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**DRAFT TANZANIA STANDARD**

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**Baking powder — Specification**

Draft for Stakeholder's Comments P3

**TANZANIA BUREAU OF STANDARDS**

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## Baking powder — Specification

### 0. Foreword

Baking powder finds widespread use as a 'chemical leavener' of dough for baked products. The constituents of baking powder are (a) sodium bicarbonate, (b) edible starch, and (c) acid reacting component(s).

On wetting, the powder produces carbon dioxide by the reaction of the acid on sodium bicarbonate. The released carbon dioxide is entrapped in the batter or dough mix resulting in volume increase and lightened texture of baked goods.

The starch in baking powder improves the product's consistency and stability by absorbing moisture and thus prolonging its shelf life. By keeping the product dry, the starch prevents the powder's alkaline and acidic components from reacting with each other prematurely.

This standard has been developed to keep up with advancements of the baking powder industry and to ensure the safety and quality of the product traded in the markets in order to safeguard the health of the consumers.

In preparation of this Tanzania standard assistance is derived from the following publications;  
IS1159 Baking Powder – Specification published by Bureau of India Standards (BIS)  
US 571 Baking Powder – Specification published by the Uganda Bureau of Standards (UNBS)

In reporting the result of a test or analysis made in accordance with the Tanzania standard, if the final value observed or calculated is to be rounded off, it shall be done in accordance with TZS 4 (see clause 2)

Draft for Stakeholder's Comments P3

## 1 Scope

This Draft Tanzania Standard specifies the requirements and methods for sampling and test of baking powder.

## 2. Normative References

The following referenced documents are referred to in the text in such a way that some or all of their content constitute 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.

TZS 116, *Labelling of food additives when sold as such — General requirements*

TZS 507, *Sodium bicarbonate — Specification*

Codex 193, *General standard for contaminants and toxins in food and feed*

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

TZS 4, *Rounding off numerical values.*

TZS 538, *Labelling of pre-packaged foods — General requirements*

TZS 109, *Food processing units – Code of hygiene*

TZS 111, *Bakery and biscuit manufacturing units – Code of hygiene*

## 3 Terms and definitions

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

### 3.1 baking powder

Is a leavening agent prepared from an acid-reacting material and sodium or potassium bicarbonate with or without the addition of other ingredients for the purpose of producing a leavening effect during the baking process of a foodstuff.

### 3.2 edible starch

is a white, tasteless and odorless substance that is insoluble in cold water or alcohol.

### 3.3.chemical leavener

is a chemical substance, except baking powder, with or without the addition of other ingredients as specified in these regulations, which is capable of producing a leavening effect during the baking process of a foodstuff.

### 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

## 4. Requirements

### 4.1 General requirements

Baking powder shall be in the form of a free-flowing white powder, free from off odors, dirt, insect infestations, foreign matter and adulterants.

### 4.2 Ingredients

Baking powder shall contain the following ingredients:

- a) refined grade sodium bicarbonate conforming to TZS 507;
- b) edible starches such as maize starch and cassava starch
- c) One or a combination of the following acid reacting components:

sodium acid pyrophosphate with or without mono acid calcium phosphate;

mono acid calcium phosphate with or without dicalcium orthophosphate;

potassium hydrogen tartrate or tartaric acid or a mixture of both;

acid compounds of aluminium; and glucono delta lactone.

#### 4.2.2 Optional ingredients:

neutral material such as calcium lactate, anhydrous calcium sulphate and sodium sulphate

### 4.3 Specific requirements

#### 4.3.1 Physicochemical requirements

Baking powder shall comply with the physicochemical requirements in Table 1 when tested in accordance with the test methods specified therein.

**Table 1 — Physicochemical requirements for baking powder**

S/N	Characteristic	Requirement	Test method
i.	Available carbon dioxide, % (m/m), min.	12	Annex A
ii.	Moisture % (m/m), max.	2	ISO 760

### 5. Food additives

Only the food additives permitted by CODEX STAN 192 in the manufacture of baking powder may be used without exceeding the limits.

### 6. Hygiene

**6.1** Baking Powder shall be prepared and packaged in premises built and maintained under hygienic condition in accordance with TZS 109 and TZS 111.

**6.2** Baking powder shall be free from pathogenic organisms.

### 6.3 Contaminants

Baking powder shall comply with the maximum levels for the contaminants given in Table 2 when tested in accordance with the test methods specified therein.

**Table 2 — Permitted maximum levels of contaminants in baking powder**

S/N	Heavy metal	Requirement	Test method
i.	Lead (Pb), mg/kg, max.	1	AOAC 999.11
ii.	Copper (Cu), mg/kg, max.	2	AOAC 999.11
iii.	Arsenic (As), mg/kg, max.	0.05	AOAC 920.46 (B)

### 7. Sampling

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

### 8. Packaging, marking and labeling

8.1 The products shall be packaged in clean and airtight food grade materials.

#### 8.2 Marking and Labelling

8.2.1 In addition to the requirements of TZS 538 and TZS 116, the product packages shall be legibly and indelibly labelled with the following information:

- i) Name of the product as “Baking powder”
- ii) Name and physical address of the manufacturer,
- iii) Batch or code number,
- iv) Net weight, in grams (g) or kilograms (kg),
- v) List of ingredients in descending order of proportion,
- vi) Date of manufacture,
- vii) Expiry date,
- viii) Country of origin,
- ix) Storage instructions,
- x) Instructions of use (These could as well be on an accompanying leaflet)

**8.2.2** The language on the label shall be “Kiswahili” or Kiswahili and English. A second language may be used depending on the designated market.

