INTERNATIONAL STANDARD

ISO 17322

First edition
2015-06-01

Fertilizers and soil conditioners — Analytical methods for Sulfur Coated Urea (SCU)

Matières fertilisantes — Méthodes analytiques pour l'urée enrobée de soufre (SCU)

Reference number
ISO 17322:2015(E)

© ISO 2015



COPYRIGHT PROTECTED DOCUMENT

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

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

Contents

Page

Foreword ... **v**
Introduction ... **vi**
1 Scope ... **1**
2 Normative references ... **1**
3 Sampling and sample preparation ... **1**
4 Determination of the appearance ... **1**
5 Determination of the mass fraction of total nitrogen ... **1**
6 Determination of 1DDR and 7DDR ... **1**
6.1 Titrimetric method after distillation ... 1
6.1.1 Principle ... 1
6.1.2 Reagents ... 1
6.1.3 Apparatus ... 2
6.1.4 Procedure ... 2
6.1.5 Calculation ... 2
6.2 Refractometer method ... 3
6.2.1 Principle ... 3
6.2.2 Reagents ... 3
6.2.3 Apparatus ... 3
6.2.4 Procedure ... 4
6.2.5 Calculation ... 5
7 Determination of the mass fraction of sulfur ... **6**
7.1 Principle ... 6
7.2 Reagents ... 6
7.3 Apparatus ... 6
7.4 Procedure ... 6
7.4.1 Determination of the sulfur content ... 6
7.4.2 Blank test ... 7
7.5 Calculation ... 7
8 Determination of the mass fraction of biuret ... **7**
8.1 Principle ... 7
8.2 Reagents ... 8
8.3 Apparatus ... 8
8.4 Procedure ... 8
8.4.1 Preparation of the calibration curve ... 8
8.4.2 Preparation of the solution to be analysed ... 9
8.5 Calculation ... 9
9 Determination of the water content ... **10**
9.1 Principle ... 10
9.2 Reagents ... 10
9.3 Apparatus ... 10
9.4 Installation and test of the Karl Fischer titrator ... 10
9.5 Procedure ... 11
9.5.1 Standardization of the Karl Fischer reagent ... 11
9.5.2 Determination ... 11
9.6 Calculation ... 11
9.6.1 Water equivalent of the Karl Fischer reagent ... 11
9.6.2 Water content of the sample ... 12
10 Determination of particle size ... **12**
11 Precision ... **12**
11.1 Ring test ... 12

© ISO 2015 – All rights reserved

11.2 Repeatability 12
11.3 Reproducibility 13
12 Test report **13**
Annex A (informative) **Interlaboratory testing** **14**
Bibliography **48**

 © ISO 2015 – All rights reserved

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.

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 134, *Fertilizers and soil conditioners*.

© ISO 2015 – All rights reserved

Introduction

Sulfur Coated Urea (SCU) is a coated, slow release fertilizer consisting of urea particles coated with sulfur, which was first developed by the Tennessee Valley Authority's National Fertilizer Development Center (TVA/NFDC), Alabama in 1961, and produced commercially in 1967. SCU is made by coating urea with sulfur and sealant. It contains 30 % to 40 % nitrogen and 10 % to 30 % sulfur. The main coating material of SCU is sulfur. Sulfur is insoluble in water and its chemical properties are stable, thus, it is an impermeable coating material. In addition, sulfur itself is a secondary nutrient and it does not pollute the soil.

This International Standard specifies analytical methods, including mass fraction of total nitrogen, one-day dissolution rate (1DDR), seven-day dissolution rate (7DDR), mass fraction of sulfur, mass fraction of biuret, mass fraction of water (H_2O), and SGN and UI of SCU. There are two methods for determining of one-day dissolution rate (1DDR) and seven-day dissolution rate (7DDR): one is titrimetric method after distillation, the other is refractometer method which is a fast analytical method.

NOTE Some countries or regions might have published other standards covering analytical methods for SCU.

© ISO 2015 – All rights reserved

Fertilizers and soil conditioners — Analytical methods for Sulfur Coated Urea (SCU)

1 Scope

This International Standard specifies analytical methods for the determination of mass fraction of total nitrogen, one-day dissolution rate (1DDR), seven-day dissolution rate (7DDR), mass fraction of sulfur, mass fraction of biuret, mass fraction of water (H_2O), and particle size of SCU.

These methods are applicable to SCU.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ISO 5315, *Fertilizers — Determination of total nitrogen content — Titrimetric method after distillation*

ISO 17323, *Fertilizers and soil conditioners — Sulfur Coated Urea — General requirements*

3 Sampling and sample preparation

Sampling and sample preparation shall be carried out in accordance with ISO 17323.

4 Determination of the appearance

It shall be determined by visual method.

5 Determination of the mass fraction of total nitrogen

It shall be determined in accordance with ISO 5315.

6 Determination of 1DDR and 7DDR

6.1 Titrimetric method after distillation

6.1.1 Principle

Digest the testing sample in static water at a constant temperature (38,0 ± 0,5) °C. Within a certain period, the nitrogen component in the testing sample will dissolve into the water through the coatings, and then the released nitrogen can be determined by titrimetric method after distillation. The percentage of released nitrogen to the total nitrogen is defined as 1DDR or 7DDR.

6.1.2 Reagents

See ISO 5315.

© ISO 2015 – All rights reserved