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Slow-release fertilizers — Determination of the release of the nutrients — Method for coated fertilizers

Engrais à libération lente — Détermination du mode de libération des éléments nutritifs — Méthode applicable aux engrais enrobés

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

ISO 21263 was prepared by CEN/TC 260 as EN 13266:2001 and was adopted by Technical Committee ISO/TC 134, *Fertilizers and soil conditioners*, with the following modifications:

— in Clause 1, two instances of “may” (permission) have been changed to “can” (possibility);

— in 7.2, the wording of the last sentence has been changed so that normative Annex A is cited normatively.

Slow-release fertilizers — Determination of the release of the nutrients — Method for coated fertilizers

1 Scope

This document specifies a method for the determination of the slow release properties of nutrients from coated fertilizers. pH-dependent hydrolysis and degradation by biological or microbial mechanisms are excluded.

The specified method is only applicable to products releasing any nutrients by means of a non-biological process (i.e. those where the nutrients are released by a physical mechanism). Microbial attack on the coating (e.g. sulfur coated fertilizers) and the consequences thereof are not measurable by the technique described.

This method involves a lengthy process which may not be appropriate for day to day testing purposes. Accelerated methods can be used provided they are correlated with this document. An example of such an accelerated method is described in Annex B. Regression analysis can also be used for this purpose.

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.

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

EN 1482,*Sampling of solid fertilizers and liming 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:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
release
transfer of a nutrient from the fertilizer to the receiving medium (water)

3.2
slow release
release under the defined conditions meeting each of the criteria set out in Annex A

3.3
initial release of a nutrient
mass fraction in percent of a nutrient released during the first 24 h after the start of the test

3.4
stated release time
time period between the start of the test and the release of a given minimum percentage of the specified nutrient

Note 1 to entry: This may also be referred to as longevity. See Annex A.

3.5
coated fertilizer
fertilizer that is encapsulated, by covering it with a water-insoluble material, in order to reduce its release rate in water

4 Principle

Elution of a test portion of a fertilizer with a specified volume of water. Determination of the concentration of the nutrient(s), that have been dissolved in defined time intervals.

5 Apparatus

Ordinary laboratory apparatus and, in particular, the following.

5.1 Glass beakers, of capacity 800 ml, with a lid.

5.2 One mark volumetric flask, 500 ml capacity.

5.3 Magnetic stirrer, with a magnetic rod with a size of 25 mm, or any other suitable stirrer.

5.4 Temperature-control equipment, capable of maintaining the medium at the temperature of (25 ± 0,5) °C.

6 Sampling

Sampling and sample preparation shall be carried out in accordance with EN 1482.

The method of sampling and of sample preparation shall be indicated in the test report. Take care to avoid damage to, or destruction of, the coating.

Do not crush or grind the sample.

7 Procedure

7.1 Preparation of the test solution

Transfer 500 ml of water, conforming to grade 3 of ISO 3696, into a beaker (5.1). Weigh, to the nearest 0,01 g, (10 ± 0,1) g of the fertilizer, add it to the water in the beaker and record the time. Weigh the beaker together with its contents: the sample of fertilizer, water and stirring rod. Note the total mass to the nearest 1 g. Start the stirrer (5.3) at a rotational frequency of approximately 300 min^{-1}. Cover the beaker with a lid to avoid evaporation of water and maintain the temperature at (25 ± 0,5) °C with the temperature-control equipment (5.4).

Each time it is desired to make a nutrient determination (see 7.2), decant the solution into another beaker (5.1), taking care to avoid any of the undissolved fertilizer being carried over. Refill the beaker (5.1) with water (conforming to grade 3 of ISO 3696) at 25 °C so as to achieve the previously recorded mass. Continue extraction immediately.