

INTERNATIONAL STANDARD

ISO
7827

Second edition
1994-09-15

Water quality — Evaluation in an aqueous medium of the “ultimate” aerobic biodegradability of organic compounds — Method by analysis of dissolved organic carbon (DOC)

*Qualité de l'eau — Évaluation en milieu aqueux de la biodégradabilité
aérobie «ultime» des composés organiques — Méthode par analyse du
carbone organique dissous (COD)*



Reference number
ISO 7827:1994(E)

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.

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.

International Standard ISO 7827 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 7827:1984), which has been technically revised.

Annex A of this International Standard is for information only.

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International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland
Printed in Switzerland

Water quality — Evaluation in an aqueous medium of the “ultimate” aerobic biodegradability of organic compounds — Method by analysis of dissolved organic carbon (DOC)

WARNING — Safety precautions — Activated sludge and sewage may contain potentially pathogenic organisms. Therefore appropriate precautions should be taken when handling them. Toxic test compounds and those whose properties are unknown should be handled with care.

1 Scope

This International Standard specifies a method for the evaluation of the “ultimate” biodegradability of organic compounds at a given concentration by aerobic microorganisms.

The conditions described in this International Standard do not necessarily always correspond to the optimal conditions allowing the maximum degree of biodegradation to occur.

The method applies to organic compounds which are

- soluble at the concentration used under the conditions of the test (10 mg/l to 40 mg/l DOC);
- non-volatile, or having a negligible vapour pressure under the conditions of the test (see note 5 in 8.3);
- not significantly adsorbable on glass and activated sludge (see note 6 in 8.3);
- not inhibitory to the test microorganisms at the concentration chosen for the test. Inhibitory effects can be determined as described in 8.3, or by using any other method for determining the inhibitory effect on bacteria of a substance (e.g. ISO 8192).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 8192:1986, *Water quality — Test for inhibition of oxygen consumption by activated sludge*.

ISO 8245:1987, *Water quality — Guidelines for the determination of total organic carbon (TOC)*.

ISO 9408:1991, *Water quality — Evaluation in an aqueous medium of the “ultimate” aerobic biodegradability of organic compounds — Method by determining the oxygen demand in a closed respirometer*.

ISO 9439:1990, *Water quality — Evaluation in an aqueous medium of the “ultimate” aerobic biodegradability of organic compounds — Method by analysis of released carbon dioxide*.

ISO 9887:1992, *Water quality — Evaluation of the aerobic biodegradability of organic compounds in an*

aqueous medium — Semi-continuous activated sludge method (SCAS).

ISO 9888:1991, *Water quality — Evaluation of the aerobic biodegradability of organic compounds in an aqueous medium — Static test (Zahn-Wellens method).*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 “ultimate” biodegradation: The level of degradation achieved when the test compound is totally utilized by microorganisms resulting in the production of carbon dioxide, water, mineral salts and new microbial cellular constituent (biomass).

3.2 primary biodegradation: The level of degradation achieved when the test compound undergoes any structural change, other than mineralization, as the result of microbial action.

3.3 concentration of suspended solids (of an activated sludge): The amount of solids obtained by filtration or centrifugation of a known volume of sludge under specified conditions and drying at 105 °C at constant weight.

4 Principle

Determination of the biodegradation of organic compounds by aerobic microorganisms using a test medium. The organic compound is the sole source of carbon and energy in the medium. The concentration of the compounds used is such that the initial concentration of organic carbon in the medium is between 10 mg/l and 40 mg/l.

If necessary, concentrations greater than 40 mg/l may be used.

Measurement of the dissolved organic carbon (DOC) at the start (day 0) and the end of the test (day 28 or longer if necessary) and at least at three regular, intermediate time intervals.

Determination of the percentage removal of DOC at each of these intervals. Evaluation of the biodegradability of the compounds used on the basis of these data.

Specific analysis may give additional information on primary biodegradation.

5 Test environment

Incubation shall take place in the dark or in diffused light in an enclosure which is maintained at 20 °C to 25 °C and which is free from vapours that are toxic to microorganisms.

6 Reagents

Use only reagents of recognized analytical grade.

6.1 Distilled or deionized water, containing less than 10 % of the initial DOC content introduced by the compound to be tested.

6.2 Test medium

6.2.1 Composition

6.2.1.1 Solution a)

Anhydrous potassium dihydrogenphosphate (KH_2PO_4)	8,5 g
Anhydrous dipotassium hydrogenphosphate (K_2HPO_4)	21,75 g
Disodium hydrogenphosphate dihydrate ($\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$)	33,4 g
Ammonium chloride (NH_4Cl)	0,5 g
Water (6.1), quantity necessary to make up to	1 000 ml

NOTE 1 The correct composition of the medium is checked by the measurement of the pH-value, which should be 7,4.

6.2.1.2 Solution b)

Dissolve 22,5 g of magnesium sulfate heptahydrate ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$) in 1 000 ml of the water (6.1).

6.2.1.3 Solution c)

Dissolve 27,5 g of anhydrous calcium chloride (CaCl_2) in 1 000 ml of the water (6.1).

6.2.1.4 Solution d)

Dissolve 0,25 g of iron(III) chloride hexahydrate ($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$) in 1 000 ml of the water (6.1). Prepare the solution freshly just before use.

NOTE 2 It is not necessary to prepare this solution just before use if a drop of concentrated hydrochloric acid (HCl) or 0,4 g/l of ethylenediaminetetraacetic acid (EDTA) is added.