

ICS 65.080

English Version

Inorganic micronutrient fertilizers - Determination of the concentration of free, chelated or complexed micronutrients and the chelating and/or complexing agents present in compound inorganic micronutrient fertilizers

Engrais inorganiques - Détermination de la concentration en oligo-éléments libres, chélatés ou complexés et des agents chélatants et/ou complexants présents dans les engrais inorganiques composés à base d'oligo-éléments

Anorganische Spurennährstoffdüngemittel - Bestimmung der Konzentration freier, chelatisierter oder komplexgebundener Spurennährstoffe sowie der Chelatbildner und/oder Komplexbildner in einem anorganischen Mehrnährstoff-Spurennährstoffdüngemittel

This Technical Specification (CEN/TS) was approved by CEN on 13 March 2022 for provisional application.

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European foreword

This document (CEN/TS 17764:2022) has been prepared by Technical Committee CEN/TC 260 “Fertilizers and liming materials”, the secretariat of which is held by DIN.

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

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Introduction

Micronutrients are considered to be, in plant nutrition, a number of elements known to be needed in small amounts for proper plant growth and development. The most common are Iron (Fe), Manganese (Mn), Molybdenum (Mo), Copper (Cu), Zinc (Zn) and Boron (B).

If an inorganic micronutrient fertilizer contains a substance, or one of the substances in the mixture, which is intended to enhance the long-term availability to plants of micronutrients in the EU fertilizing products, that substance is either a chelating agent or a complexing agent.

In this document the test method is defined to be used in order to determine free, chelated or complexed micronutrients and chelating and/or complexing agents present in compound inorganic micronutrient fertilizers (classified as product function category (PFC) 1(C)(II)(b) according to Regulation (EU) 2019/1009 [7]).

This method allows the determination of the content of Co, Cu, Fe, Mn, Zn as free and/or chelated and/or complexed micronutrients.

1 Scope

This document specifies the method for the determination of free, chelated or complexed micronutrients and chelating and/or complexing agents present in compound inorganic micronutrient fertilizers.

This method applies to compound inorganic micronutrient fertilizers when micronutrients are chelated and/or complexed.

The method is based on the determination of the following specific parameters¹:

- the water-soluble micronutrient concentration;
- the fraction of chelated micronutrients in relation;
- identification of chelating agents EDTA, DTPA, HEEDTA, IDHA, [S,S]-EDDS, [o,o] EDDHA, [o,o] EDDHMA, [o,p] EDDHA, HBED and EDDHSA;
- the fraction of complexed micronutrients;
- identification of complexing agents (lignosulfonates, heptagluconic acid (HGA)).

The method is based on

- ICP (inductive coupled plasma) or FAAS (flame atomic absorption spectrometry) measurement of the concentration of water-soluble micronutrients according to EN 16963 or EN 16965 after extraction according to EN 16962;
- LC (liquid chromatography) measurement of the chelating agents according to EN 15950, EN 13368-1, EN 13368-2, EN 13368-3, EN 15451, EN 15452;
and/or complexing agents according to EN 16109 and EN 16847;
- determination of the concentration of chelated micronutrients by CEN/TS 17786-1 and/or CEN/TS 17786-2;
- determination of the complexed micronutrients by EN 15962.

To avoid duplication of the analytical methods, CEN/TS 17786-2 describes the determination of micronutrients and the identification and determination of chelating agents.

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.

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

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

EN 13368-1, *Fertilizers — Determination of chelating agents in fertilizers by chromatography — Part 1: Determination of EDTA, HEEDTA and DTPA by ion chromatography*

¹ Abbreviated terms are described in Annex A.

EN 13368-2, *Fertilizers — Determination of chelating agents in fertilizers by chromatography — Part 2: Determination of Fe chelated by [o,o] EDDHA, [o,o] EDDHMA and HBED, or the amount of chelating agents, by ion pair chromatography*

EN 13368-3, *Fertilizers — Determination of chelating agents in fertilizers by chromatography — Part 3: Determination of [S,S]-EDDS by ion pair chromatography*

EN 15451, *Fertilizers — Determination of chelating agents — Determination of iron chelated by EDDHSA by ion pair chromatography*

EN 15452, *Fertilizers — Determination of chelating agents — Determination of iron chelated by o,p-EDDHA by reversed phase HPLC*

EN 15950, *Fertilizers — Determination of N-(1,2-dicarboxyethyl)-D,L-aspartic acid (Iminodisuccinic acid, IDHA) using high-performance liquid chromatography (HPLC)*

EN 15962, *Fertilizers — Determination of the complexed micro-nutrient content and of the complexed fraction of micro-nutrients*

EN 16109, *Fertilizers — Determination of complexed micro-nutrient ions in fertilizers — Identification of lignosulfonates*

EN 16847, *Fertilizers — Determination of complexing agents in fertilizers — Identification of heptagluconic acid by chromatography*

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

EN 16963, *Fertilizers — Determination of boron, cobalt, copper, iron, manganese, molybdenum and zinc using ICP-AES*

EN 16965, *Fertilizers — Determination of cobalt, copper, iron, manganese and zinc using flame atomic absorption spectrometry (FAAS)*

CEN/TS 17786-1, *Inorganic micronutrient fertilizers — Determination of the chelated micronutrient content and the chelated fraction of micronutrients — Part 1: Treatment with a cation exchange resin*

CEN/TS 17786-2, *Inorganic micronutrient fertilizers — Determination of the chelated micronutrient content and the chelated fraction of micronutrients — Part 2: Determination of EDTA, DTPA, HEEDTA, IDHA or EDDS*