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Mayonnaise — Specification

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Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives (MTIC) 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 Technical Barriers to Trade (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 Technical Committee UNBS/TC 2, *Food and Agriculture*, Subcommittee SC 2, Edible Oil seeds, Fats and oils.

This second edition cancels and replaces the edition (US 51-1:2000), which has been technically revised.

This revision was undertaken to provide for microbiological requirements consistent with current technology and combine the standards of US 51-1:2000 Specification for mayonnaise - Part 1: Real mayonnaise and US 51-2:2000 Specification for mayonnaise - Part 2: Low fat mayonnaise into one standard.

Introduction

Mayonnaise is a condiment sauce obtained by emulsifying edible vegetable oil(s) in an aqueous phase consisting of vinegar or lemon juice, salt, sugar and spices to cater for the varying consumer preferences. The oil-in-water emulsion being produced by the poultry's egg yolk. The colour of mayonnaise varies from near white to pale yellow, and its texture from a light cream to a thick gel. Commercial egg-free alternatives are made for vegans and others who avoid poultry eggs or dietary cholesterol.

Mayonnaise is produced in a batch process by slowly adding the oil to the water phase under vigorous mixing; thereby creating an emulsion. The egg yolk material forms a thin layer around each minute globule of oil dispersed throughout the mayonnaise. Production techniques such as mixing/homogenization may have a considerable effect on the final product structure affecting the sensory properties of the final product.

The larger the quantity of yolks used in the manufacture of mayonnaise, the greater will be the stability of the product. It protects the mayonnaise from oil separation when it is subjected to shaking or jarring during transportation, or when it is subjected to summer heat or to freezing temperatures in the wintertime.

The yolk, therefore, is the frame structure of the mayonnaise, which keeps all its constituents intact and preserves the physical consistency of the product, its texture, smoothness and homogeneity. The yolk also modifies the individual taste and flavour of the other ingredients of the mayonnaise such as the oil, condiments and spices by keeping them in a finely dispersed and emulsified condition, thus effecting a perfect blend, which produces a pleasing sensation of taste and flavour.

The watery part of the emulsion carries the oil globules; each coated with its shell of egg yolk material and also serves to dissolve the sugar and salt and helps to suspend the spices used in the product. Due to a high oil content, mayonnaise exhibits a semisolid and viscoelastic behaviour that influences its particular rheological properties, which in turn contribute to the perceived texture and flavour of the product.

Due to the general desire by most populations to reduce their fat intake, the preference has drifted to low fat content foods. Substitution of fat in mayonnaise is conducted to create low fat mayonnaise. Some thickener material commonly able to increase texture of mayonnaise is used. Low fat mayonnaise is aimed at providing consumers with mayonnaise while enabling them to take less fat. Low fat mayonnaise is produced by decreasing the dispersed phase (oil) and increasing the aqueous phase. Using fat replacer is recommended to decrease the fat content.

This standard aims at providing manufacturers with the minimum guidelines on the quality of the product.

Mayonnaise — Specification

1 Scope

This Draft Uganda standard specifies the requirements, sampling and methods of test, for mayonnaise intended for human consumption.

2 Normative references

The following documents are referred to in the text in such a way that some or all of 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 942.17, *Arsenic in foods Molybdenum blue method*

AOAC 990.05, *Copper, iron, and nickel in edible oils and fats. Graphite furnace atomic absorption spectrophotometric method*

AOAC 994.02, *Determination of Lead (Pb) in Edible Oils and Fats by Graphite Furnace atomic absorption spectrometer-AAS*

AOAC 998.09 , *Salmonella in Foods; Colorimetric Polyclonal Enzyme Immunoassay Screening Method with Rappaport-Vassiliadis (R10) Broth and/or Tetrathionate Broth 3Mä TECRAä Sal mo nella Visual Immunoassay (VIA)*

AOAC 999.11, *Determination of lead, cadmium, copper, iron and zinc in foods. Atomic absorption spectrophotometry after dry ashing*

US CAC/RCP 15, *Code of hygienic practice for eggs and egg products*

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

US 28 EAS 39, *Code of practice for Hygiene in the Food and Drink Manufacturing Industry*

