

EN 16965:2018

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Fertilizers - Determination of cobalt, copper, iron, manganese and zinc using flame atomic absorption spectrometry (FAAS)

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English Version

**Fertilizers - Determination of cobalt, copper, iron,
 manganese and zinc using flame atomic absorption
 spectrometry (FAAS)**

Engrais - Dosage du cobalt, du cuivre, du fer, du
 manganèse et du zinc par spectrométrie d'absorption
 atomique de flamme (FAAS)

Düngemittel - Bestimmung von Cobalt, Kupfer, Eisen,
 Mangan und Zink mit Flammen-
 Atomabsorptionsspektrometrie (FAAS)

This European Standard was approved by CEN on 15 October 2017.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European foreword

This document (EN 16965:2018) has been prepared by Technical Committee CEN/TC 260 “Fertilizers and liming materials”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2018, and conflicting national standards shall be withdrawn at the latest by July 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

EN 16965:2018 (E)

Introduction

The preparation of this document is based on a mandate given to CEN by the European Commission and the European Free Trade Association (Mandate M/335) concerning the modernization of methods of analysis of fertilizers in the framework of Regulation (EC) No 2003/2003 [1].

This document is part of a modular approach and concerns the analytical measurement step. “Modular” means that a test standard concerns a specific step in assessing a property and not the whole chain of measurements. Flame atomic absorption spectrometry (FAAS) is widely used and well established in most laboratories. The European Standard can be used for the determination of cobalt, copper, iron, manganese and zinc in all extracts prepared according to EN 16962 and EN 16964. The method can be applied to mineral fertilizers with micro-nutrient content of $\leq 10\%$ as well as of $> 10\%$.

The inter-laboratory study reflects the final properties of the method for determination of individual micro-nutrients in water and aqua regia extracts including extraction steps.

WARNING — Persons using this European Standard should be familiar with normal laboratory practice. This European Standard does not purport to address all of the safety issues, if any, associated with its use. It is the responsibility of the user to establish appropriate health and safety practices and to ensure compliance with any national regulatory conditions.

IMPORTANT — It is absolutely essential that tests conducted according to this European Standard are carried out by suitably trained staff.

1 Scope

This European Standard specifies a method for the determination of cobalt, copper, iron, manganese and zinc in fertilizer extracts using flame atomic absorption spectrometry (FAAS).

This method is applicable to water and aqua regia fertilizer extracts obtained according to EN 16962 and/or EN 16964.

NOTE In most cases, the presence of small quantities of organic matter will not affect determinations by FAAS and it is not necessary to apply organic matter removal.

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.

EN 12944-1, *Fertilizers and liming materials and soil improvers — Vocabulary — Part 1: General terms*

EN 12944-2, *Fertilizers and liming materials and soil improvers — Vocabulary — Part 2: Terms relating to fertilizers*

EN 16962, *Fertilizers — Extraction of water soluble micro-nutrients in fertilizers and removal of organic compounds from fertilizer extracts*

EN 16964, *Fertilizers — Extraction of total micro-nutrients in fertilizers using aqua regia*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12944-1 and EN 12944-2 apply.

4 Principle

The method is based on the FAAS measurement of the concentration of the elements in fertilizer extracts prepared according to EN 16962 and/or EN 16964. The elements are determined after appropriate dilution of the extracts. Background correction, matrix matching and lanthanum addition are applied to remove possible interferences.

5 Interferences

Matrix matching can avoid interferences from different physical behaviour of the standards and samples (in particular, different viscosity can influence aspiration of the solution). Light scattering is eliminated by background correction. Ionization of cobalt, copper, iron, manganese and zinc in air-acetylene flame may be neglected. The formation of refractory compounds is prevented or reduced by adding a releasing agent (lanthanum).