**8.2.3** The packages of the buns may also be marked with the TBS certification mark.

NOTE - The TBS Standards Mark of Quality may be used by the manufacturers only under licence from TBS. Particulars of conditions under which the licences are granted, may be obtained from TBS.

## Annex A (normative)

### Determination of available carbon dioxide

#### A.1 Introduction

Two methods have been described. Any can be used depending on the available facilities.

#### A.1 Method One

##### A.1.1 Apparatus

Schroedter's alkalimeter, as shown in Figure 1

##### A.1.2 Reagent

Sulphuric acid

Distilled water (H<sub>2</sub>O)

##### A.1.3 Procedure

Fill bulb (A) with distilled water and bulb (B) with sulphuric acid to a height of 25 mm above port (C) through which carbon dioxide escapes into the acid. Weigh the alkalimeter (*M*). Introduce 1 g of sample through side opening (D) into the decomposition flask (E). Weigh the alkalimeter again (*M*<sub>2</sub>). Open the stopcock (F) and allow about 25 ml of distilled water to flow into (E). Allow the initial vigorous reaction to subside. Place the apparatus over a flame and boil the solution for about 3 minutes. Aspirate carbon dioxide free air through the solution by applying suction at G, the air first passing through soda lime. Weigh the alkalimeter again (*M*<sub>1</sub>).

Figure 1: Schroedter's alkalimeter

Draft for Stakeholder's Comments P3

### A.1.4 Calculation

Available carbon dioxide, percent by mass =

$$\frac{100 (M_2 - M_1)}{M_2 - M}$$

where

$M_2$  is the mass, in grams, of alkalimeter with sample, before decomposition;

$M_1$  is the mass, in grams, of alkalimeter with sample, after decomposition; and

$M$  is the mass, in grams, of alkalimeter before introducing the sample.

## A.2 Method Two

### A.2.1 Apparatus

Gasometric assembly, as shown in Figure 2.

Extraction flask

The apparatus consists of a 250 ml, wide mouthed extraction flask (A) made of heat resistant glass connected by a short bent glass tube to a rubber tube (B). B is connected by a two-way stopcock (C) to a gas measuring tube (D) graduated in millilitres; the zero mark at the point just below the top and graduated up to 500 ml. Additionally connected to flask A is a 40 ml burette (H) graduated in millimetres. The gas measuring tube is connected to a levelling tube (F) through a rubber tube (E) having a pinchcock (P) to control the flow of the solution.

### Figure 2 — Gasometric assembly

### A.2.2 Reagent

Distilled water sodium chloride or sodium sulphate sodium bicarbonate 0.5 % methyl orange sulphuric acid or hydrochloric acid

### A.2.3 Procedure

Preparation of solution for gas measuring

Displacement solution — Dissolve 100 g of sodium chloride or sodium sulphate in 350 ml of distilled water. Accurately add 1 g of sodium bicarbonate (conforming to TGS 507) and 2 ml methyl orange (0.5% aqueous solution) and then enough sulphuric acid or hydrochloric acid to turn the solution acidic (solution turns to pale pink). Stir until all the released carbon dioxide is removed.

This solution is used in the gas measuring tube and the levelling bulb and seldom needs correction.

Accurately weigh 2.5 g of the sample into flask (A). Using the two-way stopcock (C), connect the gas measuring tube (D) and levelling tube (F) to the atmosphere and through a funnel on the open end of tube F, fill both tubes with displacement solution up to the zero mark of tube D. Connect the decomposition flask A with rubber tube B and turn the stopcock so that the gas measuring tube is connected to flask A and disconnected from the atmosphere. Fill burette (H) with distilled water up to the 40 ml mark and let the apparatus stand for 1 to 2 minutes so that the temperature and pressure within the apparatus comes to room conditions. Open pinchcock and bring down the solution level in tube F to reduce pressure within the apparatus. Collect the displaced solution in a glass beaker and reserve for re-use later. Slowly add 35 ml of distilled water to decomposition flask, from burette H.



To allow uniform mixing of contents and complete evolution of CO<sub>2</sub>, occasionally rotate the decomposition flask by swirling and boil the flask and its contents over a tripod stand using a Bunsen burner. To prevent overflowing of displacement solution in levelling tube, fill to a level lower than the overflow capacity. When the mixture in flask A foams up and the foam reaches the neck of the flask, stop heating and quickly immerse the decomposition flask in cold tap water kept in a tray below. Also pour water over the decomposition flask while rotating it to bring the contents to the temperature of water in the tray. When this happens wait for 5 minutes to secure equilibrium. Equalize pressure in the measuring tube by pouring solution in levelling tube, using the pinchcock P if necessary and read the volume *V* in the measuring tube.