US EAS 12, *Potable water — Specification*

US EAS 16, *Plantation (mill) white sugar – Specification*

US EAS 35, *Fortified food grade salt – Specification*

US EAS 38, *Labelling of pre-packaged foods — General requirements*

US EAS 123, *Distilled water — Specification (2nd Edition)*

US EAS 147-1, *Vinegar - Specification Part 1: Vinegar from natural sources*

US EAS 147-2, *Vinegar - Specification Part 2: Vinegar from artificial sources*

US EAS 803, *Nutrition labelling – Requirements*

US EAS 804, *Claims on food – Requirements*

US EAS 805, *Use of nutrition and health claims – Requirements*

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

US ISO 661, *Animal and vegetable fats and oils — Preparation of test sample*

US ISO 663, *Animal and vegetable fats and oils — Determination of insoluble impurities content*

US ISO 676, *Spices and condiments — Botanical nomenclature*

US ISO 948, *Spices and condiments — sampling*

US ISO 1842, *Fruit and vegetable products — Determination of pH*

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

US ISO 5555, *Animal and vegetable fats and oils —Sampling*

US IS0 6888-1, *Microbiology of food and animal feeding stuffs -- Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) -- Part 1: Technique using Baird Parker agar medium*

US ISO 7251, *Microbiology of food and animal feeding stuffs - Horizontal method for the detection and enumeration of presumptive Escherichia coli - Most probable number technique*

US ISO 11290-1, *Microbiology of the food chain — Horizontal method for the detection and enumeration of Listeria monocytogenes and of Listeria spp. — Part 1: Detection method*

US ISO 16050, *Foodstuffs — Determination of aflatoxin B1, and the total content of aflatoxins B1, B2, G1 and G2 in cereals, nuts and derived products — High-performance liquid chromatographic method*

US ISO 21527-1, *Microbiology of food and animal feeding stuffs -- Horizontal method for the enumeration of yeasts and moulds -- Part 1: Colony count technique in products with water activity greater than 0.95*

ISO 6658, *Sensory analysis — Methodology — General guidance*

ISO 11035, *Sensory analysis — Methodology — Texture profile*

US 45, General Standard for Food Additives

US 168, *Edible oils and fats – Specification*

US 738, *General Standard for Contaminants and Toxins in Food and Feed*

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

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
mayonnaise
condiment sauce obtained by emulsifying edible vegetable oil(s) in an aqueous phase consisting of vinegar, the oil-in-water emulsion being produced by the hens' egg yolk.

3.2
emulsion
mixture of two or more liquids that are normally immiscible (unmixable or unblendable). It is to be used when both phases, dispersed and continuous, are liquids. One liquid (the dispersed phase) is dispersed in the other (the continuous phase)

3.3
emulsifier
substance that stabilizes an emulsion by increasing its kinetic stability. These compounds typically have a polar or hydrophilic (i.e. water-soluble) part and a non-polar (i.e. hydrophobic or lipophilic) part. Because of this, they tend to have more or less solubility either in water or in oil. The more soluble in water (and conversely, less soluble in oil) will generally form oil-in-water emulsions, while those that are more soluble in oil will form water-in-oil emulsions

3.4
texture
sensory perception of the structure of a food

3.5
phase inversion
phenomenon that occurs when agitated oil in water emulsion, reverts to a water in oil and vice versa

3.6
vinegar
liquid, fit for human consumption, produced exclusively from suitable products containing starch and/or sugars by the process of double fermentation, first alcoholic and then acetous

3.7
organoleptic
qualities (such as taste, colour, odour, and feel) of mayonnaise that stimulate the sense organs involving the use of the sense organs.

3.8
winterized oil
oil which has the higher-melting glycerides removed by slow cooling , filtration or centrifuging. So that the oil in the mayonnaise does not separate out when refrigerated.

