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## Water quality — Selection of tests for biodegradability

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



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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is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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/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.

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## 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, CO<sub>2</sub> 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, CO<sub>2</sub> 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.