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English Version

Plant biostimulants - Determination of specific elements - Part 1: Digestion by aqua regia for subsequent determination of elements

Biostimulants des végétaux - Dosage des éléments spécifiques - Partie 1 : Digestion à l'eau régale pour le dosage ultérieur des éléments

Biostimulanzien für die pflanzliche Anwendung - Bestimmung spezifischer Elemente - Teil 1: Aufschluss durch Königswasser zur anschließenden Bestimmung der Elemente

This Technical Specification (CEN/TS) was approved by CEN on 3 January 2022 for provisional application.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. CEN/TS 17701-1:2022 E

Contents

Page

European foreword

This document (CEN/TS 17701-1:2022) has been prepared by Technical Committee CEN/TC 455 “Plant Biostimulants”, the secretariat of which is held by AFNOR.

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 Standardization Request given to CEN by the European Commission and the European Free Trade Association.

The CEN/TS 17701 series, *Plant biostimulants - Determination of specific elements*, consists of the following parts:

— *Part 1: Digestion by aqua regia for subsequent determination of elements*;

— *Part 2: Determination of total content of Cd, Pb, Ni, As, Cr, Cu and Zn*;

— *Part 3: Determination of mercury*.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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

Introduction

This document was prepared by the experts of CEN/TC 455 “Plant Biostimulants”. The European Committee for Standardization (CEN) was requested by the European Commission (EC) to draft European standards or European standardization deliverables to support the implementation of Regulation (EU) 2019/1009 of the European Parliament and of the Council of 5 June 2019 laying down rules on the making available on the market of EU fertilising products (“FPR” or “Fertilising Products Regulation”).

This standardization request, presented as M/564, also contributes to the Communication on “Innovating for Sustainable Growth: A Bio economy for Europe”. Working Group 4 “Other safety parameters” was created to develop a work program as part of this standardization request. Technical Committee CEN/TC 455 “Plant Biostimulants” was established to carry out the work program that will prepare a series of standards. The interest in biostimulants has increased significantly in Europe as a valuable tool to use in agriculture. Standardization was identified as having an important role in order to promote the use of biostimulants. The work of CEN/TC 455 seeks to improve the reliability of the supply chain, thereby improving the confidence of farmers, industry, and consumers in biostimulants, and will promote and support commercialisation of the European biostimulant industry.

The preparation of this document is based on a standardization request to CEN by the European Commission and the European Free Trade Association (Mandate M/564) concerning the modernization of methods of analysis of fertilizers in the framework of Regulation (EU) 2019/1009 of the European Parliament and of the Council.

Aqua regia is applied to digest different matrices for the subsequent determination of many elements. For example, a multi-matrix standard for aqua regia extraction of soils, sludges and biowaste was prepared by CEN/TC 444. A similar procedure was applied for determination of aqua regia extractable contents of arsenic, mercury, cadmium, chromium, nickel and lead in fertilizers and liming materials (standard prepared by CEN/TC 260). CEN/TC 260 also prepared a standard for extraction of a total micronutrients content in fertilizers using aqua regia. CEN/TC 223 published a standard for a similar procedure for soil improvers and growing media. Wide use of the aqua regia digestion, availability of the instruments and the possibility to merge the standards for different matrices in future, were the main reasons for also applying this method of digestion for plant biostimulants. A simple pre-concentration procedure is a part of this document to also cover the digestion of liquid samples with low dry matter content in the case that the measurement method is not sufficiently sensitive. An Annex A describes in detail the calculation of the initial sample weight to be taken for the pre-concentration step to achieve concentrations of the individual elements above the limit of quantification (LOQ).

WARNING — Persons using this document should be familiar with usual laboratory practice. This document 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 document are carried out by suitably trained staff.

1 Scope

This document specifies the method for the digestion of different plant biostimulants with aqua regia to enable a subsequent determination of arsenic (As), cadmium (Cd), copper (Cu), chromium (Cr), mercury (Hg), nickel (Ni), lead (Pb) and zinc (Zn). The method can be also applied for determination of other elements. The method is applicable for all solid and/or liquid plant biostimulants.

This document is also applicable to the blends of fertilizing products where plant biostimulants are the main part of the blend. Otherwise, the Technical Specification for the main part of the blend applies.

The extracts are suitable for analysis using CEN/TS 17701-2 (ICP-AES) and CEN/TS 17701-3 (Hg analysis).

NOTE Alternatively, inductively coupled plasma mass spectrometry (ICP-MS) can be used for the measurement if the user proves that the method gives the same results.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

3.1
digestion
mineralization of the organic matter of a sample and dissolution of its mineral part, more or less completely, when reacting with a reagent mixture

3.2
blank test solution
solution prepared in the same way as the test sample solution but omitting the test portion

4 Principle

The samples are digested by boiling in aqua regia for two hours under reflux conditions.

5 Sampling and sample preparation

Sampling and sample preparation are not part of this document. A recommended sampling and a sample preparation method is given in:

CEN/TS 17702-1, *Plant biostimulants - Sampling and sample preparation - Part 1: Sampling*;

CEN/TS 17702-2, *Plant biostimulants - Sampling and sample preparation - Part 2: Sample preparation*.