3.9
low fat mayonnaise
produced by decreasing the dispersed phase (oil) and increasing the aqueous phase. Using fat replacer is recommended to decrease fat content

3.10
condiment
spice, sauce, or preparation that is added to food, typically after cooking, to impart a specific flavour, to enhance the flavour, or to complement the dish

4 Description

Mayonnaise is a condiment sauce obtained by emulsifying edible vegetable oil(s) in an aqueous phase consisting of vinegar, the oil-in-water emulsion being produced by the hens' egg yolk. Mayonnaise may also contain optional ingredients in accordance with 5.4. The egg York contains lecithin, a fat emulsifier that serves as a stabilizer between the two liquids

High quality mayonnaise has a firm texture and a small droplet size. Mayonnaise reaches a peak in texture and a minimum in droplet size during mixing. At longer mixing times the quality decreases and the mayonnaise becomes over-sheared. When the ingredients are cold and a high amount of egg yolk is used, mayonnaise with a high quality can be made.

Mayonnaise with an increased oil content has a firmer texture but is also more sensitive to over-shear. Full-fat mayonnaise contains around 65- 80% a no-go for many of today's nutrition focused consumers. The oil is dispersed in a water phase to form an oil-in-water (O/W) emulsion. A low viscosity characterizes phase inversed mayonnaise, or broken mayonnaise, which is close to the viscosity of oil resulting in a water-in-oil (W/O) emulsion.

Low or reduced-fat mayonnaise, on the other hand, is a growing market, with continually reducing oil content while maintaining similar product taste and texture. As the oil is present in levels of at least 30 to 60% by weight in light or low calorie mayonnaise, substantial reformulation is necessary in order to produce a mayonnaise product with less than 5% by weight vegetable oil.

5 Essential composition and quality criteria

5.1 General requirements

Mayonnaise shall meet the following characteristics:

a) the products, when stored under refrigeration, shall maintain their consistency;

b) the colour of full fat mayonnaise, shall be white or creamy, or even yellowish in accordance with ISO 6658;

c) the taste of mayonnaise shall be characteristic of mayonnaise in accordance with ISO 11035;

d) be free from animal fats and oils;

e) the texture of the product shall be semisolid, uniform, smooth and free from lumps due to poor manufacturing in accordance with ISO 11035;

f) be free from impurities and foreign materials, rancidity and any other foreign flavours in accordance with US ISO 663;

g) bubbles of oil shall be small and uniform in size and

h) egg white content shall not be more than 20% and the egg yolk shall not be less than 6% in accordance with US CAC/RCP 15

5.2 Raw materials

a) all ingredients shall be of sound quality and fit for human consumption and shall comply with the requirements of the relevant standards especially US EAS 147-1, US EAS 147-2 and US 168;

b) water used shall comply with the requirements laid down in US EAS 12 and US EAS 123;

c) eggs and egg products shall be from the poultry birds, unless otherwise specified;

d) ingredients added to impart a characterizing flavour to the products shall be used in quantities sufficient to influence significantly the organoleptic properties of the product;

e) the winterized oil shall be used. The phases of the oil shall not separate when placed in the refrigeration.

f) raw materials shall be stored, treated and handled under suitable conditions so as to maintain their chemical and microbiological characteristics in accordance with *US 28 EAS 39*

5.3 Compositional requirements

Mayonnaise shall comply with the following compositional requirement when tested with the specified test methods in Table 1.

Table 1 — Requirements for mayonnaise (real and low fat)

S/No.	Parameter	Requirement		Method of test
		Real	Low fat	
i)	Total fat content % by mass ,max	80	60	Annex A
ii)	pure egg yolk[1] % by mass, max	6	4	
iii)	Edible vegetable oil% (m/m), max	50		Annex A
1) Technically pure egg yolk means that 20 % of albumen is tolerated related to the egg yolk				

a) water in accordance with US EAS 12 and US EAS 123;

b) acidifying agents such as lemon juice or vinegar in accordance with US EAS 147-1, US EAS 147-2, US ISO 660 *and* US ISO 1842;

c) egg white; and

d) food grade salt in accordance with US EAS 35.

5.4 Optional ingredients

Food ingredients among others intended to influence significantly and in the desired fashion the physical and organoleptic characteristics of the product or as technologically may be considered;

a) sugars complying with US EAS 16;

b) condiments, spices, herbs in accordance with US ISO 948 and US ISO 676;

c) fruits and vegetables including fruit juice and vegetable juice in accordance with US ISO 676 and;

d) mustard: and

e) dairy products.

