INTERNATIONAL STANDARD

ISO 8189

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Solid fertilizers — Determination of moisture content — Gravimetric method by drying under reduced pressure

Engrais solides — Détermination de la teneur en eau — Méthode par séchage sous pression réduite

Reference number
ISO 8189:1992(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8189 was prepared by Technical Committee ISO/TC 134, *Fertilizers and soil conditioners*, Sub-Committee SC 4, *Chemical analysis*.

Annex A of this International Standard is for information only.

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Solid fertilizers — Determination of moisture content — Gravimetric method by drying under reduced pressure

1 Scope

This International Standard specifies a gravimetric method, by drying under reduced pressure, for the determination of the moisture content of fertilizers.

The method is not applicable to fertilizers and soil conditioners containing the following:

— calcium nitrate;

— calcium hydroxide;

— calcium sulfate containing less than two molecules of water of crystallization for each molecule of calcium sulfate;

— magnesium sulfate containing one or seven molecules of water of crystallization for each molecule of magnesium sulfate;

— salts which effloresce readily at ambient temperatures or those which absorb water (desiccants).

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 8358:1991, *Solid fertilizers — Preparation of samples for chemical and physical analysis.*

3 Principle

Drying a test portion at a pressure of 66×10^3 Pa and a temperature of 25 °C for 24 h and determination of the resulting loss in mass.

4 Material

4.1 Silica gel desiccant, self-indicating, particle size 2 mm to 5 mm.

Activate the silica gel, immediately prior to use, by placing about 100 g in the evaporating basin (5.4) and transferring the basin to the oven (5.5), set at 105 °C, for 2 h. Transfer the basin with its contents to a desiccator and allow to cool to ambient temperature.

5 Apparatus

Ordinary laboratory apparatus and, in particular, the following.

5.1 Weighing bottle, 70 mm to 80 mm diameter, fitted with a stopper.

5.2 Vacuum desiccator, internal diameter about 200 mm, containing silica gel desiccant (4.1).

5.3 Vacuum pump, fitted with a pressure gauge.

5.4 Evaporating basin, internal diameter about 100 mm.

5.5 Oven, capable of being controlled at (105 ± 2) °C.

6 Preparation of test sample

Prepare the test sample, without grinding, in accordance with ISO 8358.

If necessary, quickly crush (not grind) the material in a mortar. Mix all the material and immediately take the test portion (7.1).

NOTE 1 It is advisable to crush the material in an atmosphere of relative humidity 40 % to 60 %.

7 Procedure

7.1 Test portion

Remove the stopper from the weighing bottle (5.1) and heat both for 2 h in the oven (5.5) set at 105 °C. Cool in the desiccator (5.2). After cooling to room temperature, fit the stopper and weigh to the nearest 0,001 g. Weigh, to the nearest 0,001 g, about 10 g of the test sample into the prepared weighing bottle, with the stopper placed alongside.

7.2 Determination

Place the unstoppered weighing bottle (5.1) containing the test portion, and the stopper, adjacent to each other, in the desiccator (5.2) containing the freshly activated silica gel (4.1).

Using the vacuum pump (5.3), reduce the pressure in the desiccator to an absolute pressure of $(66 \pm 1{,}3) \times 10^3$ Pa [(500 ± 10) mmHg] and maintain at this pressure for 24 h, at a temperature of (25 ± 3) °C.

WARNING — Before use, it is essential to check that the vacuum desiccator is free from defects. It should be placed behind a safety screen before applying a vacuum and should not be removed until atmospheric pressure has been restored.

Allow the pressure inside the desiccator to return to that of the atmosphere by gradually admitting air which has been dried by passage through the activated silica gel (4.1). Open the desiccator, quickly restopper the weighing bottle and weigh the bottle, stopper and contents to the nearest 0,001 g.

8 Expression of results

The moisture content of the fertilizer, expressed as a percentage by mass, is given by the formula

$$\frac{m_0 - m_1}{m_0} \times 100$$

where

m_0 is the mass, in grams, of the test portion before drying;

m_1 is the mass, in grams, of the test portion after drying.

Round the result, the mean of at least two determinations, to 0,1 % (*m/m*).

9 Test report

The test report shall include the following information:

a) a reference to this International Standard;

b) the results and the method of expression used;

c) all information necessary for the complete identification of the sample;

d) any unusual features noted during the determination;

e) any operation not included in this International Standard or in the International Standard to which reference is made, or regarded as optional.

Annex A
(informative)

Precision

A.1 General

The precision data were determined from an experiment conducted in 1979 involving 21 laboratories using one sample of each of five different types of fertilizer. Since it is not certain whether these data are valid for all fertilizers to which this International Standard applies, they are included for information only.

A.2 Repeatability

The difference between two single test results obtained from identical test material by one analyst using the same apparatus within a short time-interval should exceed the repeatability limit, r, given by the following equation, on average not more than once in 20 cases in the normal and correct operation of the method.

$$r = 0{,}1\sqrt{m}$$

where m is the arithmetic mean of the two test results (i.e. two determinations).

A.3 Reproducibility

The difference between two single and independent test results found by two analysts working in different laboratories using identical test material should exceed the reproducibility limit, R, given by the following equation, on average not more than once in 20 cases in the normal and correct operation of the method.

$$R = 0{,}4\sqrt{M}$$

where M is the arithmetic mean of the two test results (i.e. two determinations).

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