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Organo-mineral fertilizers - Identification of chelating agents

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

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The UK participation in its preparation was entrusted to Technical Committee CII/37, Fertilisers and related chemicals.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Organo-mineral fertilizers - Identification of chelating agents - 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

Engrais organo-minéraux - Identification des agents chélatants - Partie 2 : Détermination du Fe chélaté par [o,o] EDDHA, [o,o] EDDHMA et HBED, ou de la quantité d'agents chélatants par chromatographie d'appariement d'ions

Organisch-mineralische Düngemittel - Identifizierung von Chelatbildnern - Teil 2: Bestimmung von Fe chelatisiert mit [o,o] EDDHA, [o,o] EDDHMA und HBED oder der Menge der Chelatbildner mittels Ionenpaarchromatographie

This Technical Specification (CEN/TS) was approved by CEN on 21 February 2022 for provisional application.

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European foreword

This document (CEN/TS 17789-2:2022) 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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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 organo-mineral 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 product, that substance is either a chelating agent or a complexing agent.

The chelating agents are divided into two groups[1]:

— Group 1: EDTA, DTPA, HEEDTA, IDHA and [S,S]-EDDS;

— Group 2: Chelating agents present in UVCB (unknown or variable composition, complex reaction products or biological materials) chelates including [o,o] EDDHA, [o,p] EDDHA, [o,o] EDDHMA, HBED and EDDHSA.

This document defines the test method to be used in order to identify and determine the content of UVCB micronutrient chelated by [o,o] EDDHA, [o,o] EDDHMA and HBED in organo-mineral fertilizers (product function category (PFC) 1(B) according to Regulation (EU) 2019/1009 [4]).

[1] Abbreviated terms are described in Annex A.

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1 Scope

This document specifies a method for the determination by ion pair chromatography of the iron chelated by each individual *ortho*(hydroxy)-*ortho*(hydroxy) isomer of the chelating agents [o,o] EDDHA, [o,o] EDDHMA and by HBED in organo-mineral fertilizers, having an organic matrix based on vegetal residues (cocoa shells, grape residue, soybean residue, …), algae extract, and animal meal (feather, bones, blood, ...) and containing one or more of these substances, except for [o,o] EDDHMA and HBED mixes.

The method allows the identification and the determination of the total concentration of water soluble iron chelates of these chelating agents. Also, after derivatization with Fe, the soluble amount of the chelating agents can be determined when other micronutrients beside Fe are present in organo-mineral fertilizers containing [o,o] EDDHA, [o,o] EDDHMA or HBED.

This method is applicable to a mass fraction of the metal chelated of at least 0,625 %.

NOTE 1 The substances EDDHA and EDDHMA exist as several different isomeric forms. Positional isomers for the hydroxyl or methyl groups (in *ortho, meta,* and *para* positions) as well as stereo isomers (*meso* and dl-racemic forms) are known. Both *meso* and dl-racemic forms of the [*ortho,ortho*] EDDHA and [*ortho,ortho*]. Since *para, meta and ortho* methyl positional isomers of the EDDHMA present quite similar stability, they could be grouped: in the method here described the *para, meta* and *ortho* methyl positional isomers of the [o,o] EDDHMA are considered together. HBED (N,N'-bis(2-hydroxybenzyl)-ethylenediamine-N,N'-diacetic acid) does not present isomeric forms.

NOTE 2 At present, analytically pure standards only exist for [*ortho,ortho*] EDDHA, [*ortho,ortho*] EDDHMA and HBED. All other substances being unavailable as a standard, the influence of their eventual presence in the samples (with respect to the sensitivity and the selectivity of this method) has not been studied.

NOTE 3 The *meso* and the dl-racemic forms of [o,o] EDDHA and [o,o] EDDHMA can be determined separately by this method.

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*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

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