6 Food additives

Any additive used shall be in accordance with US 45

7 Contaminants

7.1 Heavy metals

Mayonnaise (real and low fat) shall comply with the limits for heavy metal contaminants in accordance with US 738 when tested with the specified test methods in Table 1.

Table 1 — Maximum level of metallic contaminants in mayonnaise

Contaminant	Maximum limit (mg/kg)	Method of test
Lead (Pb)	0.2	AOAC 994.02
Arsenic (As)	0.2	AOAC 942.17
Copper (Zn)	5	AOAC 990.05
Zinc (Zn)	5	ISO 9831
Iron (Fe)	15	AOAC 999.11
Sum of copper, zinc, and iron	20	

7.2 Pesticides residues

The products covered by the provisions of this standard shall comply with those maximum limits of pesticide residues established by Codex Alimentarius Commission

7.3 Mycotoxins

The level of mycotoxins in mayonnaise (real and low fat) shall not exceed those prescribed in Table 2

Table 2 — Mycotoxins levels in mayonnaise (real and low fat)

Mycotoxins	Maximum limit µg/kg	Test method
Aflatoxin B1 (AFB1)	5	ISO 16050
Total Aflatoxin (B1, B2, G1, G2)	10	

8. Hygiene

Mayonnaise shall be handled in accordance with US 28 EAS 39 and US CAC/RCP 15 and shall comply with the microbiological limits given in Table 3 when tested in accordance with the test methods specified there in.

Table 3 — Microbiological limits for mayonnaise

Type of micro-organism	Limits	Method of test
Total plate count, CFU/g, max	500	US ISO 4833-1
E. Coli, CFU/g, max	Absent	ISO 16649-2
Salmonella, 25 g, max.	Absent	AOAC 998.09
Staphylococcus aureus, CFU/g, max	Absent	IS0 6888-1
Yeast and moulds, CFU/g, max	< 100	US ISO 21527-1
Listeria monocytogenes count/25g	Absent	ISO 11290-1

9. Weights and measures

The weight of the package of the product shall comply with the Weights and Measures Act.

10 Packaging

Real mayonnaise shall be packaged in food grade packaging materials in accordance with US 1659.

11 Labelling

11.1 General

11.1.1 In addition to the requirements in US EAS 38, the following specific labelling requirements shall apply and shall be legibly and indelibly marked:

a) name of the product as “Real fat mayonnaise” and “Low fat mayonnaise”;

b) Net contents by weight (`System International') units;

c) name and physical address of processor/producer;

d) country of origin

e) lot/batch code number;

f) shelf life: best before/use by date;

g) statement ‘Food for Human Consumption’ shall appear on the package;

h) storage conditions and instructions as “Store in a cool dry place away from any contaminants’;

i) list of ingredients in descending order

11.1.2 When labelling non-retail packages, information for non-retail packages shall be given either on the packages or in enclosed documents, except that the name of the produce, lot identification and the name and address of the manufacturer or packer shall appear on the package.

11.2 Nutrition declaration

Any added essential nutrients declaration shall be labelled in accordance with US EAS 803, US EAS 804 and US EAS 805.

12 Sampling

Sampling and sample preparation for testing shall be carried out in accordance with ISO 5555, US CAC/GL 50 and ISO 661 respectively

Annex A
(normative)

Determination of oil

A.1 Pre-Extraction

As high fat levels can prevent effective hydrolysis; samples with 10 per cent content shall be preextracted with the same type of solvent as used in the final extraction.

