

Soil quality — Extraction of trace elements from soil using ammonium nitrate solution

ICS 13.080.10

National foreword

This British Standard is the UK implementation of ISO 19730:2008.

The UK participation in its preparation was entrusted to Technical Committee EH/4, Soil quality.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2009
© BSI 2009

ISBN 978 0 580 54932 8

Amendments/corrigenda issued since publication

Date	Comments

INTERNATIONAL STANDARD

BS ISO 19730:2008

ISO
19730

First edition
2008-12-01

Soil quality — Extraction of trace elements from soil using ammonium nitrate solution

*Qualité du sol — Extraction des éléments traces du sol à l'aide d'une
solution de nitrate d'ammonium*



Reference number
ISO 19730:2008(E)
Documents
Document Sharing Hub
© ISO 2008

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2008

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Principle.....	1
4 Reagents.....	1
5 Apparatus	2
6 Procedure	2
6.1 Sample preparation	2
6.2 Determining water content	2
6.3 Extraction	3
6.4 Phase separation	3
6.5 Stabilization of extract	3
6.6 Blank test.....	3
7 Calculation	3
8 Expression of results	4
9 Test report.....	4
Annex A (informative) Information on method of determining selected elements and treatment of particular types of soil	5
Annex B (informative) Precision	6
Annex C (informative) Notes on homogenization, initial sample mass and extraction	8
Bibliography	9

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 19730 was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 3, *Chemical methods and soil characteristics*.

Introduction

0.1 General

The displacement of trace elements in soil cannot be described solely in terms of their solubility in water, since solid and dissolved compounds interact with one another in a large number of processes. Processes that proceed in one direction (e.g. weathering, mineralization) are accompanied by equilibrium reactions between solid and dissolved forms (e.g. adsorption/desorption, precipitation/dissolution).

Factors that determine whether substances dissolve include the pH value, the redox potential, the concentration of ions in a soil solution and its complexing agent content, all of which result in the soil solution varying with location and time.

To be able to compare increases in easily soluble trace element concentrations in soil by a standardized method, soil extraction with ammonium nitrate is used, which is applicable to all those compounds of elements in a soil that may contribute to the concentration of dissolved elements under the prevailing site conditions (water-soluble compounds, exchangeably bound ions, readily soluble metal complexes).

Extraction with ammonium nitrate solution fulfils the criteria to be satisfied by an extractant for routine analyses.

- a) It can be applied to a wide spectrum of soils and elements in a wide concentration range.
- b) Disposal of the spent ammonium nitrate solution is environmentally friendly.
- c) The determination of the elements in the solution has low susceptibility to interference.

The concentrations of elements in extracts obtained with other unbuffered salt solutions (such as calcium chloride or sodium nitrate solution) often correlate well with those in ammonium nitrate extracts, but the absolute concentrations are different and, at some sites, there may be concentrations deviating substantially from average values. In addition, critical concentrations may be in the region of the limit of determination in the case of some extraction methods.

In conjunction with extraction methods for determining the reserves of elements in soil (e.g. extraction with aqua regia), the proportions by mass determined by extraction with ammonium nitrate solution can serve as a basis for site investigations and for making recommendations with regard to use and restoration of soil containing critical concentrations of elements.

0.2 Prediction of impact

0.2.1 General

The concentrations determined by extraction with ammonium nitrate solution only provide an indication of the effects of trace elements, since it is necessary also to consider numerous site factors and sometimes the amounts of elements present in the soil in order to predict impact. Thus, designations such as “biologically available”, “available to plants” or “components capable of migration” are not appropriate.

In soil that is sometimes poorly aerated (e.g. water-logged soil), variations in the redox potential need to be considered when assessing the potential of arsenic and manganese to migrate.