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Fertilizers and soil conditioners — Sulfur Coated Urea (SCU) — General requirements

Matières fertilisantes — Urée enrobée de soufre (SCU) — Exigences générales

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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).

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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.*

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. 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 when applied appropriately.

This International Standard specifies general requirements, sampling, and preparation of test sample, marking and labelling, packaging, transport, and storage for SCU.

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

Fertilizers and soil conditioners — Sulfur Coated Urea (SCU) — General requirements

1 Scope

This International Standard specifies general requirements, sampling and preparation of test sample, marking and labelling, packaging, transport, and storage for 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 7409, *Fertilizers — Marking — Presentation and declarations*

ISO 7410, *Fertilizers and soil conditioners — Final samples — Practical arrangements*

ISO 7742, *Solid fertilizers — Reduction of samples*

ISO 8157, *Fertilizers and soil conditioners — Vocabulary*

ISO 8633, *Solid fertilizers — Simple sampling method for small lots*

ISO 17322, *Fertilizers and soil conditioners —Analytical Methods for SCU*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
sulfur coated urea
SCU
coated controlled release fertilizer consisting of urea particles coated with sulfur

Note 1 to entry: The product is usually further coated with a sealant and, if necessary, a conditioner to avoid tackiness from the sealant.

[SOURCE: ISO 8157, 2.2.1.12]

3.2
slow-release fertilizers
fertilizer, of which, by hydrolysis and/or by biodegradation and/or by limited solubility, the nutrients available to plants is spread over a period of time, when compared to a “reference soluble ” product, e.g. ammonium sulfate, ammonium nitrate, and urea

[SOURCE: ISO 8157, 2.1.11]

3.3
controlled-release fertilizers
fertilizer in which nutrient release is controlled, meeting the stated release rate of nutrient and the stated release time at a specified temperature

Note 1 to entry: Typical examples are coated fertilizers.

[SOURCE: ISO 8157, 2.1.12]

3.4
one day dissolution rate
1DDR
mass percentage of the dissolution nitrogen to total nitrogen, when SCU is put in static water at 38 °C for 24 h

3.5
seven day dissolution rate
7DDR
mass percentage of the dissolution nitrogen to total nitrogen, when SCU is put in static water at 38 °C for seven days

4 Requirements

4.1 Appearance

The product shall be in granules.

4.2 Requirement of sulfur coated urea

SCU products shall be tested to demonstrate conformance with all requirements specified in Table 1 and declared values on containers by the methods specified in ISO 17322.

Table 1 — Requirements of SCU

Item	Requirements
Total Nitrogen (mass fraction)	31 % to 42 %
One Day Dissolution Rate (1DDR)	≤40 %
Seven Day Dissolution Rate (7DDR)	≤60 %
Sulfur (S) (mass fraction)	≥8,0 %
Biuret (mass fraction)[a]	≤1,2 %
Water(H_2O)(mass fraction)[b]	≤1 %
Particle size (diameter 1,00 mm to 4,75 mm)[b]	≥90 %

NOTE SCU products are characterized according to different nitrogen release time, however, other requirements of SCU specified by the countries or regions shall be followed. See informative Annex A for additional information.

[a] Regarding biuret content, the related requirements specified by the countries or regions shall be followed.

[b] The table is only indicative, special water content and particle size values can be negotiated with producers and buyers. The table is indicative as the SCU specification is determined by the customer's specific field and ambient conditions for the selected plant, crop, or vegetation.

5 Sampling and preparation of test sample

5.1 Sampling method

5.1.1 Products in bags

Carry out sampling operation by following the procedure described in ISO 8633. Take care to avoid damage to, or destruction of, the coating.

5.1.2 Products in bulk

Carry out sampling operation by following the procedure described in ISO 8633.

