



BSI Standards Publication

**Organic and organo-mineral fertilizers —
Digestion by aqua regia for subsequent
determination of elements**

National foreword

This Published Document is the UK implementation of CEN/TS 17768:2022.

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.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication is not to be regarded as a British Standard.

© The British Standards Institution 2022
Published by BSI Standards Limited 2022

ISBN 978 0 539 17898 2

ICS 65.080

Compliance with a Published Document cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 July 2022.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
TECHNISCHE SPEZIFIKATION

CEN/TS 17768

April 2022

ICS 65.080

English Version

**Organic and organo-mineral fertilizers - Digestion by aqua
regia for subsequent determination of elements**

Engrais organiques et organo-minéraux - Digestion à
l'eau régale pour le dosage ultérieur des éléments

Organische und organisch-mineralische Düngemittel -
Aufschluss durch Königswasser zur anschließenden
Bestimmung der Elemente

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

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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, Turkey 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

Contents		Page
European foreword		3
Introduction		4
1	Scope	5
2	Normative references	5
3	Terms and definitions	5
4	Principle	5
5	Sampling and sample preparation	5
6	Reagents	5
7	Apparatus	5
8	Procedure	6
8.1	Sample digestion	6
8.2	Sample pre-concentration	7
8.3	Blank	7
Annex A (informative) Adjustment to different digestion procedures and measurement apparatuses		8
A.1	Adjustment of the procedure to different final volumes	8
A.2	Calculation of the sample mass	8
A.2.1	General	8
A.2.2	Calculation of the mass of the sample – dry matter	9
A.2.3	Calculation of the mass of the sample for analysis	9
A.2.4	Example	9
Bibliography		10

European foreword

This document (CEN/TS 17768:2022) has been prepared by Technical Committee CEN/TC 260 “Fertilizers and liming materials”, the secretariat of which is held by DIN.

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.

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

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". A similar procedure was applied for determination of aqua regia extractable elements according to CEN/TS 17769 and CEN/TS 17770. CEN/TC 223 "Soil improvers and growing media" 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 the future, were the main reasons for also applying this method of digestion for organic and organo-mineral fertilizers.

1 Scope

This document specifies the procedure for the digestion of different organic fertilizers and organo-mineral fertilizers with aqua regia to enable a subsequent determination of elements.

The extracts are suitable for analysis using CEN/TS 17770 and CEN/TS 17769.

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

No terms and definitions are listed in this document.

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

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

4 Principle

The samples are digested by boiling in aqua regia.

5 Sampling and sample preparation

Sampling should be performed carefully, following the principles described in EN 1482 (all parts) with appropriate adaptations, required to account for specificities of organic and organo-mineral fertilizers.

6 Reagents

All reagents should be of recognized analytical grade. The reagents and water used shall have negligible concentrations of the elements to be determined if compared to the lowest concentrations of these elements in the sample solution.

6.1 Hydrochloric acid 37 % HCl, $c(\text{HCl}) \approx 12 \text{ mol/l}$, $\rho \approx 1,18 \text{ g/ml}$.

6.2 Nitric acid 65 %, $c(\text{HNO}_3) \approx 14,3 \text{ mol/l}$, $\rho \approx 1,4 \text{ g/ml}$.

6.3 Antifoaming agent, e.g. n-dodecane ($\text{C}_{12}\text{H}_{26}$) or octanol ($\text{C}_8\text{H}_{18}\text{O}$) are suitable.

7 Apparatus

7.1 Common laboratory glassware

All glassware and plastic ware shall be adequately cleaned and stored to avoid any contamination.

7.2 Apparatus for thermal heating digestion

Temperature is controlled with reaction vessel and reflux condenser. The capacity of the reaction vessel should be at least 5 times of the volume of the aqua regia used.