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Draft Tanzania Standard

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**Fertilizers – Method for determination of free acidity**

DRAFT FOR STAKEHOLDERS' COMMENTS ONLY

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**TANZANIA BUREAU OF STANDARD**

## 0 FOREWORD

Depending on the constituents of the manufactured fertilizers, some of the free acidity remains unreacted during the process of manufacture. The process also depends up on the concentration of acids used for the manufacture of this material. The free acids determined by the methods prescribed in this standard also has some corrosive effects on the container or bag.

In reporting the results of a test or analysis made in accordance with this standard, if the final value observed or calculated, is to be rounded off, it shall be done in accordance with TZS 4.

For the purpose of this standard only analytical grade reagents and distilled water shall be used.

## 1 SCOPE

This Tanzania standard prescribes the methods for determination of various forms of free acidity in fertilizers.

## 2 REFERENCE

The following referenced documents are indispensable for the application 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 4 Rounding off numerical values

AFDC 10 (4589) P<sub>3</sub> Fertilizers and Soil Conditioners – Vocabulary

TZS 159 Fertilizer - Methods of sampling

## 3 SAMPLING

The sample shall be drawn in accordance with TZS 159

## PART 1: DETERMINATION OF FREE ACIDITY as H<sub>2</sub>SO<sub>4</sub>

### REAGENT

- 1 Standard sodium hydroxide solution – 0.02 N
- 2 Methyl red-methylene blue mixed indicator solution – prepared by mixing equal volumes of 0.2% solution in rectified spirit of methyl red and 0.1% solution in rectified spirit of methylene blue.

### PROCEDURE

- 1 Dissolve 20g of the sample in about 50mL of cold neutral water.
- 2 Filter and make up the volume to about 200mL. The filtering media shall be neutral and shall not contain any alkaline material which would neutralize the free acidity.
- 3 Titrate the solution with standard NaOH solution using one or two drops of methyl red-methylene blue mixed indicator and a microburette.

**CALCULATION**

$$\text{Free sulphuric acid (as H}_2\text{SO}_4) = \frac{4.904 \times N \times V}{W}$$

% by mass

Where;

N = Normality of standard NaOH solution

V = Volume in milliliter (mL) of standard NaOH solution

W = Weight in gram (g) of sample taken for the test

**PART 2: DETERMINATION OF FREE ACIDITY as HNO<sub>3</sub>****REAGENT**

- 1 Standard sodium hydroxide solution – 0.02 N
- 2 Methyl red-methylene blue indicator solution – prepared by mixing equal volumes of 0.2% methyl red solution in alcohol and 0.1% methyl blue solution in alcohol

**PROCEDURE**

- 1 Dissolve 10g of the sample in 100mL of neutral water at room temperature in a beaker or conical flask.
- 2 Filter and add 2-3 drops of indicator solution
- 3 Titrate the solution with standard NaOH solution until the colour changes from violet to green

**CALCULATION**

$$\text{Free Nitric acid (as H)(HNO}_3) = \frac{4.904 \times N \times V}{W}$$

% by mass

Where;

N = Normality of standard NaOH solution

V = Volume in milliliter (mL) of standard NaOH solution

W = Weight in gram (g) of sample taken for the test

**PART 3: DETERMINATION OF FREE ACIDITY as P<sub>2</sub>O<sub>5</sub>****REAGENT**

- 1 Acetone
- 2 Standard sodium hydroxide solution – 0.1 N
- 3 Bromo cresol green indicator solution – Dissolve 0.1g bromocresol green in 100mL of rectified spirit

**PROCEDURE**

- 1 Weigh accurately about 2.5g of the prepared sample in a 250mL Erlenmeyer flask
- 2 Add 100mL neutral acetone. Shake for one hour.
- 3 Filter rapidly through whatman filter paper No.1 in to 250ml Erlenmeyer flask. Wash four times with 10mL portion of acetone
- 4 Evaporate acetone as far as possible
- 5 Add about 50mL water and drops of bromocresol green indicator
- 6 Titrate with standard NaOH solution, until the colour changes from yellow to blue

**CALCULATION**

$$\text{Free phosphoric acid (as P}_2\text{O}_5) = \frac{7.1 \times N \times V}{W}$$

% by mass

Where;

N = Normality of standard NaOH solution

V = Volume in milliliter (mL) of standard NaOH solution

W = mass in gram (g) of sample taken for the test