International Standard

ISO 18187

Soil quality — Contact test for solid samples using the dehydrogenase activity of *Arthrobacter globiformis*

Qualité du sol — Essai contact pour échantillons solides utilisant l'activité déshydrogénase de Arthrobacter globiformis

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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 document 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 of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 4, *Biological characterization*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 444, *Environmental characterization of solid matrices,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 18187:2016), which has been technically revised.

The main changes are as follows:

— the scope was amended to include the possibility of applying the contact assay for testing the effect of chemicals (as detailed in Annex C);

— further details regarding other potential interfering factors (for the testing of plastic and low-density waste materials) on the performance of the contact assay were addressed, and adequate methodological alternatives were suggested to reduce uncertainties in the assay outcome;

— validity criteria were updated to include the range of dehydrogenase activity inhibitions expected under three other reference substances (i.e. copper sulfate (II) pentahydrate, 3,5-dichlorophenol, zinc sulfate heptahydrate) that are spiked into quartz sand and used as alternative positive controls in the quality testing of waste materials;

— in Clause B.4, genome sequencing is proposed to confirm the identity of *Arthrobacter globiformis*, instead of microbiological identification strips which are no longer recommended.

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

This document describes the miniaturized solid contact assay with *Arthrobacter globiformis* that allows the preliminary assessment of solid material (i.e. soil and waste materials) within 6 h. The principle of the assay relies on dehydrogenase activity inhibition of an added test organism, caused by bioavailable toxic substances in soil and waste samples. This is an ecologically relevant assay as far as it uses a ubiquitous soil bacterial species with high affinity to surfaces [1][2] whose dehydrogenases are involved in different biological mechanisms withstanding bacteria integrity (e.g. respiratory chains). Moreover, it has been noticed that this parameter (dehydrogenase activity inhibition) is quite sensitive to different toxic substances.[3][4][5][6][7]

Overall, this assay is non-labour-intensive, rapid, cost-effective and sensitive, providing results that improve the physical and chemical assessment of natural samples while allowing a quick indication of their biological effects.

The miniaturized solid contact assay is based on the solid contact assay established by Reference [8].

This document is also based on Reference [9].

The results of an interlaboratory trial towards the evaluation of test variability to assess different waste and soil samples, as well as chemicals, are presented in Annex A and in Reference [10].

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Soil quality — Contact test for solid samples using the dehydrogenase activity of *Arthrobacter globiformis*

1 Scope

This document specifies a rapid method for assessing solid samples in an aerobic suspension, by determining the inhibition of dehydrogenase activity of *Arthrobacter globiformis* using the redox dye resazurin.

It is applicable for assessing the effect of water-soluble and solid matter bounded non-volatile contaminants in natural samples, such as soils and waste materials. Although not the main purpose, the contact test can additionally be used for testing the effect of chemicals, as described in the Annex C. The test yields a result within 6 h and can therefore be used for screening potentially contaminated test material.

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 5667-15, *Water quality — Sampling — Part 15: Guidance on the preservation and handling of sludge and sediment samples*

ISO 18400-206, *Soil quality — Sampling — Part 206: Collection, handling and storage of soil under aerobic conditions for the assessment of microbiological processes, biomass and diversity in the laboratory*

CEN/TR 15310-1, *Characterization of waste — Sampling of waste materials — Part 1: Guidance on selection and application of criteria for sampling under various conditions*

EN 14735, *Characterization of waste — Preparation of waste samples for ecotoxicity tests*

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
contact time
exposure period of the bacteria to a suspension of solid matter

3.2
negative control
sample of a *control substrate* (3.6) with a mixture of known solutions [distilled water, *medium* (3.13) B or *inoculum* (3.12)]

Note 1 to entry: It is used to standardize the analysis.

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