

TAIMEDE BIOSTIMULAATORID. SPETSIIFILISTE
AINETE MÄÄRAMINE. OSA 1: KUNINGVEEGA
LAHUSTAMINE AINETE HILISEMAKS MÄÄRAMISEKS

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>See Eesti standard EVS-EN 17701-1:2024 sisaldab Euroopa standardi EN 17701-1:2024 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 27.11.2024.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN 17701-1:2024 consists of the English text of the European standard EN 17701-1:2024.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 27.11.2024.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
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ICS 65.080

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EUROPEAN STANDARD

EN 17701-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2024

ICS 65.080

Supersedes CEN/TS 17701-1:2022

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

Pflanzen-Biostimulanzien - Bestimmung spezifischer
Elemente - Teil 1: Aufschluss durch Königswasser zur
anschließenden Bestimmung der Elemente

This European Standard was approved by CEN on 26 August 2024.

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.

CEN members are the national standards bodies of 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, Türkiye and United Kingdom.



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

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

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European foreword

This document (EN 17701-1:2024) has been prepared by Technical Committee CEN/TC 455 “Plant biostimulants”, the secretariat of which is held by AFNOR.

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 May 2025, and conflicting national standards shall be withdrawn at the latest by May 2025.

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 supersedes CEN/TS 17701-1:2022.

EN 17701-1:2024 includes the following significant technical changes with respect to CEN/TS 17701-1:2022:

- better explanation of the scope regarding blends;
- addition of normative references.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

EN 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 implement this European Standard: 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, Türkiye and the United Kingdom.

Introduction

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 5 June 2019 [1] laying down rules on the making available on the market of EU fertilising products (“FPR” or “Fertilising Products Regulation”).

This standardization request, presented as SR M/564 and relevant amendments, also contributes to the Communication on “Innovating for Sustainable Growth: A Bio economy for Europe”. The interest in plant 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.

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 “Environmental characterization of solid matrices” [2, 3]. 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 [4, 5, 6], for extraction of micronutrients from mineral fertilizers [7]. CEN/TC 223 “Soil improvers and growing media” published a standard for a similar procedure for soil improvers and growing media [8].

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. Annex A describes in detail the calculation of the initial sample mass 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 applicable to the blends of fertilizing products where a blend is a mix of at least two of the following component EU fertilising products categories: Fertilizers, Liming Materials, Soil Improvers, Growing Media, Inhibitors, Plant Biostimulants, and where the following category Plant Biostimulants is the highest % in the blend by mass or volume, or in the case of liquid form by dry mass. If Plant Biostimulants is not the highest % in the blend, the European Standard for the highest % of the blend applies. In case a blend of fertilizing products is composed of components in equal quantity or in case the component EU fertilising products used for the blend have identical formulations¹, the user decides which standard to apply.

The digests are suitable for analysis using EN 17701-2:2024 (ICP-AES) and EN 17701-3:2024 (Hg analysis).

NOTE Alternatively, inductively coupled plasma mass spectrometry (ICP-MS) can be used for the determination of the elements in the aqua regia digests if the user proves that the method gives the same results.

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 17702-1:2024, *Plant biostimulants — Sampling and sample preparation — Part 1: Sampling*

EN 17702-2:2024, *Plant biostimulants — Sampling and sample preparation — Part 2: Sample preparation*

3 Terms and definitions

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

ISO and IEC maintain terminology 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/>

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

¹ An example of such a blend is a product with two claimed functions consisting of a non-microbial plant biostimulant and an organic fertilizer composed of 1kg/kg of plant biostimulant from seaweed.