



NSAI
Standards

Standard Recommendation
S.R. CEN ISO/TR 15462:2009

Water quality - Selection of tests for biodegradability (ISO/TR 15462:2006)

S.R. CEN ISO/TR 15462:2009

Incorporating amendments/corrigenda issued since publication:

<i>This document replaces:</i>	<i>This document is based on:</i> CEN ISO/TR 15462:2009	<i>Published:</i>
This document was published under the authority of the NSAI and comes into effect on: 27 November, 2009		ICS number: 13.060.70
NSAI 1 Swift Square, Northwood, Santry Dublin 9	T +353 1 807 3800 F +353 1 807 3838 E standards@nsai.ie W NSAI.ie	Sales: T +353 1 857 6730 F +353 1 857 6729 W standards.ie
Údarás um Chaighdeáin Náisiúnta na hÉireann		

S.R. CEN ISO/TR 15462:2009

TECHNICAL REPORT

CEN ISO/TR 15462

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

November 2009

ICS 13.060.70

English Version

**Water quality - Selection of tests for biodegradability (ISO/TR
15462:2006)**

Qualité de l'eau - Sélection d'essais de biodégradabilité
(ISO/TR 15462:2006)

Wasserbeschaffenheit - Auswahl von Prüfverfahren für die
biologische Abbaubarkeit (ISO/TR 15462:2006)

This Technical Report was approved by CEN on 14 May 2009. It has been drawn up by the Technical Committee CEN/TC 230.

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Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

The text of ISO/TR 15462:2006 has been prepared by Technical Committee ISO/TC 147 “Water quality” of the International Organization for Standardization (ISO) and has been taken over as CEN ISO/TR 15462:2009 by Technical Committee CEN/TC 230 “Water analysis” the secretariat of which is held by DIN.

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The text of ISO/TR 15462:2006 has been approved by CEN as a CEN ISO/TR 15462:2009 without any modification.

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S.R. CEN ISO/TR 15462:2009

TECHNICAL REPORT

ISO/TR 15462

Second edition
2006-05-15

Water quality — Selection of tests for biodegradability

Qualité de l'eau — Sélection d'essais de biodégradabilité



Reference number
ISO/TR 15462:2006(E)

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
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Published in Switzerland

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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.

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.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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ISO/TR 15462 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 5, *Biological methods*.

This second edition cancels and replaces the first edition (ISO/TR 15462:1997), which has been technically revised.

Introduction

The biodegradation of substances and wastewater ingredients depends not only on the molecular structures of the test material, but also on important additional factors, such as the

- aquatic or terrestrial test environments;
- aerobic or anaerobic test conditions;
- source and concentration of the microorganisms of the inoculum;
- acclimatization and adaptation of the inoculum;
- concentration of the test material;
- presence of other organic substrate;
- possible toxic effects of the test material under the test conditions;
- physical and chemical properties and bioavailability of the test material (e.g. volatility, water solubility, adsorption on surfaces);
- physical and chemical properties of the test system (e.g. volume of test mixture and test vessels, CO₂ removal and oxygen concentration, temperature);
- test conditions (e.g. mixing, shaking, mode of aeration, batch or dynamic, closed or open test vessels);
- test duration;
- analytical parameters used (sum parameters, such as DOC, BOD, CO₂ or substance specific analysis).

As so many factors can influence the test results, it is not possible to define a “true” or “reference” method. The reproducibility of the test results using different methods or conditions or even using identical test methods can be low and differing test results can be obtained. Usually, a test material, which is either easily or poorly biodegradable, will produce similar test results in replicates and on repetition. Substances, which are partly or moderately biodegradable and need special consortia of bacteria or long adaptation periods, will often produce disparate results.

The biodegradation tests listed in this Technical Report are designed to determine the biodegradability of chemical substances or wastewaters under standardized conditions. The test results are required to predict the biodegradation behaviour of the test materials in natural or technical aquatic environments, for example, in rivers, lakes, ponds, sea, wastewater treatment plants, digesters. To improve their predictive value, the test methods should simulate, to a certain degree, such environments. As the conditions in these environments are often very different, sometimes even diametrically opposed, the standard methods reflect these differences. Therefore, it is necessary to provide a sufficient number of different standardized test methods to allow the choice of the best one for a specific purpose.

Water quality — Selection of tests for biodegradability

1 Scope

This Technical Report gives an overview of biodegradation tests for the aquatic environment standardized by ISO and provides recommendations on their use. In Annex A, the biodegradation guidelines for the aquatic medium of the OECD are included, because these methods are sometimes identical to ISO standards or are useful supplements. In addition, inhibitory tests with bacteria and mixed bacterial inocula are included in this Technical Report because a possible toxicity on the inoculum is important information for the choice and performance of biodegradation tests. It is very helpful to determine bacteria toxicity in advance using the same inoculum as the planned biodegradation test before starting biodegradation testing.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

activated sludge

biomass and inert matter produced in the aerobic treatment of wastewater by the growth of bacteria and other microorganisms in the presence of dissolved oxygen

2.2

biochemical oxygen demand

BOD

mass concentration of dissolved oxygen consumed under specified conditions by the aerobic biological oxidation of a chemical compound or organic matter in water

NOTE For the purpose of this Technical Report, it is expressed as milligrams of oxygen uptake per milligram or gram of test compound.

2.3

biodegradation phase

time from the end of the lag phase of a test until about 90 % of the maximum level of biodegradation has been reached

NOTE It is expressed in days.

2.4

biogas

carbon dioxide and methane produced by anaerobic bacteria

2.5

chemical oxygen demand

COD

mass concentration of oxygen equivalent to the amount of a specified oxidant consumed by a chemical compound or organic matter when a water sample is treated with that oxidant under defined conditions

NOTE It is expressed as milligrams oxygen uptake per milligram or gram test compound.

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