SLOVENSKI STANDARD
oSIST prEN ISO 10634:2017

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Kakovost vode - Navodilo za pripravo in obdelavo v vodi slabo topnih organskih spojin za nadaljnje vrednotenje njihove biorazgradljivosti v vodi (ISO/DIS 10634: 2017)

Water quality - Guidance for the preparation and treatment of poorly water-soluble organic compounds for the subsequent evaluation of their biodegradability in an aqueous medium (ISO/DIS 10634: 2017)

Wasserbeschaffenheit - Anleitung für die Vorbereitung und Behandlung von in Wasser schwer löslichen organischen Verbindungen für die nachfolgende Bestimmung ihrer biologischen Abbaubarkeit in einem wäßrigen Medium

Qualité de l'eau - Lignes directrices pour la préparation et le traitement des composés organiques peu solubles dans l'eau en vue de l'évaluation de leur biodégradabilité en milieu aqueux (ISO/DIS 10634:2017)

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Water quality — Guidance for the preparation and treatment of poorly water-soluble organic compounds for the subsequent evaluation of their biodegradability in an aqueous medium

Qualité de l'eau — Lignes directrices pour la préparation et le traitement des composés organiques peu solubles dans l'eau en vue de l'évaluation de leur biodégradabilité en milieu aqueux

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 147, *Water quality*, Subcommittee SC 5, *Biological methods*.

This second edition cancels and replaces the first (ISO 10634:1995), which has been technically revised.

Introduction

The standardizing work carried out by ISO/TC 147/SC 5 has shown that the development of a single method for evaluating the biodegradability of organic compounds with a low solubility in water (i.e. < 100 mg.l^{-1} (References[1],[2] and[3]) may not be envisaged in the immediate future. In fact, the selection of the most suitable working method to obtain a satisfactory emulsion or dispersion of these compounds in the test media depends particularly on their physicochemical properties. Consequently, the selection of the most suitable method has to be left to the judgement of laboratories responsible for the tests based on their experience and the product information supplied by the applicant. For this reason, this document describes various techniques for treating poorly water soluble organic compounds before they are investigated for biodegradability tests. The objective is to reach a stage where, for any given technique, the same working method is used by all laboratories, thus making it easier to compare results. Specificities of the selected protocol should be kept in mind for the evaluation and interpretation of the results of the biodegradation test.

The techniques described in this document will not necessarily produce the same biodegradability results of the test compound if they are used in parallel. The use of solvents and dispersing or emulsifying techniques may be additional sources of uncertainty and may lead to test results which differ from those obtained without using these techniques. Furthermore, dispersions or emulsions may be produced which would not exist as such in nature. It is recommended to perform biodegradability tests with the direct addition of a test compound and using dispersion techniques in parallel because activity of inoculum used should be comparable. The presence of microorganisms with potential to degrade the test substance is assumed to be identical. The composition and activity might change when the tests are conducted subsequently.

According to current standards for testing the biodegradability, only pure or compounds containing a low amount of impurities should be tested. Biodegradability tests are not recommended for heterogeneous mixture or multicomponent substances as the results of such tests are difficult to interpret especially when the degradation is partial. Moreover, the use of solvents and dispersion techniques may lead to unrepresentative heterogeneous distributions and to misleading test results in the subsequent biodegradability tests.

Water quality — Guidance for the preparation and treatment of poorly water-soluble organic compounds for the subsequent evaluation of their biodegradability in an aqueous medium

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

IMPORTANT — It is absolutely essential that tests conducted in accordance with this document be carried out by suitably qualified staff

1 Scope

This document specifies techniques for preparing poorly water-soluble organic compounds (i.e. liquid and solid substances) with a solubility in water of less than approximately 100 $mg.l^{-1}$ and introducing them into test vessels for a subsequent biodegradability test in an aqueous medium using standard methods.

The subsequent tests on biodegradability are primarily methods using the analysis of the released carbon dioxide described in ISO 9439 and the determination of the oxygen described in ISO 9408 and following the usual precautions for ISO 10707. Thus, one can notice that the methods measuring the removal of DOC are not appropriate.

This document does not specify the biodegradation test methods; it is restricted to describing the techniques for introducing the test compounds into the test medium and to keep them in a dispersed state (Reference[4]). These techniques are implemented while observing the experimental conditions described in the standardized methods for evaluating biodegradability. It should be noted that volatile compounds may not be tested by the carbon dioxide method specified in ISO 9439.

Users should be aware that some of the preparation methods described in this document might not be accepted by regulators for concluding on the ready biodegradability of tested compounds.

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 9408, *Water quality — Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium by determination of oxygen demand in a closed respirometer*

ISO 9439, *Water quality — Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium — Carbon dioxide evolution test*

ISO 10707, *Water quality — Evaluation in an aqueous medium of the "ultimate" aerobic biodegradability of organic compounds — Method by analysis of biochemical oxygen demand (closed bottle test)*

ISO 14442, *Water quality — Guidelines for algal growth inhibition tests with poorly soluble materials, volatile compounds, metals and waste water*

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 http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

4 Presentation of suitable preparation and analytical methods

4.1 Preparation methods

In this document several techniques for introducing the test compounds into the test medium are described. The preparation methods are the following:

— direct addition: this technique is recommended for poorly soluble compounds instead of the preparation of a stock solution;

— ultrasonic dispersion: this technique may be applied to non-volatile liquid and solid compounds;

— adsorption or weighing on an inert support;

— dispersion or solubilization with additive;

— combination of methods listed above.

NOTE Regarding combination of methods, it would be preferable to run the techniques individually in parallel (i.e. simultaneously by the same method and with the same inoculum) to gain insight into whether one technique is dominant or whether both are contributing to enhance bioavailability and biodegradation.

4.2 Analytical methods

The test compound concentration is calculated as described in ISO 9439, ISO 9408 and ISO 10707.

When the test compound is introduced directly or on an inert support in the test vessel, it is not necessary to confirm the tested concentration.

When the preparation method used a stock solution of the tested compound, it is necessary to confirm the concentration tested. For this purpose:

— a specific analytical method is required if the support or additive is an organic chemical (for example: surfactant);

— the total organic carbon (TOC) analysis is acceptable if the support or additive is an inorganic compound (for example: silica gel) or if an homogeneous dispersion is obtained by physical treatment (example: ultrasonic treatment).

5 Direct addition and addition with inert support

5.1 General

It is recommended to perform biodegradability tests, with the direct addition of a test compound and using dispersion techniques in parallel because activity of inoculum used should be comparable. The presence of microorganisms with potential to degrade the test substance is assumed to be identical.

The test compound is weighed and directly introduced into the test vessels or weighed onto an inert support and introduced into the test vessels which are subjected to continuous agitation.