#### A.2.4 Calculation

Deduct from this volume *V*, the volume of distilled water added (35 ml) to get the correct volume of CO<sub>2</sub> evolved after decomposition at atmospheric temperature and pressure.

The volume of CO<sub>2</sub> evolved, in millilitres, at normal temperature and pressure shall be calculated as follows:

where

$$V_2 = \frac{T_2 \times P_1 V_1}{P_2 \times T_1}$$

*V*<sub>2</sub> is the volume of CO<sub>2</sub>, calculated at normal temperature and pressure; *T*<sub>2</sub> is the normal temperature (273 °K or 0 °C);

*P*<sub>2</sub> is the normal pressure (760 mm);

*P*<sub>1</sub> is the corrected barometric pressure at temperature *T*<sub>1</sub>;

*V*<sub>1</sub> is the *V* - 35 ml = corrected volume of CO<sub>2</sub> evolved after decomposition;

and *T*<sub>1</sub> is the observed temperature of displacement solution.

One gram mole (44 g) of carbon dioxide, at NTP will occupy 22 400 ml, that is, 22 400 ml of CO<sub>2</sub> at NTP, weigh 44 g.

*V*<sub>2</sub> ml CO<sub>2</sub> a obtained from 2.5 g of baking powder NTP will weigh, in grams:

$$\frac{V_2 \times 44}{22400 \quad 1}$$

Therefore, available carbon dioxide, percent by mass =  $100 \times \frac{V}{2} \times \frac{44}{44} = 40 \times \frac{V}{2} \times \frac{44}{44}$

**Annex B**  
(normative)

**Sampling of baking soda**

**B.1 General requirements of sampling**

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

- The product shall be kept in a protected place not exposed to damp air, dust or soot.
- The sampling instrument shall be clean and dry when used.
- Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from contamination.
- The samples shall be placed in clean, odourless and dry glass containers. The sample containers shall be of such size that they are almost completely filled by the sample.
- Batch containers shall be sealed airtight after filling and marked with full details of sampling, batch or code number, name of the manufacturer and other important particulars of the consignment.
- Samples shall be stored following the product storage conditions prescribed by the manufacturer.
- Sampling shall be done by a qualified and authorised person.

**B.2 Scale of sampling**

The number of containers to be tested from a lot shall depend on the size of the lot and shall be in accordance with Table 2.

**Table 2 — Number of containers to be selected for sampling**

<b>Total Number of containers in the lot (<i>N</i>)</b>	<b>Number of containers to be selected (<i>n</i>)</b>
Up to 50	3
51 to 100	4
101 to 300	5
301 to 500	6
501 and above	7

### **B.3 Random sampling**

Sampling shall be done randomly from the lot and random number tables shall be used. In case such tables are not available, the following procedure may be adopted:

Starting from any container, count them as 1, 2, 3, .....r and so on, in one order. Every  $r^{\text{th}}$  container counted shall be chosen,  $r$  being the integral part of  $N/n$ , where  $N$  is the total number of containers in the lot and  $n$  the number of samples to be selected as shown in Table 2.

### **B.4 Test samples and referee samples**

#### **B.4.1 Preparation of individual samples**

Empty the container on a clean sheet of paper and mix thoroughly. Cone and quarter as often as necessary till about 75 g of the material is left. From this, take about 15 g of the material and divide it into three equal parts. Each part so obtained shall constitute an individual sample representing the container and shall be transferred immediately with particulars given in B.1 (e). The individual samples obtained shall be divided into three sets in such a way that each set has a sample representing each selected container. One of these sets shall be marked for the purchaser, the other for the vendor and the third being the referee sample.

#### **B.4.2 Preparation of a composite sample**

Equal quantities of the product shall be taken the containers from where the individual samples were obtained and mixed together to obtain a composite sample weighing not less than 160 g. This composite sample shall be divided into three equal parts and transferred to clean dry glass containers and labelled with the particulars given in B.1 (e). One of these composite samples shall be marked for the purchaser, the other for the vendor and the third being a referee sample.

#### **B.4.3 Referee samples**

Referee samples shall consist of a set of individual samples (B.4.1) and a composite sample (B.4.2) marked for this purpose and shall bear the seals of the purchaser and the vendor. These shall be kept at a place agreed to between the two.

### **B.5 Number of tests**

Tests for requirements given in 5.1 and 5.2.1 (Table 1) shall be conducted on each set of individual samples.

Tests for contaminants (Table 2) shall be conducted on the composite sample (B.4.2).

### **B.6 Criteria for conformity**

The lot shall be declared to be in conformity with all the requirements of this specification, if it has been found satisfactory in accordance with B.5.

**Bibliography**

IS 1159 (1981) (Reaffirmed in 2010) — Specification for baking powder (First Revision)

US 571: 2006, Baking powder — Specification

KS 346: 2000, Specification for baking powder (First Revision)

Draft for Stakeholder's Comments P3

Draft for Stakeholder's Comments P3

Draft for Stakeholder's Comments P3