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AMMONIUM SULPHATE (FERTILIZER GRADE) — SPECIFICATION

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Ammonium sulphate (fertilizer grade) — Specification

1 Scope

This African Standard specifies the requirements, method of sampling and test methods for ammonium sulphate fertilisers.

2 Normative references

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.

EN 12048, *Solid fertilizers and liming materials — Determination of moisture content — Gravimetric method by drying at 105 ± 2 °C*

ISO 7409, *Fertilizers — Marking — Presentation and declarations*

ISO 8157, *Fertilizers and soil conditioners — Vocabulary*

ISO 8397, *Solid fertilizers and soil conditioners — Test sieving*

ISO 10084, *Solid fertilizers — Determination of mineral-acid-soluble sulfate content — Gravimetric method*

ISO 14820-1, *Fertilizers and liming materials — Sampling and sample preparation — Part 1: Sampling*

ISO 14820-2, *Fertilizers and liming materials — Sampling and sample preparation — Part 2: Sample preparation*

ISO 17318, *Fertilizers and soil conditioners — Determination of arsenic, cadmium, chromium, lead and mercury contents*

ISO 25475, *Fertilizers — Determination of ammoniacal nitrogen*

3 Definitions and abbreviations

For the purpose of this standard the, the terms and definitions in ISO 8157 apply.

4 Requirements

4.1 General

Ammonium sulphate fertiliser shall be in the form of white colour crystals or granules. It shall be soluble in water. The product shall be free flowing and free from all visible impurities.

4.2 Chemical requirements

Ammonium sulphate fertiliser shall comply with the requirements in Table 1.

Table 1 — Chemical requirements for ammonium sulphate fertilizer

Characteristic	Requirement	Method of test
Ammoniacal nitrogen, as N ₂ , % m/m, minimum	20.6	ISO 25475
pH value (10% m/v)	To be declared	Annex A
Free acidity, as H ₂ SO ₄ , maximum	0.05	Annex B
Moisture at 105 °C, % m/m, maximum	1.0	EN 12048
Total sulphur, S, max	24	ISO 10084

4.3 Heavy metals

Heavy metal contaminants if present should not exceed the level in Table 2

Table 2 — Heavy metal contaminants limits

Parameter	Limit (mg/kg)	Test method
Arsenic, As, max	10	ISO 17318
Cadmium, Cd, max	15	ISO 17318
Mercury, Hg, max	0.1	ISO 17318
Lead, Pb, max	10	ISO 17318
Chromium, Cr, max	50	ISO 17318

5 Sampling

Sampling shall be carried out in accordance with ISO 14820-1.

6 Tests

6.1 Methods of test

Samples of ammonium sulphate fertilizer shall be prepared in accordance with ISO 14820-2 and tested in accordance with the methods of test indicated in Table 1 and Table 2.

6.2 Inspection

Ammonium sulphate fertiliser shall be inspected for conformance to the packaging and labelling requirements.

7 Compliance

The lot shall be deemed to comply with the standard if after inspection and testing it complies with the requirements of the standard.

8 Packing and labelling

8.1 Packing

Ammonium sulphate fertiliser shall be packed in clean, non-defective and strong containers.

The material for which the container is made shall be such as to protect the contents from moisture and also not lead to easy rupture during handling, transportation and storage.

NOTE The product may be also supplied in bulk containers.

8.2 Labelling

Each container of ammonium sulphate fertiliser shall bear a label in indelible marking in accordance with Globally Harmonized System (GHS) and with the following particulars:

- a) name of the product
- b) name and physical address of manufacturer / distributor/supplier, and registered trade mark, or trade name if any;
- c) pH value
- d) name and guaranteed percentage of any other nutrient element present
- e) net mass, in kg;
- f) minimum ammoniacal nitrogen content as N
- f) lot identification;
- g) country of origin;
- h) any marking required by the country of origin or destination.
- i) the dates of production and expiry

8.2.1 Bulk containers

Where the product is distributed in bulk, the labelling information shall accompany the delivery notice to the purchaser

9 Certificate of analysis

A certificate of analysis stating the minimum percentage levels of plant nutrient elements and magnesium shall accompany every lot or consignment of ammonium sulphate fertiliser

10 Material safety

Each container must be accompanied by a Material Safety Data Sheet (MSDS) and Technical Data Sheet (TDS)

Annex A
(normative)

Determination of pH

A.1 Principle

Measurement at 20 °C of the pH of 100 g/L solution of compound fertilizer, using pH meter fitted with glass and calomel electrodes.

