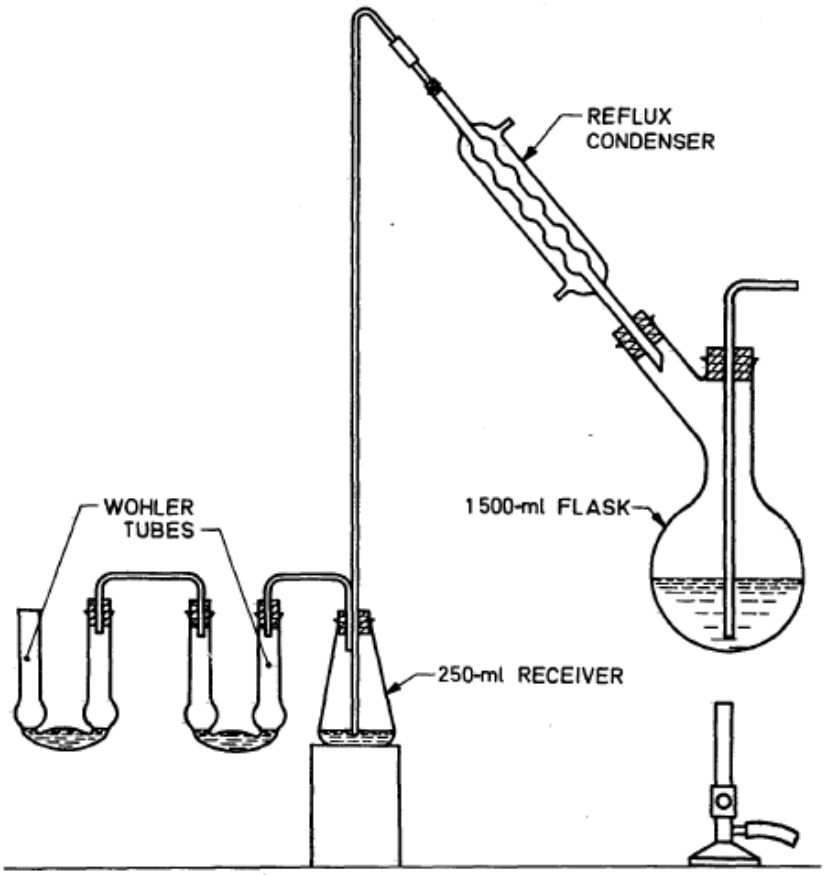

Figure E.2 — Apparatus for sulphur dioxide test in gelatin – Method 2

E.3.2 Reagents

E.3.2.1 Hydrogen peroxide — 3 percent neutral solution, free from sulphate.

E.3.2.2 Barium chloride — 10 percent solution.

E.3.2.3 Hydrochloric acid — 2 N solution.

E.3.2.4 Hydrochloric acid— concentrated (SP GR 1.1.8)

E.3.2.5 Carbon dioxide

E.3.2.6 Sodium hydroxide — 0.1 N solution, accurately standardised,

E.3.2.7 Bromophenol blue indicator — Dissolve 0.5 g of bromophenol blue in 7.5 ml of 0.1 N sodium hydroxide solution and dilute to 1000 ml with distilled water.

E.3.3 Procedure

Measure 10 ml of the hydrogen peroxide solution into the conical flask, add the same quantity into the first Wohler tube. In the second tube (which serves as a guard) place 5 ml of a mixture, of equal volumes of the hydrogen peroxide and barium chloride solutions, which has been slightly acidified with 2N hydrochloric acid solution.

Introduce 500 ml of distilled water and 20 ml of the concentrated hydrochloric acid into the round bottomed flask and boil for a short time in a current of carbon dioxide. Allow to cool, while continuing the flow of carbon dioxide, and add about 32 g, accurately weighed, of the powdered sample to the flask. For this purpose, momentarily remove the bung through which the lead-in tube passes. Heat gently until the gelatin is in solution and then boil for 1 hour, passing a slow current of carbon dioxide. Just before the end of the distillation, stop the flow of water through the condenser, to allow any sulphur dioxide, which is retained by the condensed moisture in the tube of the condenser to be driven over into the receiver, cooling the latter meanwhile by immersion in a vessel of water.

As soon as the exit from the condenser is hot to the touch at the point of entry into the receiver, disconnect from the condenser and wash down into the receiver with distilled water. Combine the contents of the first Wohler tube with the liquid in the conical flask, and titrate cold with the sodium hydroxide solution, using bromophenol blue indicator. The solution in the second Wohler tube should remain perfectly clear.

If any precipitate of barium sulphate is formed, the test should be repeated with an increased volume of hydrogen peroxide present in the conical flask and first tube.

E.3.4 Calculation

Sulphur dioxide, mg/kg = $\frac{0.32\mathrm{T}}{\mathrm{W}}$

where;

T = volume of 0.1 N sodium hydroxide solution in millilitres, required and

W = mass in grams of powdered gelatin sample used.

Hence, if exactly 32 g of sample are taken and sodium hydroxide solution is exactly 0.1 N 1 ml of sodium hydroxide solution = 100 ppm of SO_2

Bibliography

[1] IS 5719: 2005, Gelatin, food grade – Specification

[2]

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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