A.1.1 Requirements

Usual laboratory apparatus

A.1.2 Procedure

A.1.2.1 Weigh in the sample with a precision of 1000 □ 2 mg. Load the glass thimble with 1 g celite and the sample. Do not cover with cotton

A.1.2.2 Fit adapters on the thimbles, by introducing them into the thimbles in such a way that the circlip is compressed progressively into the thimble, (i.e. the closed side of the circlip is pressed in first and then working towards the open side) and insert them into the Soxtec HT extraction unit

A.1.2.3 Add solvent and extract for 10 minutes in rinsing position

A.1.2.4 After the extraction, dry the extraction cups in an oven at 100 ºC for 30 minutes. Let them cool down and weigh them. Calculate percentage extracted fat. If the fat content is higher than 20 per cent, it is recommended to use a second extraction cup for the final extraction

A.1.2.1 Remove the thimble holders from the glass thimbles. Transfer the pre-extracted sample as quantitatively as possible from the glass thimble to a sample tube for acid hydrolysis. Proceed from step 2 of the hydrolysis part

A.2 Hydrolysis

A.2.1 Procedure

A.2.1.1 Weigh the samples with a precision of 1000 ± 2 mg and transfer them to the sample tubes

A.2.1.2 Add 1g to 2 g of celite and 100 mL to 120 mL of the acid solution to each sample tube. The level of the acid solution shall be over the top of the cover of the heaters

A.2.1.3 Insert the tubes into position in the 1047 hydrolyzing unit. Lower the suction tubes to the fume exhaust position by pulling the handle upwards. The Teflon part shall rest on the top of the sample tubes and suction tubes shall be about one centimetre down in the sample tubes

A.2.1.4 Place the glass thimbles into the thimble supports and insert them into the hydrolyzing unit

A.2.1.5 Start the water aspirator pump for the fume exhaust system. Open vacuum valves under each thimble. Adjust during boiling for low fume exhaust

A.2.1.6 Turn on the heater to maximum effect and place the reflector in front of the sample tubes. When the solution starts boiling, adjust to a gently boiling speed with the heater control

A.2.1.7 At the end of the hydrolyzing period, turn off the heater and remove the reflector

A.2.1.8 Open the cold-water tap for the condensers (approximately 2 L/min)

A.2.1.9 Pull down the suction tube handle. Dilute the acid solution in each tube with some 100 mL of 20 ºC to 25 ºC-distilled water. Close the vacuum valve under each thimble

A.2.1.10 Lower the suction tubes. Open the vacuum valve under one thimble and suck up the sample solution and as much as possible of the solid particles in the solution. Close the valve and repeat in the same way with the rest of the tubes

A.2.1.11 Wash each tube by opening the vacuum valve and spray 5 mL x 50 mL of approximately 50 ºC distilled water, by using the water sprayer

A.2.1.12 Raise the suction tubes and take out one of the sample tubes. Cover the cleaning rod with a thin layer of deflated cotton wool and wet it with acetone. Clean the inside of the tubes by gently pushing and pulling the cleaning rod up and down in the tube. Take a small piece of the cotton wool and clean the outside of the suction tube if necessary. Place each pad of the cotton wool on the top of the sample residue in the glass thimble

A.3 Drying

A.3.1 To make the wet sample residue hyophilic and achieve effective solvent extraction, the residue and thimble must be dried.

a) Alternative 1: Dry overnight at 60 ºC to 80 ºC in an oven

b) Alternative 2: Dry in a microwave oven with turntable at medium power for 30 min to 60 min

A.3.2 Most samples can be dried in a microwave oven, except meat and fish products.

A.4 Procedure for Solvent Extraction

A.4.1 Fit the adapters, as in A1.2.2, to each thimble and insert them into the Soxtec HT extraction unit.

A.4.2 Extract and analyse the samples according to the Soxtec HT extraction unit instructions (see Soxtec HT manual).

A.5 Calculation

A.5.1 Calculate the fat content according to the formula below.

$$per\ cent\ fat = \left(\frac{W_3 - W_2}{W_1}\right) \times 100$$

Where,

W_3 = the extraction cup weight after fat extraction and cooling in a desiccator;

W_2 = clean and pre-dried extraction cup and

W_1 = sample weight.

A.5.2 If a pre-extraction is required, using two extraction cups, add the two results that have been calculated, and the sum is the total fat in the sample.

$$per\ cent\ fat\ /oil\ = F_1\ +\ F_2$$

Where,

F_1 = fat content after pre-extraction and

F_2 = fat content in final extraction.

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