A.2 Reagents

All reagents shall be of recognized analytical purity. The water used shall be distilled water or water of at least equivalent quality.

A.2.1 Disodium tetraborate buffer solution, prepared as follows:

Dissolve 3.81 ± 0.01 g of sodium tetraborate decahydrate in water, transfer quantitatively to a 1000 mL one-mark volumetric flask, dilute to the mark and mix thoroughly. Store the solution away from atmospheric carbon dioxide. The pH of this buffer solution at 20 °C is 9.22.

A.2.2 Potassium hydrogen phthalate buffer solution, prepared as follows:

Dissolve 10.21 ± 0.01 g of potassium hydrogen phthalate in water, transfer quantitatively to a 1000 mL one-mark volumetric flask, dilute to the mark and mix thoroughly. Store the solution away from atmospheric carbon dioxide. The pH of this buffer solution at 20 °C is 4.00.

A.3 Apparatus

Ordinary laboratory apparatus, and

A.3.1 pH meter, fitted with a glass measuring electrode and a calomel reference electrode, of sensitivity 0.05 pH units.

A.4 Procedure

A.4.1 Weigh to the nearest 0.001 g, 10 g of the test sample.

A.4.2 Preparation of test solution

Place the test sample (A.4.1) in a clean beaker (250 ml capacity) and dissolve in about 50 ml of water, stirring with a glass rod taking care to maintain the temperature at $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$. Transfer the solution quantitatively to a 100 mL one-mark volumetric flask, dilute to the mark and mix thoroughly.

A.4.3 Calibration of pH meter

Calibrate the pH meter (A.3.1) at a temperature of $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$ using the two buffer solutions (A.2.1) and (A.2.2).

A.4.4 Determination

Transfer the test solution (A.4.2) into a clean dry beaker (250 mL capacity), introduce the two electrodes of the pH meter (A.3.1) and determine the pH of the solution at a temperature of $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$, that is under the same conditions as used for the calibration (A.4.3).

A.5 Number of determinations

Carry out two determinations on test portions taken from the laboratory sample.

A.6 Expression of results

Express the results in pH units, to the nearest 0.1 unit, taking the mean of the two determinations. State the temperature at which the measurement was carried out.

Annex B (normative)

Determination of free acid

B.1 Principle

Dissolution of the product in water and the subsequent titration of the solution against standard sodium hydroxide solution in the presence of an indicator.

B.2 Reagents

B.2.1 Distilled water, or water of equivalent purity, neutral to the indicator.

B.2.2 Sodium hydroxide, standard volumetric solution $c(\text{NaOH}) = 0.02 \text{ mol/L}$.

B.2.3 Methyl red - methyl blue mixed indicator solution, prepared by mixing equal volumes of 0.2% solutions in rectified spirit.

B.3 Apparatus

Ordinary laboratory apparatus and in particular, the following:

B.3.1 Burette, of 10 mL capacity, graduated in divisions of 0.05 mL.

B.3.2 Analytical balance, of accuracy 0.001 g.

B.4 Procedure

B.4.1 Test solution

Dissolve about 20 g of the test sample weighed to an accuracy 1 mg in about 50 mL of cold water (B.2.1). Filter into a volumetric flask (250 mL) and take up the solution to 200 mL. The filtering media shall be neutral and shall not contain any alkaline material which should neutralize the free acid.

B.4.2 Determination

Add two drops of the indicator (B.2.3) to the test solution (B.4.1) and titrate, while stirring, with the sodium hydroxide solution (B.2.2) until the indicator changes colour.

B.5 Number of determinations

Carry out two determinations on the same test sample.

B.6 Expression of results

The free acidity, expressed as a percentage by mass of sulphuric acid, is equal to

$$\frac{V \times c \times 98.08}{10 \times m}$$

where

V is the volume, in millilitres, of the sodium hydroxide volumetric solution used (B.4.2)

c is the exact concentration, expressed in moles per litre, of the sodium hydroxide volumetric solution used;

m is the mass, in grams, of the test portion (B.4.1)

98.08 is the molar mass of sulphuric acid.

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