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Soil quality — Dissolution for the determination of total element content —

Part 3: Dissolution with hydrofluoric, hydrochloric and nitric acids using pressurised microwave technique

Qualité du sol — Mise en solution pour la détermination des teneurs élémentaires totales —

Partie 3: Mise en solution par l'acide fluorhydrique, l'acide chlorhydrique et l'acide nitrique à l'aide de la technique de micro-ondes pressurisées

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 3, *Chemical methods and soil characteristics*.

A list of all parts in the ISO 14869 series can be found on the ISO website.

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Introduction

This document is a module for analysis of inorganic parameters in soil and soil material. This document concerns the complete dissolution for the subsequent analysis of elements.

An acid mixture based on nitric acid, hydrofluoric acid and hydrochloric acid will be used to totally dissolve most soils and similar materials. The resulting solutions can be determined separately or after combination with atomic absorption spectrometry (AAS) techniques, inductively coupled plasma optical emission spectrometry (ICP-OES) or inductively coupled plasma mass spectrometry (ICP-MS) determination methods.

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Soil quality — Dissolution for the determination of total element content —

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1 Scope

This document specifies a method for microwave-assisted dissolution of soil samples for determination of total element contents of

Al, As, Ba, Ca, Cd, Co, Cr, Cs, Cu, Fe, Hg, K, Li, Mg, Mn, Na, Ni, P, Pb, S, Se, Sb, Sr, Tl, V, Zn

using an acid mixture of nitric acid (HNO_3), hydrofluoric acid (HF) and hydrochloric acid (HCl). This method is applicable to all types of soil and soil material.

The main field of application is geological and pedological survey.

The acid mixture is suitable for total dissolution of element contents in soil (major, minor and trace), but some refractory compounds such as SiO_2, TiO_2, spinel, Al_2O_3 or other compounds may remain as a residue. In such a case, the use of alkaline fusion, following ISO 14869-2, is recommended to determine the true total element content.

NOTE 1 In environmental studies, usually, aqua regia extraction is applied using ISO 12914 or ISO 11466.

Solutions produced by the microwave method are suitable for analysis, for example, by using atomic absorption spectrometry (FAAS, HGAAS, CVAAS, GFAAS), inductively coupled plasma optical emission spectrometry (ICP-OES) and inductively coupled plasma mass spectrometry (ICP-MS).

NOTE 2 Due to the presence of chloride in the digestion solution, limitations for the application of some analytical techniques can occur.

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.

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 11074, *Soil quality — Vocabulary*

ISO 11464, *Soil quality — Pretreatment of samples for physico-chemical analysis*

ISO 11465, *Soil quality — Determination of dry matter and water content on a mass basis — Gravimetric method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11074, ISO 11464 and ISO 11465 apply.

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