
**Water quality — Determination of
biochemical oxygen demand after n days
(BOD _{n}) —**

**Part 2:
Method for undiluted samples**

*Qualité de l'eau — Détermination de la demande biochimique en
oxygène après n jours (DBO _{n}) —*

Partie 2: Méthode pour échantillons non dilués



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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.

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 5815-2 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*.

This first edition of ISO 5815-2, together with ISO 5815-1, cancels and replaces ISO 5815:1989, which has been technically revised.

ISO 5815 consists of the following parts, under the general title *Water quality — Determination of biochemical oxygen demand after n days (BOD_n)*:

- *Part 1: Dilution and seeding method with allythiourea addition*
- *Part 2: Method for undiluted samples*

ISO 5815-2 is the equivalent of European Standard EN 1899-2.

Introduction

This part of ISO 5815 is intended for analysis of biochemical oxygen demand (BOD) in waters with a BOD in the range 0,5 mg/l to 6 mg/l of oxygen.

The times of incubation specified in this part of ISO 5815 are 5 days, as in ISO 5815:1989 and as applied in many European countries, or 7 days, as applied in several Nordic countries for many years. The 7-day incubation typically gives higher BOD results than the 5-day incubation.

With an incubation period of 5 days, weekend work can only be avoided if samples are collected Wednesdays, Thursdays or Fridays. With an incubation period of 7 days, samples collected on the first five weekdays can be analysed without implying weekend work. For this reason, a 7-day incubation period can be considered more convenient than the conventional 5-day incubation.

A new, modified 7-day incubation period is described in Annex A. Early investigations indicate that BOD results obtained by this modified method are identical to results obtained by the 5-day method described in the main text of this part of ISO 5815. It is hoped that more comparative data on these two incubation methods will be obtained during the coming years, so that the modified 7-day incubation method can be included fully at the time of review and revision of this part of ISO 5815.

For the determination of BOD_n of water samples, the respirometric method described in ISO 9408 may also be used.

In this part of ISO 5815, the limit of determination, D_L , is defined as

$$D_L = t_{0,95(f)} \cdot 2 \cdot s_B \cdot \sqrt{1 + \frac{1}{n}} \quad (1)$$

where

s_B is the within-series standard deviation;

$t_{0,95(f)}$ is the Student t -value;

f is the degrees of freedom for the determination of s_B ;

n is the number of analyses for determination of the blank in an analytical series;

s_B is calculated from determinations of real samples with a BOD content near the estimated D_L .

In cases where the analytical method does not require any blank correction, the term

$$\sqrt{1 + \frac{1}{n}} \quad (2)$$

is omitted.

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Water quality — Determination of biochemical oxygen demand after n days (BOD_n) —

Part 2: Method for undiluted samples

WARNING — Persons using this part of ISO 5815 should be familiar with normal laboratory practice. This part of ISO 5815 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.

1 Scope

This part of ISO 5815 specifies determination of the biochemical oxygen demand (BOD) of waters of undiluted samples. It is applicable to all waters having biochemical oxygen demands greater than or equal to 0,5 mg/l of oxygen (the limit of determination) and not exceeding 6 mg/l of oxygen.

The results obtained are the product of a combination of biochemical and chemical reactions. They do not have the rigorous and unambiguous character of those resulting from, for example, a single, well-defined, chemical process. Nevertheless, they provide an indication from which the quality of waters can be estimated.

The test can be influenced by the presence of various substances. Those which are toxic to microorganisms, for example bactericides, toxic metals or free chlorine, inhibit biochemical oxidation. The presence of algae or nitrifying microorganisms can produce artificially high results. In these situations a modification of the method may be necessary.

Annex A describes alternative incubation periods.

Annex B describes procedures for modification of the method by addition of seeding material, salts, inhibition of nitrification by allylthiourea (ATU) addition, neutralization, homogenization and/or filtration. These modifications may be found necessary for specific evaluations of the water quality of receiving waters.

Annex C provides precision data.

2 Normative references

The following referenced documents are indispensable for the application 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 3696:1987, *Water for analytical laboratory use — Specification and test methods*

ISO 5813:1983, *Water quality — Determination of dissolved oxygen — Iodometric method*

ISO 5814:1990, *Water quality — Determination of dissolved oxygen — Electrochemical probe method*