
**Fertilizers and soil conditioners —
Solid urea aldehyde slow release
fertilizer — General requirements**

*Engrais et amendements — Engrais urée aldéhyde solide à libération
lente — Exigences générales*

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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.

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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. (standards.iteh.ai)

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Introduction

Solid urea aldehyde slow release fertilizer is a non-coated and chemically synthesized nitrogen fertilizer with slow release effect. In 1924, the first slow release fertilizer patent in the world was issued to urea formaldehyde (UF) and in 1955, UF was put into commercial production as the oldest slow release fertilizer. Solid urea aldehyde slow release fertilizer has the longest history of research, use and production among the slow release fertilizers used in practice. At the same time, it is the most widely used of all slow release fertilizers.

For facilitating international fertilizer trade, it is necessary to have an international and general standard for solid urea aldehyde slow release fertilizers.

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Fertilizers and soil conditioners — Solid urea aldehyde slow release fertilizer — General requirements

1 Scope

This document specifies general requirements, analytical methods, sampling and preparation of test sample, marking and labelling, packaging, transport and storage for solid urea aldehyde slow release fertilizer.

This document applies to pure solid urea aldehyde slow release fertilizer, i.e. urea formaldehyde (UF), methylene urea (MU), crotonylidene diurea (CDU), isobutylidene diurea (IBDU). This document does not apply to mixtures of nitrogenous fertilizers containing solid urea aldehyde slow release fertilizer.

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

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 19746:2017, *Determination of urea content in urea-based fertilizers by high performance liquid chromatography (HPLC)*

ISO 25705:2016, *Fertilizers — Determination of urea condensates using high-performance liquid chromatography (HPLC) — Isobutylidenediurea and crotonylidenediurea (method A) and methylen-urea oligomers (method B)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8157 and the following 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

urea aldehyde slow release fertilizer

products of reaction between urea and aldehyde(s) that produce a slow release nitrogenous fertilizer

EXAMPLE Urea formaldehyde (UF), methylene urea (MU), crotonylidene diurea (CDU), isobutylidene diurea (IBDU).

3.2
cold water insoluble nitrogen
CWIN

insoluble nitrogen fractions in urea formaldehyde or methylene urea products that are insoluble in phosphate buffer solution (pH 7,5) or distilled water at 25 °C during a 15 min period

3.3
cold water soluble nitrogen
CWSN

soluble nitrogen fractions in urea formaldehyde or methylene urea products that are soluble in phosphate buffer solution (pH 7,5) or distilled water at 25 °C during a 15 min period

Note 1 to entry: CWSN = Total nitrogen – CWIN

3.4
hot water insoluble nitrogen
HWIN

insoluble nitrogen fractions in urea formaldehyde or methylene urea products that are insoluble in phosphate buffer solution (pH 7,5) at 100 °C during a 30 min period

3.5
hot water soluble nitrogen
HWSN

soluble nitrogen fractions in urea formaldehyde or methylene urea products that are soluble in phosphate buffer solution (pH 7,5) at 100 °C during a 30 min period

Note 1 to entry: HWSN = Total nitrogen – HWIN

3.6
hot water soluble nitrogen only
HWSN only

soluble nitrogen fractions in urea formaldehyde or methylene urea products that are soluble in phosphate buffer solution (pH 7,5) at 100 °C during a 30 min period and insoluble in phosphate buffer solution (pH 7,5) at 25 °C during a 15 min period

Note 1 to entry: HWSN only = HWSN – CWSN = CWIN – HWIN

3.7
activity index
AI

percentage of *CWIN* (3.2) that is solubilised in hot water (*HWSN only*) (3.6)

Note 1 to entry: $AI = \frac{CWIN - HWIN}{CWIN} \times 100$

Note 2 to entry: CWIN and HWIN in Note 1 are expressed in the mass fraction (%).

Note 3 to entry: A higher AI indicates better slow release characteristics of urea formaldehyde fertilizer.

4 Requirements

4.1 Visual inspection

The product shall be in powder, granules, prills, pellets, pastilles, chips or other solid forms. Visually inspect for the presence of contaminant and foreign matter.

4.2 Requirement of solid urea aldehyde slow release fertilizer

Solid urea aldehyde slow release fertilizer shall be tested to demonstrate conformance with all the requirements specified in [Tables 1](#) and [2](#) respectively, and declared values on containers.

Table 1 — Requirements of urea formaldehyde/methylene urea fertilizer

Item		Requirements
Total nitrogen (TN) (mass fraction)	≥	36 %
Ureic nitrogen (mass fraction)	≤	5 %
HWSN (mass fraction)	≥	3/5 of the declared total nitrogen content
AI	≥	40 %
The requirements specified by national/regional legislation shall be followed when urea formaldehyde/methylene ureas are covered by legislation.		

Table 2 — Requirements of IBDU and CDU

Item		Requirements
Total nitrogen (mass fraction)	≥	28 %
Ureic nitrogen (mass fraction)	≤	3 %
Nitrogen from IBDU or CDU (mass fraction)	≥	25 %
The requirements specified by the national/regional legislation shall be followed when IBDU or CDU are covered by legislation.		

5 Analytical methods

5.1 Determination of the appearance

It shall be determined by visual method.

5.2 Determination of the mass fraction of total nitrogen

It shall be determined in accordance with ISO 5315.

5.3 Determination of the mass fraction of ureic nitrogen

It shall be determined in accordance with ISO 19746.

5.4 Determination of the mass fraction of CWIN

5.4.1 Principle

Extraction of the test portion in phosphate buffer solution (pH 7,5) or distilled water at 25 °C. Filtration of insoluble residue, washing and determination of nitrogen content in insoluble residue.

5.4.2 Reagents

5.4.2.1 Phosphate buffer solution (pH 7,5). Dissolve 14,3 g KH_2PO_4 and 91,0 g K_2HPO_4 in water and dilute to 1 l. Dilute 100 ml of this solution to 1 l.

5.4.2.2 Anhydrous ethanol.

5.4.2.3 Reagents listed in ISO 5315.

5.4.3 Apparatus

5.4.3.1 Usual laboratory apparatus.