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Soil quality — Determination of redox potential — Field method

Qualité du sol — Détermination du potentiel d'oxydoréduction — Méthode de terrain

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Foreword

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

This second edition cancels and replaces the first edition (ISO 11271:2002), of which it constitutes a minor revision. The changes are as follows:

— update of normative references;

— update of bibliography;

— editorially revised.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The redox potential is a physico-chemical parameter used to characterize soil aeration status in a global way. Under field conditions, it gives information on the condition of oxidation or reduction of those compounds which, according to cases, play an important part in plant nutrition, can induce toxicity phenomena or intervene in gas transfers to the atmosphere (greenhouse effect). It can also be used to a certain extent to follow soil performances in case of sludge disposal or composting, and to adjust applications accordingly. Under laboratory conditions it can be used in order to study oxygen diffusion phenomena to aggregate level.

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Soil quality — Determination of redox potential — Field method

1 Scope

This document specifies a field method for the determination of soil redox potential (E_h).

NOTE The electrochemical measurement of redox potential described in this document is possible only if the relevant soil horizon has a moisture status defined as fresh or wetter according to the classes presented in Annex D.

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.

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
redox potential (E_h)
electrochemical potential reflecting the oxidation-reduction status of a liquid chemical system (in this case of the soil solution)

4 Principle

Redox potential is an electrochemical equivalent of the free energy of redox reactions, and for an equilibrated single redox system of the general form:

$$A_{ox} + ne^- + mH^+ \geq A_{red} \quad (1)$$

is given by the Nernst equation:

$$E_h = E^0 + \frac{RT}{nF} \ln \frac{A_{ox}}{A_{Red}} - \frac{2{,}303\, mRT}{nF}\, pH \quad (2)$$

where

A_{ox} and A_{Red} are the activities of the oxidized and reduced forms of the element, respectively;

e^- refers to the electron(s) involved in the reaction;

H^+ refers to the proton(s) involved in the reaction;

n and m are the numbers of electrons and protons involved in the reaction, respectively;

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