5.2 Reduction of samples

Mix all the increments (collected as in 5.1) uniformly and promptly to form a single aggregate sample using a device or by hand. The aggregate sample is reduced to about 1 kg by the riffle sample divider method (see ISO 7742:1988, Annex A.2) or the quartering method (see ISO 7742:1988, Annex A.3). Next, divide into two parts for final laboratory samples. The two laboratory samples are put into two clean and dry glass or plastic containers or any other inert material of adequate resistance capable of maintaining the sample in its original condition. The containers shall be fitted with airtight closures. Carry out all the operations described above as rapidly as possible to avoid loss or gain of moisture. Each container shall be secured and sealed following the instruction given in ISO 7410. Each laboratory sample shall be labelled following the instructions given in ISO 7410.The label shall, at minimum, carry the following information:

a) name of manufacturer;

b) name of product;

c) manufacturer's reference and batch number or production date (if available);

d) lot size;

e) date of sampling;

f) place of sampling;

g) signature of the sampler;

h) signature and name of the person or his representative on whose premises the sample was taken.

One of the containers is used for further quality analysis, while the other is kept for additional analysis in six months.

5.3 Test sample preparation

Select one of the laboratory samples from the two containers obtained in 5.2. Mix the content of the container according to the procedure in ISO 7742. The test sample used for determining total nitrogen, sulfur, biuret, water, and solid content should be reduced to 100 g. Grind this test sample in the grinder until all of the sample has passed through the test sieve of aperture size 0,50 mm. The rest of the content of the container, except the 100 g test sample mentioned above, is used for determination of 1DDR, 7DDR, and particle size. Both of the test samples are put into clean and dry bottles to be used for further analysis.

6 Marking and labelling

The marking and labelling should follow the legislation. Further information can be provided if appropriate and when the legislation allows.

Any labelling recommendations should conform to the United Nations "Globally Harmonized System of Classification and Labelling of Chemicals" (GHS) and applicable national or regional adoption thereof.

Anything referring to the labels should refer to the latest version of ISO standards and local/regional legislations.

6.1 The following information should appear on the face of the containers:

a) total nitrogen content;

b) sulfur content;

c) date of production;

d) net mass;

e) address and name of the manufacturer.

When products are packaged in tons, only total nitrogen content, sulfur content, net mass, address, and name of the manufacturer should appear.

6.2 A product's instructions should be printed on the back of containers. The information should include: name of product, nutrient content, method of usage, storage, and usage precautions.

6.3 The single mass value of each container shall be declared (e.g. 50 kg).

6.4 All other information required by ISO 7409.

7 Packaging, transport, and storage

The applicable national or regional safety guidelines for handling and storage should be followed.

7.1 During transportation the packaged products should be handled with care to avoid moisture, sunlight, and damage of fertilizer and fertilizer packages.

7.2 The products should be stored in a dry, cool place (ambient temperature) away from sunlight and moisture.

Annex A
(informative)

Some examples for SCU

Table A.1 — Examples of SCU

Item	Requirements (%)				
	Example I	Example II	Example III	Example IV	Example V
Total nitrogen (mass fraction)	≥39,0	≥37,0	≥34,0	≥31,0	39,7
One-day dissolution rate (1DDR)	≤40	≤27	≤15	≤10	45
Seven-day dissolution rate (7DDR)	≤60	≤45	≤30	≤20	57
Sulfur (S) (mass fraction)	≥8,0	≥10,0	≥15,0	≥20,0	14,0
Biuret (mass fraction) ≤	1,2				0,7
Water (H_2O) (mass fraction) ≤	1,0				0,3
Particle size (diameter 1,00 mm to 4,75 mm or 3,35 mm to 5,60 mm) ≥	90				

NOTE The release time of SCU depends on factors including temperature, moisture, soil microorganism, and wet/dry cyclic condition. Therefore, stated release time varies in areas, climates, and cultivation. 1DDR of nutrient, and 7DDR are two important indicators of the SCU for field performance. As can be seen from the examples, increased sulfur content will decrease the 1DDR and 7 DDR values.